THE   INCIDENCE   OF   INCOME   TAXES.

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T H E S I S

PRESENTED FOR DEGREE Ph. D.,

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Part I.

THE OLDER THEORY OF THE INCIDENCE OF A GENERAL INCOME TAX.

Chapter I

Chapter II

the INCIDENCE of

Chapter III

Part II

THE INCIDENCE of PARTIAL INCOME TAXES

Chapter IV

Chapter V

Chapter VI

Chapter VII

Part III

THE INCIDENCE OF a GENERAL INCOME TAX

Chapter VIII

Chapter IX

Chapter X

Chapter XI

Chapter XII

Chapter XIII

Chapter XIV

Part IV

ADDITIONAL PROBLEMS

Chapter XV

Chapter XVI

Chapter XVII

Chapter XVIII

PART I.

The Older Theory of the Incidence of a General Income Tax.

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CHAPTER I.

Introductory.

For a considerable period it has been held by economists that the incidence of a general income tax is not shifted, and that such a tax has no tendency to raise or otherwise alter the prices of commodities. The most careful formulation of this theory, which, for convenience, I refer to as the older theory, can be found in the writings of Professor Seligman[*] and Mr. Coates,[1] and the same view of the matter was for the most part adopted by the Colwyn Committee on National Debt and Taxation which made its Report in 1927.

In December of 1927 however, a very important article by Mr. D.H. Robertson appeared,[2] which made it plain that the arguments on which the economists had relied to show that the incidence of a general income tax is not shifted, were erroneous. The whole matter was seen to require further investigation.

The following two Chapters of Part I of this book outline the older theory of the incidence of a general income tax and go on to criticise this theory. When it has been made clear that the older theory is no longer tenable, instead

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[*] E.R.A. Seligman, "Income Taxes and the Price Level", in his Studies in Public Finance, p.59 and republished as Appendix XII in Appendices to the Report of the (Colwyn) Committee on National Debt and Taxation.

1. W.G. Coates, "Memorandum on the Incidence of the Income Tax", Appendix XI, in the same volume of appendices.

2. D.H. Robertson, "The Colwyn Committee, the Income Tax and the Price Level", Economic Journal, 1927.

of proceeding direct to a reconstruction of this theory we deal in Part II with the incidence of partial income taxes. This is partly on account of the interest and importance of such taxes in themselves and partly because an insight into the nature of these taxes seems likely to be helpful to an understanding of the incidence of a general income tax.

In Part III the problem of the incidence of a general income tax is again taken up: to construct a theory of the incidence of a general income tax is the main object of this book. Part IV goes on to supplement Part III and deals with a number of related questions.

Parts I, II and III can be read independently of one another; and if the student chooses he may omit reading Part I or Part II: or else, if his interest be mainly in the incidence of partial income taxes, he may read Part II alone, Part IV should only be read after Part III.

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C H A P T E R II.
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The Three Arguments of the Older Economic Theory of the Incidence of a General Income Tax.*
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1. Down to 1927 it was generally held by economists that the incidence of a tax on income is not shifted but remains where it has been placed. Such a tax, they believed, leaves the prices of commodities and the rewards of the factors of production, at the same levels as it had found them. The only difference introduced into the situation by the tax, according to this theory, is that each person hands over a portion of his income to the government for its uses, instead of using it on his own account.

The theory that the economists had put forward can be summarized as follows, in such a way as to show the relationship between its different parts. There are three arguments in the theory :-

(i) An income tax that has been imposed leaves each producer still a producer in the industry in which he had been to begin with.

(ii) The number of firms in each industry remains constant.

(iii) Each firm places the same quantity of goods on the market as it had done to begin with.

Hence, the theory concludes, the total supply of each commodity is unchanged by the tax. Therefore the price of each commodity is unchanged.

Let us state each of the arguments of this theory in turn: afterwards we go on to examine and criticize them.

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* The present chapter is much indebted to D. H. Robertson, art. cit., Economic Journal, 1927; to Cabiati's "Per riempire alcune 'empty boxes' finanziarie", Giornale degli Economisti 1928; and to Fubini's "Sull' influenza dell' imposta sulla domanda a sull' offerta", Giornale degli Economisti, 1929.

(i) The first argument, as the economists who use it are careful to point out, only applies to the case of a general income tax, which is imposed on all branches of industry. When a general tax of this kind is imposed it will not pay any industrialist to transfer his business from one branch of industry to another: because he could not escape the tax by doing so. Suppose that the entrepreneur's income in his present branch is **R**; and that after payment of the income tax he is left with 80% of **R**. Then 80% of R will still be a greater net income than it is open to him to obtain in any other branch. He will therefore remain in the same branch as he had been in initially. Thus the tax sets up no tendency to a transfer of resources between the different portions of the industrial field. It leaves each producer still a producer in that industry in which it had found him to begin with.

(ii) The Marginal Firm or No-Profits Firm argument is stated by Seligman as follows: "...the question is how the marginal producer, the producer at the margin is affected .. A tax on income is a tax on net profits; and net profits are not cost but the surplus over cost. A tax on profits cannot reach the man at the margin who makes no profits. But the man at the margin who makes no profits . . pays no tax because he makes no profits . . . If the man at the margin who at any time fixes the entire supply of the commodities that is sold in the market pays no tax, how can the income tax be added to the price ? The tax on profits is paid only by the man who makes profits, that is by the intra-marginal producer, not by the marginal producer. But the tax paid by the intra-marginal producer cannot affect the price which is paid by the marginal producer who pays no tax."[*]

[*] Seligman, art. cit ., Appendices to the Colwyn Report, p. 121.

The skeleton of this argument would be:

Price is determined by the marginal or no-profits firm.

This firm makes no profits and therefore pays no income tax. Since _it_ pays no income tax, _its_ position is unaffected by the tax. Price therefore is unaffected by the tax.

That is, although a general income tax be imposed it will leave the price structure unaffected.

(iii) The Marginal Unit argument of this theory completes the proof. As well as there being a marginal or price-determining firm, these theorists hold, there is for each firm, a marginal or price-determining unit of production. This marginal unit for any firm is the last unit of production that the firm is just induced and no more to place on the market. Sir Walter Layton states the argument briefly and effectively thus: "If we consider any firm, he says, "production under competition continues up to that point where the last unit produced makes no contribution towards profit and therefore nothing towards the revenue of the State. This is the unit of production which determines prices, which should therefore be unaffected by a tax on those units which yield some profit. On the same reasoning the amount of output should remain unchanged."*

The argument can be illustrated very simply by the curve of marginal costs MC in the diagram. If the firm is producing in a competitive market, the price of the commodity remains unchanged whether the firm increases or reduces its output: price therefore can be shown by a horizontal straight line.

Diagram I.

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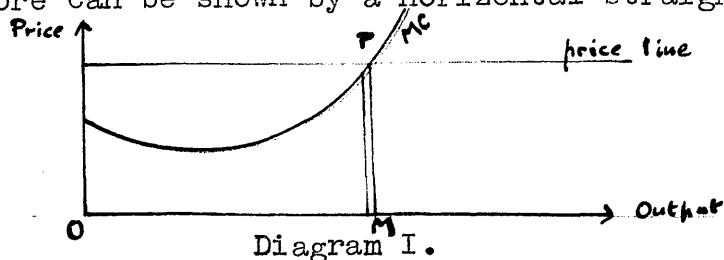
* Minutes of Evidence taken before the (Colwyn) Committee on National Debt and Taxation, p.177, § 11.

The producer, it is known from economic theory, will in these circumstances continue production just up to the point at which marginal cost is equal to price, and no further. If he were to produce beyond M he would incur a loss on the extra units that he produced: if he were to produce less than OM units he would forego a gain on the units he had refrained from producing. The OMth unit that he produces, fetches a return shown by the area of the very thin rectangle in the diagram. The cost of production of this unit is given by the same area. This unit just covers its cost of production and no more. It yields the producer no profit over and above its cost of production. The producer makes no payment of income tax on account of this unit, since he makes no profit from it. Hence the production of this unit is left unaffected by the income tax; the OMth unit will continue to be produced after the tax as it had been before it. But if the OMth unit is produced the firm's output must be unchanged, because the firm had initially produced OM units of output.

Thus the economic theory which we outline seeks to establish that when a general income tax is imposed, there will be no interchange of resources between the different branches of industry, that the number of firms in each branch will remain unchanged, and that the output of each one of these firms will likewise be unchanged. If the logic of these arguments be correct, then the theory holds itself to have established that commodity and factorial prices will be left unaltered by the tax. But are the arguments of the theory valid ? That is what we now go on to discuss.

2. (i) The first argument of the theory we are describing holds that since the whole of the economic field is taxed, each manufacturer will continue in the same line of production as before. An assumption underlying this argument is that the

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gross income of each person in the new situation, i.e., his
income before he pays the income tax, remains the same as it
had been initially.   Let us to begin with grant this assumption
Even then the conclusion that the argument purports to arrive
at will not follow.   There will still be some transference
of resources from one part of the field to another.   One
requirement that must be fulfilled in order that a condition
of ·equilibrium should exist is that the "net advantages"
offered to a person by his occupation, should be the highest
on his scale of preferences that it is open to him to attain,
when not only the monetary reward of the occupation, but also
the social esteem, leisure etc., attaching to it are counted
among its "net advantages".   The income tax reduced only one
form of the net advantages of different occupations, the mone-
tary advantage.   Consequently a person who was formerly
hovering in choice between two occupations, one whose net
advantages are largely monetary and another whose advantages
are largely non-monetary, and so not taxed, may now tend to
favour more strongly the class of occupation affording its net
advantages more largely in the non-monetary form.   Or even, as
can be shown,* it is possible that the individual will, in these
circumstances, be brought by the income tax, from a state of
indifference in choice, to a decision favouring the occupa-
tion which will afford him the larger monetary income.
Again a person of certain psychological tastes may be led to
retire earlier from business as a result of an income tax
which swallows up part of the earnings that he makes: the
effort may then seem to him not worth while. Yet the same
tax may induce another man to extend his business life over a
longer period until he makes that accumulation of capital on
which he had set his mind.

    Changes and shifts of economic resources we know that

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* See Chapter XI infra.

there would be, even though we were to grant the assumption
that the gross earnings of the factors of production would be
left unaffected by the tax. The direction of the changes we
do not here need to enquire into. It is sufficient for our
purpose to establish the fact of changes. Thus even granting
the assumption most favourable to it, the contention of the
first argument of the older economic theory of the income
tax would not be true.

A more obvious set of causes exists, which makes the
event differ further from what this argument contends it would
be. If we look at the matter from the side of demand, those
taxpayers who have handed over a portion of their income to
the Government, are now in possession of a smaller sum of
money to spread over their saving and consumption. For this
reason their demands for consumption goods, and also for pro-
duction or capital goods, will undergo alteration. Moreover
the government of the country has now come into possession of
a larger spending power; the goods that are dominantly con-
sumed by governments will be in greater demand. Corresponding
to this altered structure of demand in the community, there
will be a transference of resources between different branches
of industry. As a result of this an intricate system of
changes in the rewards of the factors of production will take
place - the very thing that had been assumed away by the first
argument of the older theory.

Thus we see that the first argument of the theory that
we are examining must be regarded as erroneous: the con-
clusions it drew did not follow from the premises: and then
~~even~~ these premises themselves had been unsuited to discussion
of the case.

(ii) The argument of the older theory that relates to the
no-profits firm falls under the same judgment. It collects
together into itself a number of erroneous statements. The
marginal firm of economic theory is not, as this argument
alleges, a no-profits firm. The marginal firm is, it is true,

a firm that is just undecided as to whether or not it should
continue/its present line of production: a slight increase
  in
in the favourable factors would determine it to continue.
The profits of the firm at the moment, and in the short run,
however, are by no means decisive in determining whether or
not a firm is at the margin.   The marginal firm may, at the
moment or in the short run, be earning no profits; but it may
also be a firm which is earning large profits; or perhaps
even large negative profits, that is, be making a considerable
loss.   The case last mentioned might, e.g. occur, where a
firm was newly established and expecting for some time yet
to suffer losses, as part of a process of building up a
business connection.   Only, in this case the firm would
look forward to a period in the future at which it expected to
recoup these losses out of profits it would make, once it
had become fully established.   Indeed, when the upholders
of the argument that we examine pointed to one set of firms,
and affirmed that because at the moment their profits or
their losses were of a certain amount, therefore such and
such was the case -- when they did this they were running
counter to a fundamental tenet of economic theory, viz.,
that the facts of the past, even of the immediate past do
not in themselves matter, ("byegones are forever byegones"):
they have no significance except in so far as they are a guide
to future expectations.   It is in terms of expectations that
our theory should reason.

The position of false eminence to which in some writings
the no-profits firm had been raised, grew out of a misunder-
standing of Marshallian doctrine; and it was a misunder-
standing which at the time was very widespread.   Marshall,
however, had never depicted the marginal firm as being the
no-profits firm.   He had intended his doctrine of the
margin, when used to trace price and production changes through

time, to be taken in conjunction with his doctrine of the "representative firm", a conception totally different from that of the no-profits firm. "Our representative firm", said Marshall, "must be one which has had a fairly long life, and fair success, which is managed with normal ability, and which has normal access to the economies, external and internal, which belong to that aggregate volume of production; account being taken of the class of goods produced, the conditions of marketing them and the economic environment generally."*

Among the costs which were covered by a representative firm were 'interest and insurance on all the capital', and "the gross earnings of management (including insurance against loss), of those who superintend the risks, who engineer and superintend the working.[1]

Moreover Marshall would have disliked saying that the margin determines price: he would have preferred to consider the relationship as one in which the margin, like price, was itself governed by the general relations of demand and supply:[2] and in long period supply price he would have included the costs mentioned above.

(iii) The third argument, that of the marginal unit, gives a correct definition of what is meant by the marginal unit. This argument could be stated in its correct form as follows:

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* Marshall, Principles of Economics, p.317; and Robertson
    art. cit., p.568.

1. Marshall op. cit., p.343. The point is well illustrated
    by Marshall's discussion of a tax on printing presses,
    op. cit., p.415.
        A discussion of the nature of the representative firm
    and its place in Marshallian doctrine can be found in
    the following: Robertson art. cit., Economic Journal 1927;
    Robertson, Shove and Sraffa, "Increasing Returns and the
    Representative Firm: a Symposium," Economic Journal, 1930.
    Robbins, "The Representative Firm", Economic Journal,
    1928; and Davenport, The Economics of Alfred Marshall,
    p.359, et seq.

2. Marshall, Ibid., p.410.

if demand remains unchanged, (i.e. all demand curves in the
system remain unchanged), and if all factorial prices remain
unchanged, then the unit of output that had been the marginal
unit before the tax will continue to be the marginal unit after
the tax has been imposed.   Let us illustrate and prove that
this is so by means of a diagram:
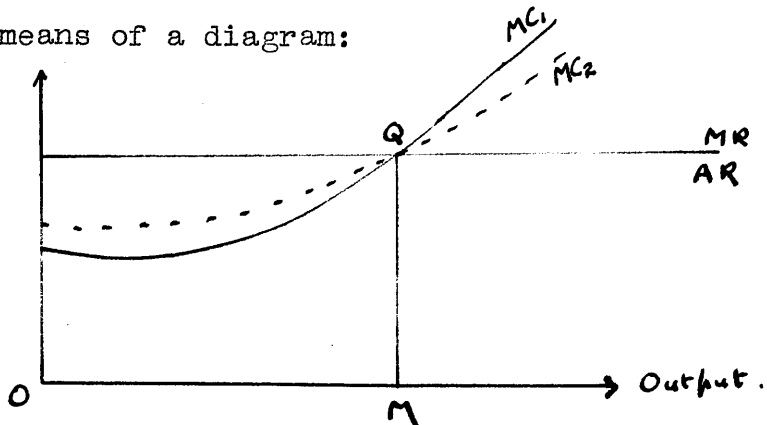
Diagram II.

We draw MC_1 the curve of marginal costs for a firm selling
its commodity in a competitive market; the average and margin-
al revenue for the firm will be the horizontal co-incident
lines AR and MR in the diagram. If there were no tax the OM^{th}
unit, corresponding to the point of intersection of MC_1 and MR,
would be the marginal unit: for this unit marginal revenue
and marginal cost to the firm are equal.   The firm's output,
were there no tax, would be OM.

After the tax the new curve of marginal costs must be of
the shape MC_2 shown: because the income tax absorbs a portion
of the profit from each unit of output sold.   On the OM^{5h}
unit of output sold there is no profit. Hence the new curve
of marginal costs MC_2, still cuts the curve of marginal revenue
in the point Q, corresponding to the output OM.   The firm
therefore, will still market OM units as before.

An hypothesis on which this conclusion depends is that
the supply curve of each factor of production remains unalter-
ed in shape.   This is equivalent to supposing that, despite
the tax, the factors are willing to accept the same gross
rewards as before for the same services as before, even though
they have now to pay to the government out of these gross

rewards certain sums by way of income tax. An assumption of this kind is very far-reaching indeed. But, and here is the point, so far as practical application of the argument is concerned, there is no reason to believe that in actual life the supply curves of the factors of production remain unaltered in shape when a change takes place in the height of the tax. Indeed, as we go on to show there is reason to believe the contrary. Let us suppose that a general income tax has been imposed. It is then no solution of the problem to state what would have happened had it been the case that the supply curves of the factors had remained unaltered, when in fact, as we show later, they will have altered. What the solution of the problem does require is that we should find out the changes in the shapes of the supply curves of the factors of production that accompany a given alteration in the tax. From the side of supply the shape of the curve of marginal costs to a firm is a function of the height of the tax. It will alter in a determinate way when the tax alters.

So also from the side of demand; the shape of the curve of marginal revenue of a firm is a function of the height of the tax.

What the argument that we have examined proves -- and it is in this third argument that the kernel of truth of the older theory is to be found -- is that if we know the shape of the curves of average and marginal revenue for a firm in the new situation, and also the shape of its curves of cost - excluding - tax in the new situation, we already know, without taking the tax into any further account, what price and output for the firm will be, (and since for each firm hence also for the industry). The influence of the income tax on the situation is already sufficiently taken into account when we have determined the alteration that it induces in the shape of the demand and cost curves in the new situation. This theorem must be borne in mind by the reader throughout the whole of the subsequent discussion.

The truth of this theorem can be seen by reference to
diagram III. Suppose that, after the tax has been imposed,
the curve of marginal revenue and curve of marginal cost, when
cost is reckoned so as to exclude income tax, for any firm,
become MR and MC respectively. The diagram again presupposes
perfect competition in the industry so that the curve MR is
shown as a horizontal straight line. An output of ON units
would equate marginal revenue to marginal cost, if the tax
were to be disregarded.
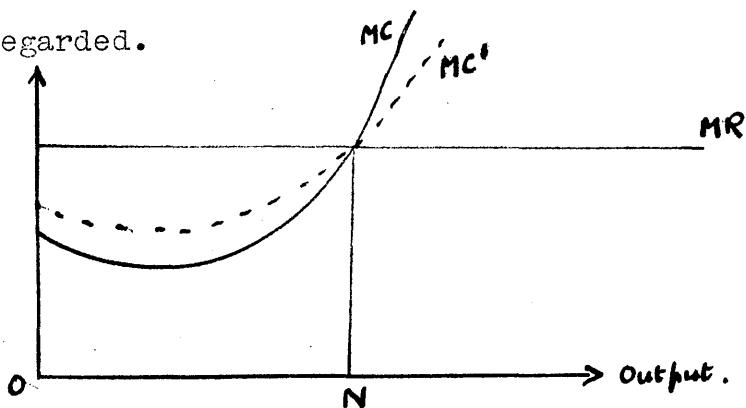
Diagram III.

When the income tax that has been imposed is taken into
account the new curve of marginal cost to the firm, when cost
is reckoned so as to include the tax payment by the firm,
becomes MC'. The tax absorbs a portion of the profit from
each unit of output that is sold, so that the shape of the
curve MC is as shown. The ON^{th} unit of output yields no
profit: the curves MC, MC therefore coincide at a point cor-
responding to an output of ON units. And an output of ON units
still equates marginal revenue for the firm to its marginal
cost, when the tax is taken into account in its cost reckoning.
Hence if, in the following pages, we can find the influence of
a general income tax on the shape of the marginal revenue and
marginal cost curves for the different lines of industry, this
will be sufficient to determine the effects produced by the tax
on prices and outputs. No additional allowance need be made for
the part played in costs of the general income tax itself.
The tax only affects price and output implicitly by causing an
alteration in the shapes of the curves of revenue and of cost
- excluding - tax.

CHAPTER III.

The Discussion of the Colwyn Report on the Incidence of the British Income Tax.*

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1. A cardinal point in the Colwyn Committee's treatment
of the incidence of the income tax is the meaning that the
Committee gives to the word Incidence. The Committee ex-
plains its use of the term thus. 'It adopts the meaning given
to the term by economists,' it says, 'and this meaning is fairly
narrow.' "For them (the economists) "incidence" is only con-
cerned with the question on whom the more immediate burden
of the tax as a tax rests. This is the first thing to be
decided about any tax. It is to be distinguished from the
question of further effects, which may be exceedingly important."[1]
Now the suggestion of the phrase "more immediate burden of the
tax" is that it is a trial immediary that the Committee has in
mind. The Committee's meaning turns out to be otherwise, how-
ever, for the passage continued: "For instance the burden of
a tax may rest upon an employer, and in consequence he may cut
down his staff; in such a case the effects of the tax may be
more serious to the employees than to anyone else, but the
incidence of the tax is not said to be upon them."[2] Thus it
seems to be not an immediary in regard to time, but an imme-
diary in regard to persons, that the Committee has in mind in
its distinction between the Incidence and the Effects of a tax.

What exactly the import of such a distinction is, I cannot
pretend to say. After trying to fit several meanings to the
terms Incidence and Effects as used later in its Report how-

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* The Report of the (Colwyn) Committee on National Debt
  and Taxation, 1927, pp. 106-169.

1. Ibid., p. 106, § 288.

2. Ibid., p. 106, § 288. See also p.119, § 325.

ever, I have come to the conclusion that the meaning of the
Committee in its use of the terms is essentially as follows:
When factorial supplies are taken to be given then the Com-
mittee refers to the consequences of the income tax as its
Incidence. When factorial supplies are taken to be variable
the consequences of the income tax as regards price are said
to be its Effects. *

    Although this expresses the central core of meaning of
the Committee, it can be said without any doubt, firstly that
this usage of the word Incidence does not correspond to the
usual meaning given to the term in the writings of economists
Economic discussions of the incidence of taxes recognise that
factorial prices may change as a result of the tax.[1] Secondly
a more important defect of the use made of the term is that
although this is the central core of meaning it appears to be
giving to the word Incidence, the Committee is not itself
fully aware of this. As a result, the argument and the import
both of the section of the Report dealing with Incidence, are
lacking in clarity.

    2. It is possible that some people are prefer to place a
time interpretation on the definitions of Incidence and
Effects that we have quoted from the Report: it may appear
to them that by Incidence the Committee means the price

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* In regard to this interpretation of Incidence, Cf. Ibid.,
  § 308 and the corresponding footnote, §295, §§ 310-314,
  especially "Let it . . same § 311, and § 314; and in
  regard to Effects, Cf. Ibid., § 440-451. For the remainder
  of this chapter when the words Incidence and Effects are
  used in the meaning of the Colwyn Committee, they are
  printed with capital letters.

1. For example Cf. Marshall, Principles, pp. 414-5.

consequences brought about by the tax after the lapse of a short period of time, and by Effects, the consequences after a long period of time.

This interpretation however would leave the _Report_ open to the same criticisms as before. The Incidence of a tax has not been taken by economists to refer to its short period consequences. The Classical School of economists meant by incidence, the price consequences produced by the tax after the lapse of the long period. Marshall and Edgeworth used a time analysis in which incidence referred to effects produced by the tax either after the long period of time or after short periods of given length.* But a number of passages in the Report make it appear very improbable that a time distinction of this kind is intended between the Incidence and the Effects of a tax. The previous interpretation appears the more probable, whereby Incidence refers to the consequences produced by the tax when the supply schedule of each factor of production can be taken to remain unaltered in position.

3. The Committee states its conclusions in regard to Incidence and Effects of the tax thus :

" We conclude that the broad economic argument is true over practically the whole field and for practically the whole of the time, any exceptions to it being local or temporary and insufficient to invalidate it."[1]

Then as regards Effects: "We have seen that, with unimportant exceptions, the Income Tax is not passed directly into the price of goods and services. Whether prices are indirectly affected is another question, depending on the total effect of the tax on saving and enterprise. Saving and enterprise are undoubtedly diminished to same extent . . . So far as the Income Tax, operating in these ways, has any tendency to reduce the

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* Cf. _infra_, Chapter   §

1. _Report_, p.119. § 324.

volume of production, it must also have a tendency to increase prices . . . It appears to us that over the whole field its influence has been of little relative importance."[2]

In its discussion leading up to the establishing of these conclusions the main advance in analysis made by the Report, and it was an important one, had been to show the necessity for considering the time variations in the supply of labour, of capital and of enterprise caused by the tax. The Committee's discussion of savings in Great Britain, of the reserves of joint stock companies and of the time variation in the supply of labour and enterprise was particularly illuminating. To have done this in the face of the dogmatism of the economists, was no small achievement.

Still, in the important points of methodology relating to the meaning of the word incidence and as to the taking into account the expenditure of the tax proceeds, the Committee's Report was inadequate and unsatisfactory. In more than one place the Report essays to take into account the expenditure of the resources raised by the tax. But nowhere does it envisage the important movements towards redistribution of the national income that are in fact carried out in this way, and the effects on demand schedules and consequently on the prices of goods: the increased demand for battleships and for roads that the government is enabled to make by an increase in the rate of tax, the increased demands for food and clothes and houseroom made by the poorer sections when purchasing power is diverted away from the rich is only vaguely hinted at.[3] For example had the Committee been more aware of the factor in the situation, changing demand schedules then its analysis

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2. Ibid, p.164. § 438.

3. The treatment of the expenditure of the tax proceeds given by the Colwyn Committee is discussed later in Chapter   , §

and conclusions regarding the "Incidence" of the tax --
taking this in the sense intended by the Committee -- must
have been very different. It goes without saying that its
analysis of the "Effects" of the tax also would have been
different.

4. The task with which we ourselves are confronted in
thisbook is a different one from that which confronted the
Colwyn Committee. The object of the Committee was to enquire
into the effects of the income tax and other taxes in Great
Britain at the date at which it sat. Our object is to make a
theoretical investigation of any income tax in a closed market.
Our disquisition therefore will be purely theoretical and
there should be room in it for the variety of all possible
sets of circumstances that are compatible with the initial
assumptions that we make. Whether the tax be in Great Britain
or in Haiti so far as we are concerned, should be irrelevant.
If, as sometimes we do, we use statistics that are drawn from
the case of Great Britain, it will merely be in order to make
a point clearer and not because the statistics in question
have any particular relevance to the investigation.

In Part III of the book we consider the effects of a
general income tax. Before doing so we proceed in Part II
to analysis of the case of some partial income taxes.

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P A R T   II.

The Incidence of Partial Income Taxes.

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C H A P T E R IV.

A Tax on the Income of a Monopolist.

1. Let us consider the case of a person who has a monopoly
in the manufacture of an article, and let a tax be imposed on
his income. We suppose that the monopolist is confronted
with a perfectly definite demand schedule for his commodity,
and that he knows the shape of it in the neighbourhood of the
point of equilibrium; also the shape of his cost curve in the
neighbourhood of the point of equilibrium.

In this paragraph let us consider the case where the
~~supply of the~~ private factors[*] of the monopolist are in fixed
supply to the business concerned.

If the tax imposed be a proportional one then very simple
reasoning shows that price will remain unchanged. He had fixed
price before the tax so as to get the maximum possible reward.
Let the tax be one of 20%. If he leaves price unaltered his
net reward will be 80% of the maximum gross reward. But this
is greater than 80% of any other reward. By leaving price
unaltered therefore, the monopolist will get the greatest
reward that it is open to him to achieve. Hence in the case
considered, a proportional tax has no effect on either the
price or output of the monopolist.

Next, let us suppose that the tax that has been imposed,
is not proportional, but is progressive in amount. In diagram
I let AR and MR be the average and marginal revenue curves
respectively, to the monopolist, and let AC_1 and MC_1 be his
curves of average and marginal costs before the tax.

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[*] This terminology is used by J.R. Hicks, in "Annual
Survey of Economic Theory: Theory of Monopoly",
Econometrica, 1935.
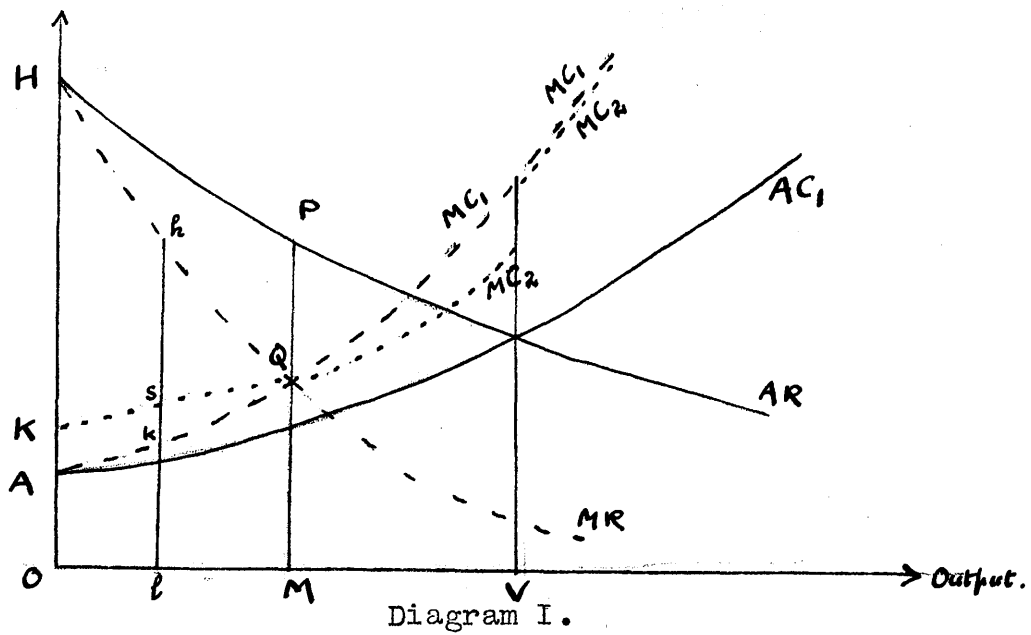
Diagram I.

Over the range O to V curve MC_1 is drawn as — — — —
and MC_2 as - - - - - .   In the range beyond V both curves
are coincident.

In order to maximize the revenue to his private factors
he will fix output at the level OM given by the intersection
of the marginal revenue and marginal cost curves.   The price
corresponding to this output is PM.

In the diagram the Ol^{th} increment of output is shown
as affording a return kh to the monopolist.   Of this return
the tax absorbs a portion ks.   This occurs for the revenue
from each unit of output and the curve of marginal costs to
the monopolist becomes displaced into the position MC_2. Since
for the OMth unit of unit, marginal cost had been equal to
marginal revenue, the monopolist had gained no return on this ·
unit.   He therefore will pay no income tax on it, and the
curve MC_2 will intersect the curve MC_1 in the point Q.   Thus
the curve of marginal costs for the monopolist after the tax
has been imposed, will still intersect the curve of marginal
revenue MR, in the point Q.   An output OM therefore, will
still maximize the revenue to the monopolist's private
factors.   The corresponding price remains unchanged at PM.
Price and output are the same for the monopolist after the
tax as they had been before it.

Hence we see that when the private factors of a monopolist
are in fixed supply, a tax on his income leaves the price

and output of his commodity unchanged. In the diagram
the net revenue of the monopolist before the tax had been
equal to area AQH. After the tax his net revenue is KQH.
The exchequer has absorbed an amount of revenue AQK.[*]

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[*] A case not envisaged in the above is discussed at some
length by Amoroso, viz. where the marginal rate of the tax
becomes sufficiently high as to absorb the whole of the
monopolist's profit from each unit of output. In this
case there will be an equilibrium output to the left of
the point M in the diagram and also, as can be seen from
considerations of symmetry, an equilibrium output to the
right of M. He may choose either of these two points of
equilibrium. Cf. Amoroso, Lezioni di Economia Matematica,
p.226 et seq.

The case that we have treated and also the case discussed
by Amoroso, are both covered by the following mathematical
proof.

Let the monopolist's total revenue from an output of X
units by R (x) and his total cost be C (x)

The reward to the monopolistic factors, which are in
fixed supply, is

$$(I (x) = R (x) - C (x)$$

Denote the total tax payment, which is a function of I,
by T (I). T is also a function of x so that we can write
it T (x).

Before the imposition of the tax the monopolist maximizes
I. In order that equilibrium should exist, it is required
that

$$\frac{d R}{d x} = \frac{d C}{d x} \qquad (1).$$

with the corresponding condition for differentials of the
second order, for a maximum.

After the imposition of the tax the monopolist maximizes his
net revenue I (x) - T (x) The necessary condition for
equilibrium therefore is that

$$\frac{d I}{d x} - \frac{d T}{d x} = 0.$$

i.e. $$\frac{d I}{d x} - \frac{d T}{d I} \frac{d I}{d x} = 0.$$

$$\frac{d I}{d x} \left\} 1 - \frac{d T}{d I} \right\} = 0. \qquad (2)$$

In equation (2) there are two factors: it is sufficient
that either of them should be equated to zero.

If $$\frac{d T}{d I} = 1$$

then $$\frac{d T}{d x} = \frac{d I}{d x}$$

(contd)

3.

2. The supply of the monopolist's private factors to this line of production however, may not be fixed. To see what is meant let us suppose to begin with that the nature of the industry is were such that the monopolist's private factors have to be applied either all-in-a-lump, or not at all. An instance of this might be where the monopolist had to superintend a process for 10 hours a day, say, or not at all.

In this case the net reward to the monopolist's private factors is equal to area K Q N after the tax instead of A Q N as initially. This net return to his private factors now, may have fallen below the return that they could get in some other part of the industrial field. If so he will withdraw entirely from the original line of production. The monopoly goods will no longer be manufactured.

The more general case however, is that in which the monopolist can vary the supply of his private factors, labour and capital, as between the production of the monopolized commodity and other commodities. This is also the more important case for practice. Let us illustrate it by a diagram.

Footnote continued from page 3:

This is the case discussed by Amoroso, in which the marginal rate of imposition of the tax becomes sufficiently great to absorb the total profit from each unit of output. The curve MC_2 in Diagram I, would intersect MR to the left, and again to the right, of the point Q.

In the text we do not envisage a marginal rate of taxation of over 100%, such as this would require, as being possible. Hence, for equilibrium in the case there discussed, it must be the other factor $\frac{dI}{dx}$ that is equated to zero. This gives

$$\frac{dR}{dx} = \frac{dC}{dx} \quad \ldots \quad (3)$$

which is the same as equation (1). Therefore in this case output and price are the same after the tax as before it.
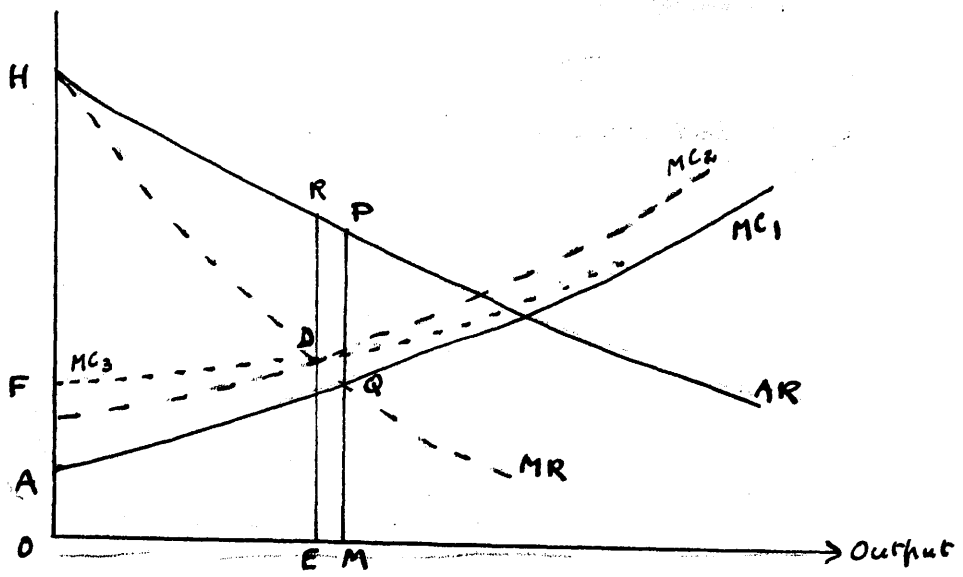
Diagram II.

The curve MC_2 is drawn as — — — — — , the curve MC_3 as $\cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot$.

The curves A R and MR in diagram II, are the curves of average and marginal revenue respectively to the monopolist: MC_1 is the curve of marginal costs to him before the tax is imposed. Now, however, the monopolist's private factors are in variable supply to the production of this commodity, e.g. he may be able to withdraw certain of his labour factors from this line of output and place them in others. Again he may be able to devote his capital either to this or to other lines of business. We take it that it is the whole of the monopolist's revenue from this line of production, that is taxed.

When he is drawing up his schedule of costs of production for his business the monopolist must take into account the cost of his own labour and capital. Each unit of these he will charge to the firm at the figure that the unit would fetch in the most profitable other use open to it. In the case of his labour if the 7th unit of it, say, that he exerts per day, could fetch in its most profitable other use a sum of seven shillings, then he will charge this unit of labour in the cost schedule of the monopoly, at seven shillings. In the case of capital his system of costing will be the same. If e.g. the normal rate of interest be

5.

4%, then he will always charge his capital to the monopoly at this rate.

Since the cost curve MC_1 includes payments to the monopolist's private factors in this way, it is not possible to read off from the diagram what his total revenue is before the tax is imposed. He gets the return that his factors would yield him if employed in their most fabourable uses outside the business; and as well he gets a surplus return over and above this, equal to A Q H. His output before the tax is O M, at a price, P M.

When the tax is imposed the curve of marginal costs $M C_1$, to the monopolist, will undergo two separate and independent displacements. In the first instance the cost that he charges to each unit of labour and each unit of capital that he devotes to the business, must be raised. Suppose, for example, that the tax be one of 10%. Then 10% of the return that he gets on the 7th unit of his labour will be absorbed by the tax. He had formerly charged this unit of labour, in his costing, at seven shillings to the firm. Before his reckoning will be complete, he will now have to charge the unit to the firm after the tax at $7 \left(1 + \frac{10}{100} \right)$ shillings, that is at seven shillings, 8.4 pence. Similarly each £100 of capital that he employs in this line of production he will now have to charge to the firm at $4\left(1 + \frac{10}{100} \right)$%, that is at 4.4%. Because he has now to incur an additional cost on behalf of each unit of labour or capital that he devotes to this line of production -- a cost taking the form of an additional tax payment on the return that he gets from the unit.

In this way the monopolist's curve of marginal costs $M C_1$ is made to undergo an upward displacement into the position $M C_2$ as shown. Since the costs incurred in the production of the O Mth unit of output have increased, the new curve of marginal costs $M C_2$ will not pass through the

point Q, but will lie above it.   Every point on the
curve in fact must undergo a vertical displacement.

As well, the tax absorbs a portion of each increment
of monopoly surplus that accrues to the producer -- this
being the revenue from his factors when employed in their
monopoly use, over and above what they would fetch in their
most favourable outside employment.   The effect of this is
to alter the position of the curve of marginal costs M C_2
into the position M C_3.   If, after the previous displacement
of the curve into the position M C_2, it had intersected the
curve of marginal revenue at the point D, corresponding to
an output O E, then since the monopoly surplus from the
O Eth unit is zero, no tax is paid on the zero surplus
corresponding to this unit, and the curve M C_3 will also
intersect the curve of marginal revenue in the same point D.

In this case the producer's output, given by the point
of intersection of his curve of marginal costs M C_3, with
that of marginal revenue, will be O E instead of O M as
initially.   O E is always less than O M.   His output will
have contracted and the price of the commodity will no
longer be P M, but the higher amount R E.[*]

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[*] Using the same terminology as in footnote p. 24   supra,
   the monopolist's costs are now a function both of output
   and the height of the Tax: so that we may write total
   costs now as C(x, T)
      The monopolist's gross reward
         I = R (x) - C (x, T)

   If P be net reward after payment of the tax,

      P = I - T

        = R (x) - C (x, T) - T

   His net reward is a maximum if

   $$\frac{d P}{d x} = 0 = \frac{d I}{d x} - \frac{d T}{d x}$$

   $$= \frac{d I}{d x} - \frac{d T}{d I} \frac{d I}{d x}$$

   $$= \frac{d I}{d x} \left\{ 1 - \frac{d T}{d I} \right\}$$

Footnote contd.

The extent of the resultant contraction in output and rise in price, depends on the amount of the vertical displacement that has taken place between the initial and the new position of the curve of marginal costs. It depends also on the slope of the demand and cost curves of the firm. The more gentle the slope of the demand curve, i.e., the more elastic is the demand, the greater will be the falling off in output. If the monopoly operates under conditions of falling costs, then the steeper the slope of the curve of marginal costs, the greater will the contraction in output be. If the monopoly works under increasing costs of production, the more gentle the slope of the curve of marginal costs, the greater will be the contraction in output. The truth of these statements can be shewn by drawing the appropriate diagrams.

(Contd. of footnote from previous page)

i.e. if either of the factors in this equation is zero

$$\frac{d\,T}{d\,I} = 1$$

only if the marginal rate of tax is 100%

If $\frac{d\,I}{d\,x} = 0$

then $\frac{d\,R}{d\,x} = \left\{ \frac{\partial C}{\partial x} + \frac{\partial C}{\partial T}\,\frac{d\,T}{d\,I}\,\frac{d\,I}{d\,x} \right\}$ .. (4)

The value of x, say x_2, satisfying equation (4) is less than the value of x, say x_1 satisfying equation (3) on p. 25 supra: because the curve of $\frac{d\,R}{d\,x}$ has a negative gradient; and the two curves $y = \frac{dC}{dx}$ and $y = \frac{\partial C}{\partial x} + \frac{\partial C}{\partial T}$.

$$\frac{d\,T}{d\,I}\,\frac{d\,I}{d\,x}$$

have each got either a positive gradient or else a negative gradient greater than that of $y = \frac{d\,R}{d\,x}$: and for every value of x less than x_1, the

curve $y = \frac{\partial C}{\partial x} + \frac{\partial C}{\partial T}\,\frac{d\,T}{d\,I}\,\frac{d\,I}{d\,x}$

lies above the curve $y = \frac{d\,C}{d\,x}$.

3. In the case where uncertainty exists the above treatment needs modification. The monopolist's reward will then be in the nature of profit. Corresponding to each price that he may fix there will be for him an expected schedule of profits, no one size of gain being certain, but each different size of gain having a certain probability of occurrence.* Corresponding to the price p_A, before the
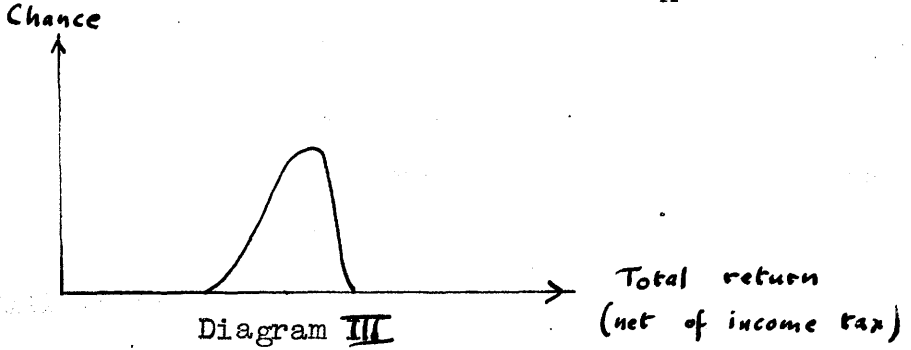
Diagram III

Uncertainty Schedule for price p_A
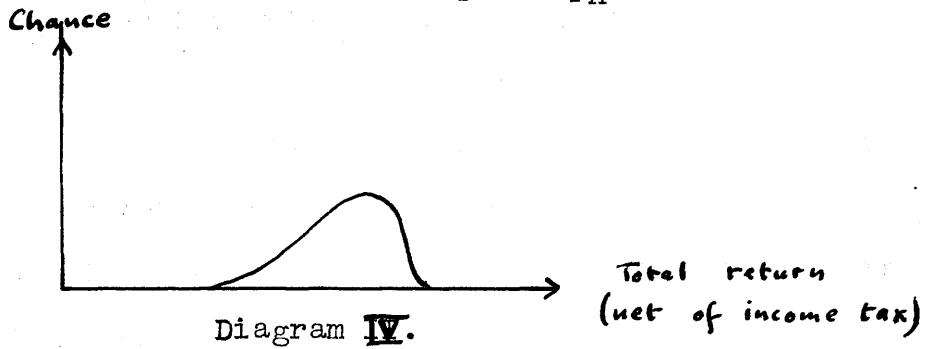
Diagram IV.

Uncertainty schedule for price p_B

tax, the probability schedule of gains is, let us suppose, as in diagram I; and the probability schedule corresponding to price p_B, as in diagram II. Price p_A may be either higher or lower than price p_B.

Let us consider the case where the private factors of the monopolist are in fixed supply to the firm. Without the tax the monopolist would, let us suppose, have chosen price p_A. The effect of the tax is to absorb a portion of

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* Cf. J.R. Hicks, "The Theory of Uncertainty and Profit", Economica, 1931.

whatever size of gain accrues. Thus the tax alters the
shape of each **probability** schedule, Although without the
tax the monopolist would prefer the schedule corresponding
to price p_A, it is quite possible that when the tax alters
the shape of each schedule of net gains, he will prefer the
new schedule corresponding to price p_B, rather than that
corresponding to price p_A. In this case therefore, even
though the private factors of the monopolist are in fixed
supply to the business, the imposition of the tax will
cause a change to take place in price. It is not possible
to say whether the effect of the tax will be to cause a
rise or a fall in price. Sometimes it will be the one,
sometimes the other.

Likewise, when the private factors of the monopolist
are in variable supply to the business, the presence of
uncertainty when the tax is imposed, will ~~act as~~ create a further
tendency towards price change. Whether the effect will
be towards a raising or a lowering of price, however, it is
not possible to say.

*****

C H A P T E R V.

The Incidence of an Income Tax on the Diamond

Monopoly in South Africa.

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1.   The romantic story of the discovery of diamonds in
South Africa is well known.   Exploitation of the diamond fields
had begun just before 1870.   By the early 1890's, due to the
forceful personality of Cecil Rhodes, most of the diamond
producing companies had entered into agreement to restrict
the output of diamonds, so as to maintain their prices.*
From that date till the early 1920's, nearly the whole of the
world's annual supply of diamonds came from South Africa.   In
the early 1920's however, the monopoly of these companies
began to be encroached upon; and before the end of the decade
their monopoly had definitely been lost; many new sources of
production had come into operation.

Diamonds are a luxury article; and it had frequently
been shown in the history of the industry that the demand
for them was very rigid.   No doubt the benefit derived by
the South African producers from their monopoly, while it
lasted, had been very great.

For a considerable time extending down to the present
day, the diamond-mining companies of South Africa have been
subjected to a higher rate of tax than the other companies
in the Union: (gold-mining companies are excluded in this
statement: Cf. Chapter 7 infra.)   The extent of the differen-
tial taxation of the diamond-mining companies has varied in
height at different times.[1]   Let us enquire into the economic

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* A Plant, "Economic Development, 1795-1921" in The Cambridge
   History of the British Empire, Vol.VIII, South Africa,
   pp. 773-7.

1. M.H. de Kock, An Analysis of the Finances of the Union
   of South Africa, devotes a chapter to the history of
   mining taxation in the Union.

effects that such taxation would have produced in the diamond-mining industry over the long period, had the industry retained its world monopoly of production.

For the sake of definiteness let us enquire what economic effects would have been produced in the monopolistic diamond industry by a tax on income 2½% higher than that on other industries.

2. The land owned by the diamond-mining industry was of little or no use for other lines of production. The quantity of diamond-bearing land therefore, was fixed in supply downwards to the industry: it would not fall below the existing level even though the rent payment for it were to diminish. Nor was the quantity of diamond-bearing land that the industry owned amenable to increase. Hence the quantity of diamond-bearing land owned by the monopoly was fixed in supply; and that land was purely a rent-factor.

The diamond industry formed only a small portion of the total industry of South Africa. Over the long period therefore, one would expect that both labour and materials to it would be in perfectly elastic supply: and that in the short period the elasticity of supply of both these factors would be less than perfect.

Capital we will also regard as being in perfectly elastic supply to the industry.*

Diamond-mining is concerned with the working out of an exhaustible resource. We consider the process as if it were continuous and concerned with the working of an inexhaustible resource.[1]

We are going to suppose also that in the initial and final state of the industry no uncertainty exists. Actually, of course, in the diamond industry uncertainty does exist. The assumption that we make that no uncertainty exists will

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* Cf. the discussion of the elasticity of supply of capital to the gold-mining industry, p. 56-7 infra.

1. ~~Cf. the remark made in footnote, p.   infra.~~
   Cf. p. 58 infra.

introduce a certain lack of correspondence between the
conclusions we arrive at and reality.

It may be, it is true, that some of the hypotheses in
terms of which we reason, correspond to some extent inade-
quately with the real circumstances of the case: but at any
rate the hypotheses made have been openly stated and so error
should be the more easily detected. Making these hypotheses
we enquire first into the long period effects that the tax would
have.

Over the long period the net remunerations that the
industry pays to labour and materials are unaffected by the
tax; because these are in perfectly elastic supply to it.
Had there been no tax the diamond industry would have employed
capital up to that point at which it yielded a return equal to
the normal rate of interest, say $R\%$. After the tax the in-
dustry will only employ capital in each direction until it
yields a (gross) return equal to $R (1 + \frac{2\frac{1}{2}}{100})\%$, so as to
leave a net remuneration of $R\%$ to the capital. On this
account therefore there will be a contraction in the output
of diamonds and a corresponding rise in the price of diamonds.

If we refer back to Diagram II, Chapter IV, p. 26   ,
it is as if, over the long period, the curve of marginal cost
to the industry had, through the change in the cost (gross
remuneration) of capital to the industry, been raised from the
position $M C_1$ into the final position $M C_3$. Labour costs,
in the case of the diamond industry, are unaffected by the
tax, and play no part in the displacement of the curve $M C_1$
into the final position $M C_3$.

Since the price of labour to the industry has remained
at the same level, while the price of capital to it has risen,
a certain amount of substitution of the use of labour for
that of capital will have taken place. The more readily is
labour substitutable for capital in the diamond-mining industry,

the smaller will be the eventual fall in output and rise in price. Again we have said that the demand curve for diamonds is fairly rigid: this will be an influence tending to curtail the contraction in their output, but not the rise in their price.

~~New~~ On the assumptions that we have made, over the long period the elasticity of supply of labour and of capital to the industry is perfect. These elements therefore will share none of the tax burden of the industry, which in the long period will have come to rest entirely on the owners of the diamond-bearing ground, and on the purchasers of the diamonds that the industry produces.

3. In the short period, we have said, the supply of labour to the industry will be to some extent rigid, i.e., less than perfectly elastic; and the same, though probably in a lesser degree, will be true of the supply of materials to the industry. In the short period therefore, both of these factors ~~would~~ will share a part of the burden of the tax, along with the owners of the diamond-bearing land, and with the purchasers of the diamonds. Their share of the burden borne by labour and the suppliers of materials to the industry, ~~would~~ will take the form of lower wage rates and lower prices received for the goods that they supply to the industry.

The rate at which the output of diamonds will contract in the short period and the resultant rate of rise in price of diamonds, will depend on the time-variation of the elasticities of supply of these two factors to the industry. As well it will depend on the facility or difficulty of transfer of the plant that had been used in the diamond-mining industry, to other lines of production after the tax has been imposed; and on the rate at which the plant in the industry wears out. If the diamond-producing plant is

4.

of but small service in other lines of production and
wears out only very slowly, then the rise in price of
diamonds and the contraction in output will tend to be
the slower.

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C H A P T E R VI.

The Incidence of a Partial Income Tax. [*]

1. An income tax which is imposed on the income of a particular industry, may be graduated according to either a personal or an impersonal criterion. If the criterion is a personal one, then the income tax will be graduated according to the income and family responsibilities of the person who comes into receipt of the dividends paid by the industry. If the criterion is an impersonal one, then the tax will be assessed, not on the incomes of the persons receiving dividends, but on the incomes of the firms themselves. In this case the height of the tax will depend on the size of income earned by the firm. The tax levied by the Government of South Africa on gold mining, for example, is graduated in this impersonal way.

We will suppose to begin with, that it is in this impersonal fashion that the tax we discuss is graduated: the rate of tax depends on the size of income of the firm.

2. The following are the assumptions that we make :-

That firms in the industry are working under conditions of perfect competition.[1]

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[*] Some aspects of the theory of a partial income tax have been finely treated by Fasiani in his article "Contributo ad alcuni punti della teoria della traslazione delle imposte sui 'profitti' e sui 'redditi'" published in Studi Sassaresi for 1931 and 1932.

1. We do not envisage the production function as being homogeneous and of the 1st. degree.

1.

That the tax is imposed on the income of each firm in the industry and the marginal rate of the tax is either constant or progressive.

That in both the long and in the short period of time after the tax has been imposed, entrepreneurs in the industry affected are able to hire factors of production at constant prices; that is, that the suppliers of factors of production to the industry, in both the long and in the short period are perfectly elastic. This assumption we afterwards remove to make provision for the important cases in which it would not hold good.

That the proceeds of the tax are small enough for the government's expenditure of them to cause only a disturbance in industry generally that is small enough to be neglected.

3. Let us consider how costs of production of any firm in the industry are affected by the tax. The firm hires its factors after the tax has been imposed, at the same prices as initially. Its cost for labour and for land for any unit of production after the tax, if the technical coefficients of production of the firm remain unchanged, are the same for that unit as they had been before it. Let us suppose that the technical coefficients of the firm remain unchanged in this way.*

In diagram I AVC_1 and MVC_1 are the curves of average and marginal variable cost respectively to a firm in the industry, and ATC_1 is its curve of average total costs. This firm had, before the tax was imposed, been in equilibrium at the output O M, when the price of its commodity was O P. This price and output had just enabled it to cover its variable costs of production O M, Q M in amount, and to

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* For a good discussion of the meaning of technical coefficients of production, see H. Schultz, "Marginal Productivity and the General Pricing Process", Journal of Political Economy, 1929.

earn over and above the normal rate of interest on the fixed capital it employed. The normal return on its fixed factors had amounted to O M, R Q.
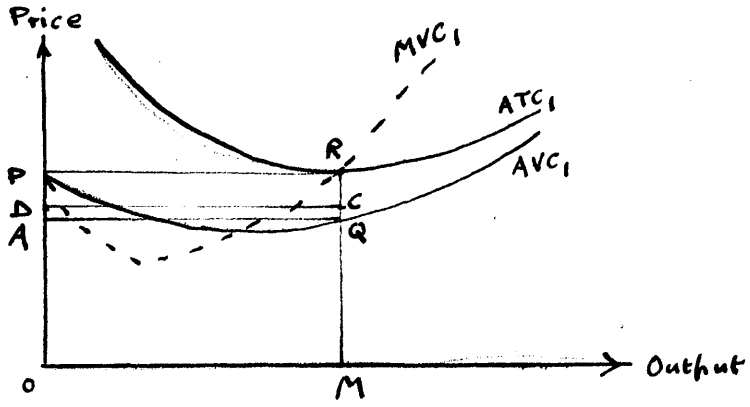
Price

Diagram I.

To give an arithmetical example, let us suppose that the tax imposed on the industry concerned is at a flat rate of 20%. Then in the period during which the firm whose cost conditions are represented in diagram I expects the price of its commodity to remain unchanged, it will expect the tax to absorb a portion, A Q C D in the diagram, equal to 20% of the total remuneration O M, R Q to its fixed factors.

4. A fuller representation of the case of which this is the end result can be given and in a way that applies to either a proportional or a graduated tax. This is done in diagram II which, like the previous supposes that the price the firm expects to receive for its commodity remains unchanged at the initial level O P, and that the technical coefficients of the firm remain the same at each scale of output after the tax, as they had been before it.

Diagram II.

Price

This diagram on a larger scale is given opposite.
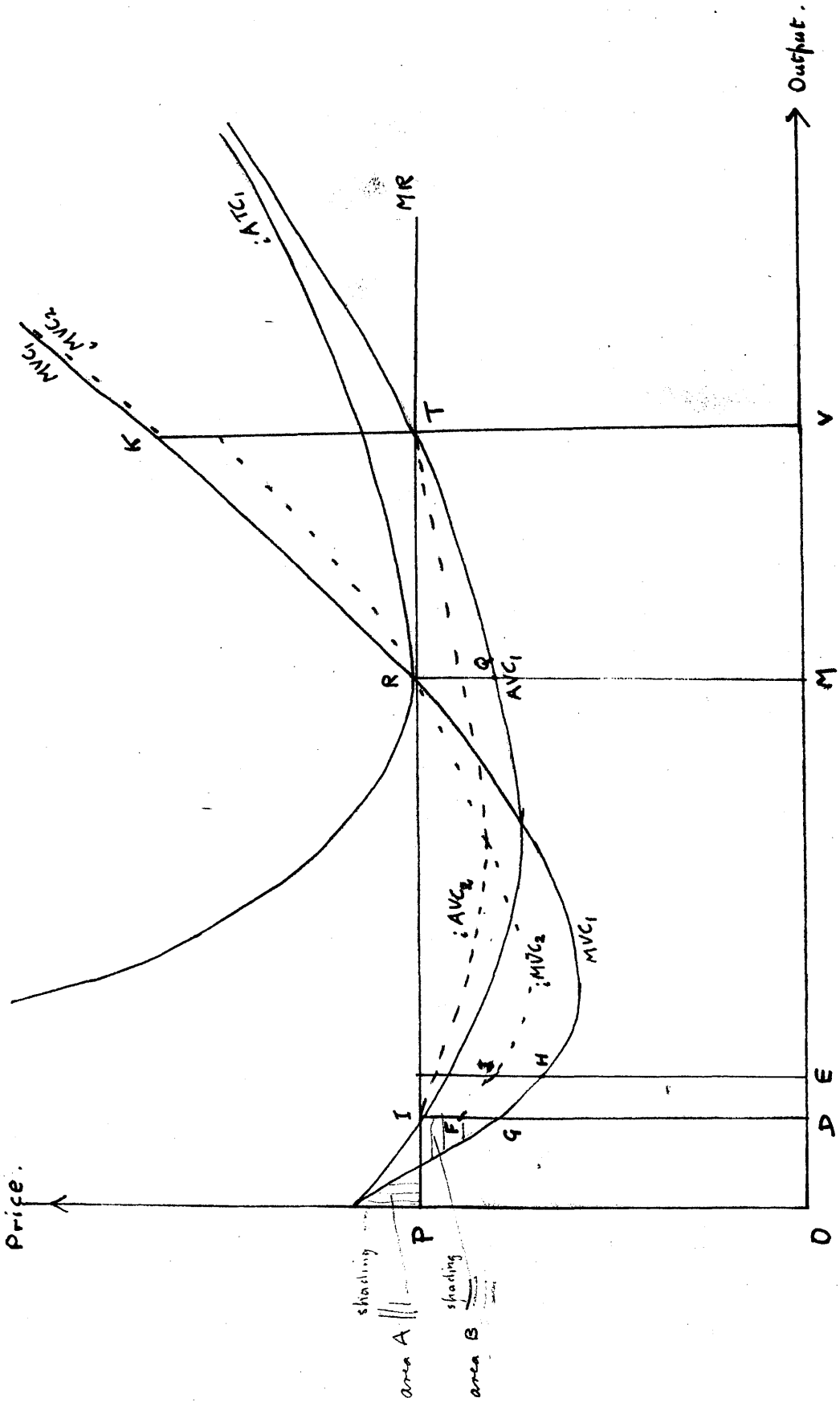
area A

area B

Diagram II.
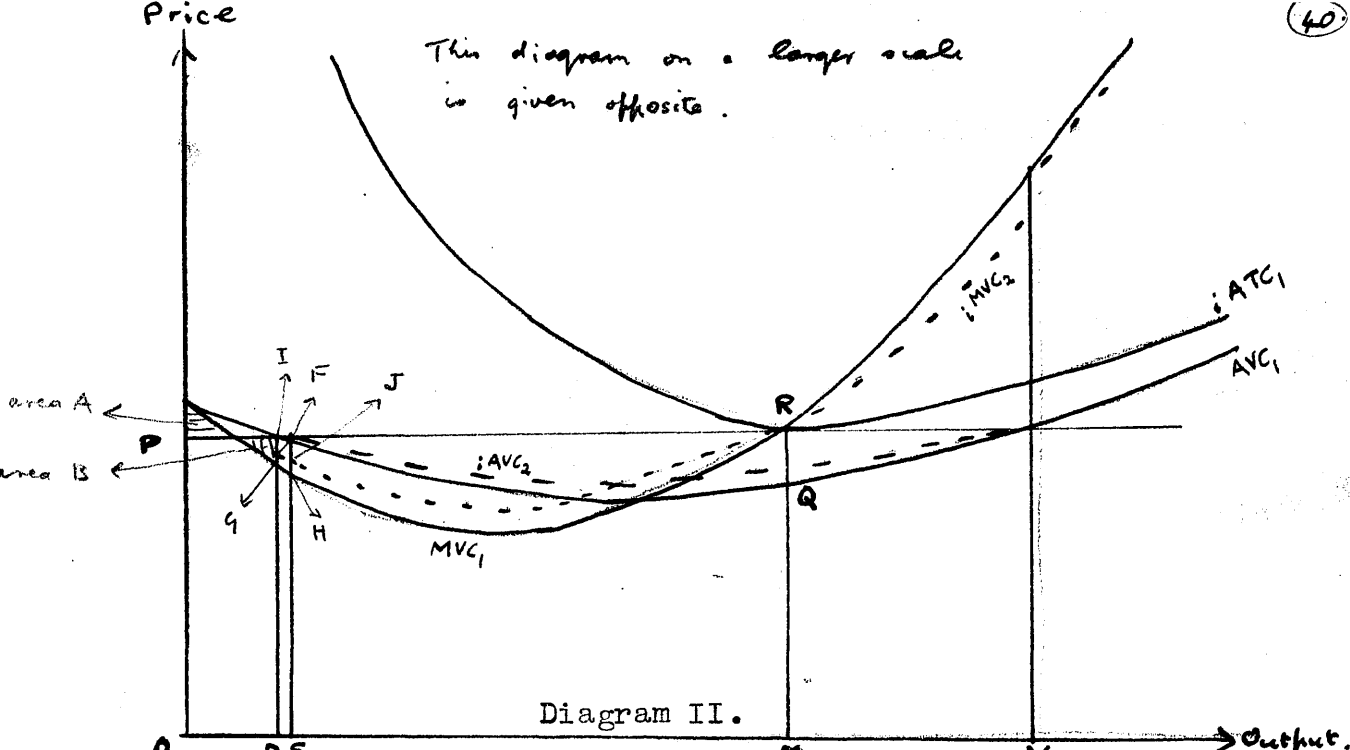
The producers' expectation is that the price of the

commodity will remain unchanged at the point in time under

consideration.

The position of the average and marginal curves after the

tax are shown by broken lines.

Area A = area B.

Curves MVC_1, $_iMVC_2$ coincide over the range of production

O to D. So also for AVC_1, $_iAVC_2$

Area GHRI = area RTK.

Over range of output D to V curves MVC_1 ; $_iMVC_2$; AVC_1;

$_iAVC_2$ are separate and distinct.

For output OV and over curves MVC_1, $_iMVC_2$, AVC_1; $_iAVC_2$

are again coincident.

In the diagram MVC_1 and AVC_1 are the curves of marginal

and average variable costs initially; and ATC_1 in the initial

curve of average total costs. Initial price is OP. Area A =

area B: the firm does not begin to make any return over and

above its variable costs until its output has reached a level

OD. After this output has been reached each additional unit

of output fetches a balance over and above the variable costs

for the unit concerned. It is on this return over and above

variable costs that taxation has to be paid; an amount of

taxation FGHJ being paid on the increment of output DE, and

and so on. The total amount paid in taxation when output is OM is shown by the area GHRJF. This is a cost that the firm must incur; it is an addition to variable costs. The marginal curve of variable costs therefore, is raised as shown over the range DM, from its initial position MCV_1 into the new position $_iMVC_2$. To the new marginal cost curve $_iMVC_2$ there will correspond a new average curve of variable costs $_iAVC_2$

The suffix i is used in regard to the two curves $_iMVC_2$ $_iAVC_2$ in order to impress that the positions shown for the two curves are the positions that they take up at the end of a short period at the end of which no reaction towards a higher price level is expected by the producers to take place. When it is expected by the producers concerned that there will be a higher price level at the end of any given period then the positions of the new curves of variable cost — including-tax for the corresponding period of time will be different from $_iMVC_2$ and $_iAVC_2$ and will lie above them; because then, for the increment of output DE say, in diagram II the labour and other costs will be the same as before, but the price received for the increment is higher and therefore will bear a greater amount of tax payment. As soon as the price expectation alters, therefore, $_iMVC_2$ and $_iAVC_2$ are no longer the curves of cost - including tax - to the firm; new curves have to be drawn.

The curve of average total costs is referred to as $_iATC_1$ because the position of the curve shown is that which it occupied before, and not after, the tax was imposed.

Referring to the state of affairs shown in diagram II after the output OM has been passed each additional unit of output brings a net loss to the producer instead of a gain. Each such unit in the new circumstances secures him a diminution in his total tax payment, because of the diminution it creates in the revenue to the fixed factors. Thus for an

output greater than OM the curve $iMCV_2$ lies below the curve MVC_1.

Shareholders in this industry now get a less remuneration from capital invested in it than would have been got had their capital been invested in other branches of industry. When the fixed capital comes to be worn out some of them will not renew their holdings of it until a reduction in plant has taken place, sufficiently large to enable a new price to be established for the commodity that will afford the normal rate of return on fixed capital invested in the industry.

The rise in price will take place partly through some firms not renewing their plant and partly through some plant forsaking this industry for others.

The expected return to the fixed capital of the firm in Diagram II is now FJRI instead of FJRI $+$ FGHRJ as formerly; the part FGHRJ has been absorbed by the income tax. It will be for the firm concerned to consider whether, taking this and other periods of time into account, it would not be possible for part or all of its plant to fetch a higher return in some other line of production. If, costs of transfer being taken into account, such a higher return could be obtained, then the transfer will be made. The higher the return the plant will fetch in other lines, and the lower the costs of transfer to such other lines, then the quicker will be the falling off in the output in the industry and the quicker the rise in the price of its commodity.

Diagram III depicts this other possible case of the same phenomenon as is shown in Diagram II. It shows the slightly simpler case where the curves of marginal and average variable costs do not cut the price line in the downward part of their movement. The curves are named by the same symbols as before, and the reasoning is exactly parallel.
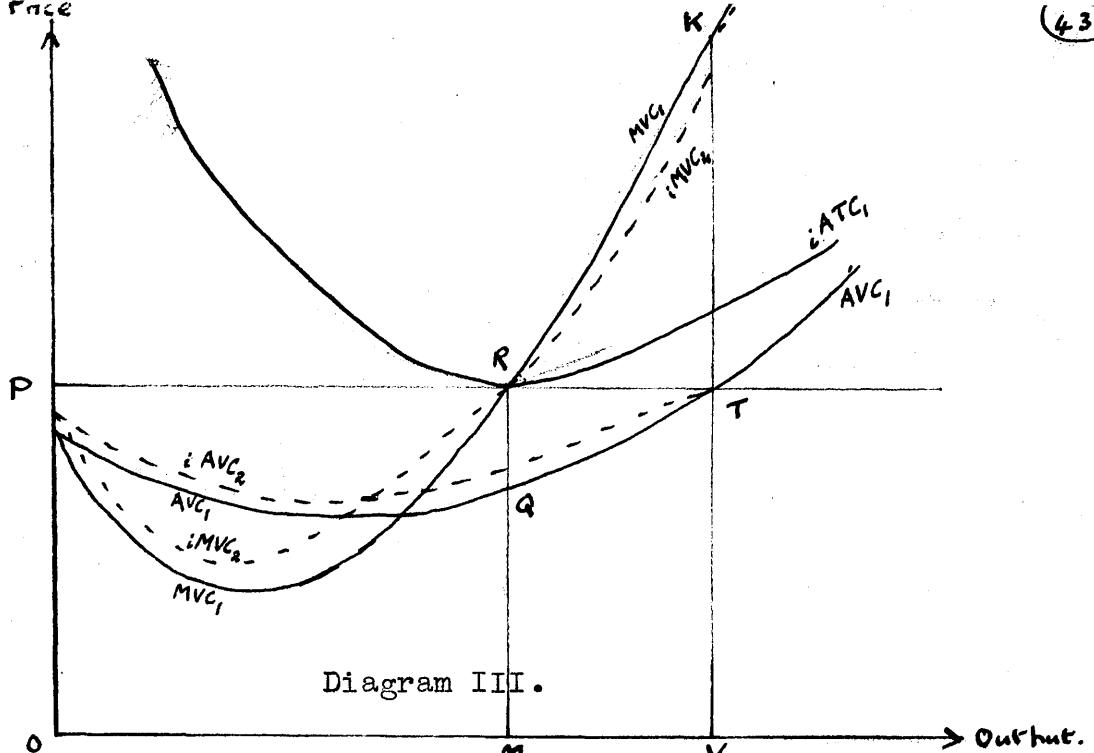
Diagram III.

Further, if the technical co-efficients of the firm remain unaltered over the long period, Diagram II (or diagram III) can be amended to show the higher price level that finally results. In diagram IV average and marginal variable costs - excluding - tax are given, as in diagram II, by the curves AVC_1 and MVC_1.

The price that the firm receives for its commodity in the new position of equilibrium must be sufficient to cover these variable costs and to afford at the same time the normal rate of remuneration net of income tax, to the fixed capital that it employs. This fixed capital by hypothesis is the same after the tax as it had been before it and so the total net remuneration on the capital must be the same as it had been initially.

To see how the gross reward to these factors must have increased as a result of the tax, suppose that the reward to the fixed factors had initially been K; then K must also be their final net reward.

Let the final gross reward of the fixed factors be K + I.

I will be the payment of income tax made on the firm's total gross reward.

If the tax imposed on firms in the industry is at a flat rate of 20%, then I must be such that

$$(K + I)(1 - \frac{20}{100}) = K$$

$$\therefore \quad I = \frac{20}{80} K = 25\% \text{ of } K.$$

7.

In general, let the marginal tax payment by the firm on a gross revenue of i be at the rate $f(i)$. If before the tax the total fixed costs of the firm had been equal to K, then after the tax they will be equal to $K + I$ where

$$(K + I) - \int_{0}^{K + I} f(i)\, di = K$$

that is, $\quad I = \int_{0}^{K + I} f(i)\, di \quad \ldots\ldots \quad (1),$

an equation in K and I and therefore sufficient to determine I.

The curve of average final total costs ATC_2 will be raised correspondingly above the curve AVC_1. The new price of the commodity must be at a level O Z (Cf. diagram IV) sufficient to cover fixed costs to the firm on the new higher scale $K + I$. Unless price does permit it to cover costs on this scale, the firm will go out of production. Thus in diagram IV, rectangle ab. On $= K + I$, where I is defined by equation (1.)
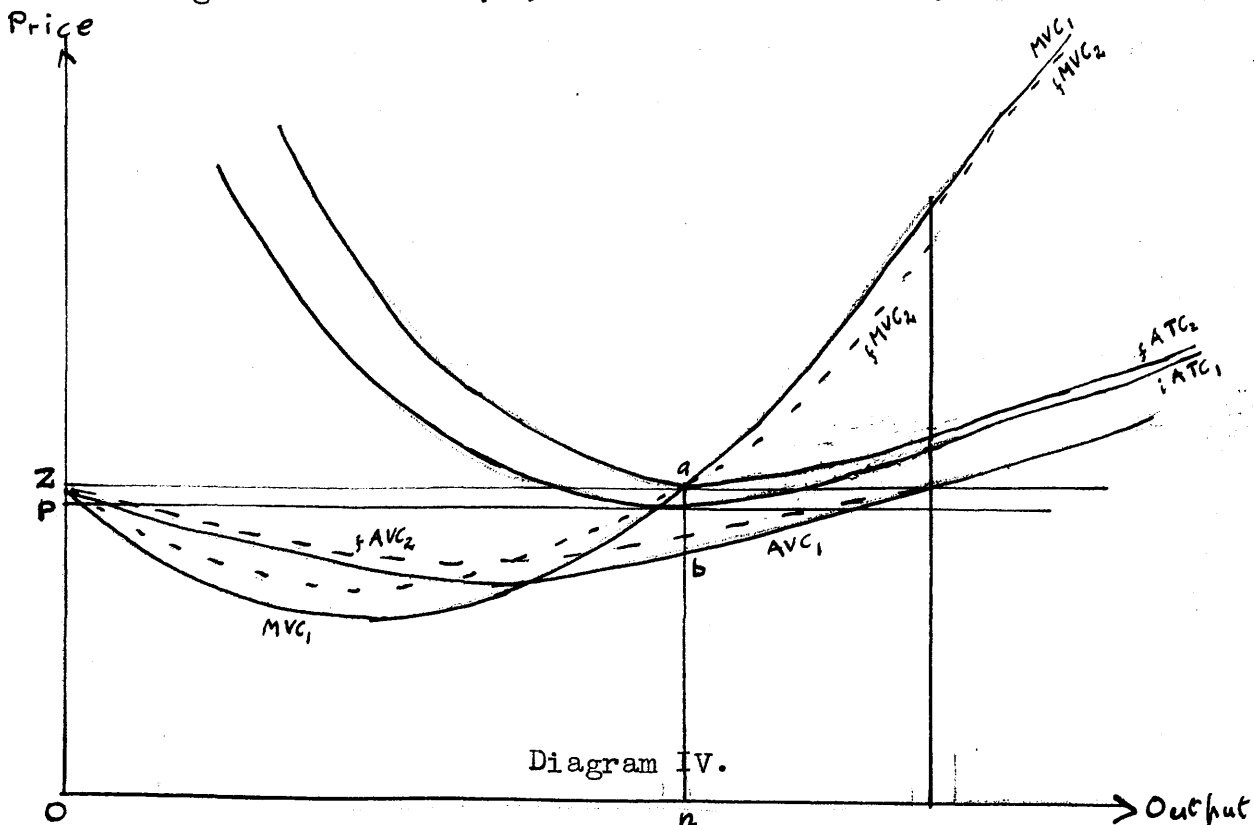
Diagram IV.

It is important to notice, when Diagram II and Diagram IV have reference, as we suppose, to the conditions of the same firm at two points in time after the tax has been imposed, the curves MVC_1, AVC_1 are the same in the two diagrams: the

curves $iMVC_2$, $iAVC_2$ in diagram II represent the curves of marginal and average variable cost - including - tax to the firm at a point in time when it is expected that no price reaction will have taken place: and the curves $fMVC_2$ $fAVC_2$ in diagram IV represent these curves of marginal and average variable cost - including - tax when price has attained its final equilibrium level. The curves $fMVC_2$, $fAVC_2$, are higher at all points over the range, ON, than the curves $iMVC_2$ and $iAVC_2$ respectively.

Thus the diagrams II and IV afford some conception of the dynamics of the shifting process of the tax that takes place. If we assume that the tax is imposed suddenly and unexpectedly, then at the initial moment in time after the imposition of the tax, the price level of the commodity will be expected to show no change over its previous level: diagram II will give a picture of the state of affairs at this initial moment and for such subsequent points in time as price is expected to remain unaltered. The condition of affairs finally ruling will be as shown in diagram IV.

If a time axis were to be drawn perpendicular to the paper say, diagram II would give a cross section of the resulting 3- dimensional figure at time zero; and at the other end of the axis, representing the equilibrium situation, would be diagram IV. The total rise in price is seen by a comparison of the two figures. The rise should of course, be pictured as taking place gradually through time. In the same way the curves of variable cost - including - tax should be pictured as gradually moving up during the period of time occupied by the shifting process, from the positions $iMVC_2$ and $iAVC_2$, into the positions $fMVC_2$ and $fAVC_2$ respectively.

5. The diagrammatic treatment that we have given, forms, as it were, a skeleton of the theory; but the assumptions on

which this treatment proceeded were, some of them, fairly
drastic, and may now be gradually relaxed so as to get a more
realistic treatment of the case.

An assumption that we made was that the technical co-
efficients of production at each scale of output were the
same after the tax as they had been before it. The effect
of the tax, however, has been equivalent to increasing the
cost of capital to this industry, while the prices of the
other factors to it remain unchanged. In these circumstances
substitution of land and labour for capital in this industry
will to some extent take place. The greater the extent to
which it is possible to carry this substitution, the smaller
will be the resultant rise in the price of the commodity.

A limiting case will occur when the diagram of substitu-
tability between the taxed factor capital and the untaxed land
and labour factors is infinitely great. In this case the
final equilibrium price of the commodity will be the same as
the initial price; meanwhile a radical change will have been
introduced into the method of manufacture. An infinite
degree of substitutability of land and labour for capital in
this wise, would never exist in practice. Some amount of
capital, of such a kind as to be subject to the tax, would,
in fact, be needed in the manufacture of the commodity.

Some firms in the industry will be able to substitute
the use of land and labour for capital more readily than
others: they may enjoy, for example, advantages in the em-
ployment of labour which others do not have. As a result of
the change in factorial prices such firms will come to occupy
more important places in the structure of the industry than they
had done before.*

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* See the arithmetical example given by Ricardo, Principles
    of Political Economy and Taxation, Gonner's edition, pp.188-
    9.

In the process of transition between the initial and final state of the industry some firms due to luck or errors in judgment will make fortuitous losses, others will make fortuitous gains. From this cause again, some firms will find themselves better placed in the final equilibrium than they had been to begin with.

If the tax is graduated upwards according to the size of the firm's profits, the smaller firms in the industry receive a differential advantage in the new state of affairs as compared with larger firms. Small firms will tend to capture a bigger share in the total volume of the industry's trade.

6. Initially and finally the industry that we are considering is supposed to be in a state of equilibrium, with uncertainty existing in the industry during the intervening process of change. When we take into account this uncertainty that is created by the tax there will be two trains of consequences to consider. Consumers for their part will cut down their consumption of the commodity that had been affected by the tax: some will diminish their consumption abruptly, others will only diminish it gradually. Most of them will, for a time, experiment with substitutes, until their consumption settled down again to a new optimum combination of commodities. Likewise producers of the commodity will be experimenting. They will be running their works at new levels of output: only gradually will they exploit all the possibilities of substitution among factors of production in the new condition of affairs, and manage to arrive at a new optimum set of relationships with other businesses.

The demand curve for the commodity therefore, will not remain unaltered in position as we had assumed; during the period of transition from the initial to the final state, its position will be altering throughout time. When the

11.

purchasers of the commodity discover or anticipate that its price is going to alter then they will form estimates of probable future movements in its price, and adjust their subsequent purchases of the commodity accordingly; e.g., they will accelerate their demand for the commodity at any moment if they expect a rise in its price just after this. The less perishable is the commodity, that is the smaller the costs of transforming it through time, the more play will be given to such anticipatory buying by purchasers: and this will be a force tending to even out fluctuations in price.

In the same way there will be a changing flux of producers' expectations as to the price that the commodity will fetch at the date in the future when it reaches the market. His expectation as to price is one of the determinants of the output of any producer, and producers' expectations, along with the technological and economic nature of the plant in the industry, will play their part in determining the course of the price and production changes that the tax brings about.* Over the longer period of time producers' expectations will be superseded in importance and determined in pattern by events and by objective factors such as the actual historical course of price. Only, in the earlier stages of the process, i.e., during the short period, they may expect an influence of great practical importance.

7. When constructing his theory, Adam Smith made one exception to the doctrine that a partial income tax is shifted. The exceptional case is where the tax is levied on the profits "of stock employed in agriculture". Such a tax, Smith

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* When both demand and supply are varying through time, the path traced out by the resultant price charge will depend on the velocity of the movement of the demand curve in relation to that of the supply curve. See Fasiani, "Velocita nelle variazioni della demanda e dell' offerta e punti di equilibrio stabile e instabile," <u>Atti della R. Accademia della Scienze di Torino, 1932.</u>

considered, could cause no rise in the price of agricultural commodities nor would it be borne by the farmer himself, who must have his due profit; it must therefore be borne by the landlord in the form of a diminution in rent.*

This case of Adam Smith's corresponds to a case not envisaged in the preceding treatment - the case where the industry/that has been taxed employs an appreciable proportion of the total supply of one factor of production. Should this be the case, then when a rise takes place in the price of the commodity being produced, less of the factor of production concerned will be required to place the smaller output on the market. A fall in the price of the factor will therefore take place. The fall will be greater, the greater the proportion of the factor employed by this industry and the smaller the substitutability between it and other factors in outside industry. In this case the industry partially avoids a rise in the price of the commodity by sharing part of the tax burden with another factor. The longer the period of time that elapses however, the greater will be the tendency for the factor concerned to move into other industries and for a rise in the price of the commodity to take place.

8. In the case of a tax graduated according to the earnings of a firm, (and as well where the tax is graduated according to a personal criterion), typical phenomena of tax-capitalization will be called into existence. The tax on each firm will be capitalized or amortized in the form of a fall in the price of the firm's shares.

Later in the book it will be seen that changes in capital values are also brought about by a general income tax.

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* Wealth of Nations, Cannan's edition, Vol. II.
p.340.

None the less, Einaudi suggests,[*] we should not refer to changes in share values that take place when a general income tax is imposed, as being instances of tax capitalization: we should refer to them less specifically, he says, as being "changes in capital values". The grounds for distinction between the two cases are purely pragmatic. For the term "capitalization of a tax" to be appropriate, says Einaudi, the fall in capital values should be concentrated on one group of firms: the amount of money collected by the tax should not be so great as to cause, when it is spent by the government, an alteration in margins throughout the whole of industry: and the rate of interest should be left unaltered by the tax.

This usage would reserve the term "capitalization" to cases where the phenomena are clear cut. To effects that are wider and less clearly articulated it would apply the less specific term 'changes brought about in capital values'. The suggested terminology does call to mind a useful distinction between the two kinds of phenomena and will be adopted by us.

9. We have already mentioned that a tax may be graduated in either of two main fashions. Graduation in the case that we have considered has been in accordance with an impersonal criterion, the size of the firm's earnings. The criterion may, on the other hand, be a personal one, according to which the height of the tax is made to vary with the income and family circumstances of the recipient. In the oase of both types of tax the phenomena of tax capitalization will come about.

If the tax on the industry concerned is graduated in a personal way and is progressive in amount, then it will fall more heavily on the richer shareholders in the industry concerned. There will therefore be an immediate sale of shares

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[*] L. Einaudi "Osservazioni critiche intorna alla teoria dell' amortamento dell' imposta", Nota presentata alla R. Acad. dei Lincei, 1918-19, section XIV.

by these richer shareholders to individuals in lower income
strata.   The sellers of shares will, in each transaction,
receive an amount equal to the former value of the shares
minus the capitalized value of the tax;   not, however, of
the tax capitalized at the rate payable by the richer
shareholders,but at the rate payable by the marginal buyer
or seller: that is, the richest person who is just induced
and no more, at the existing scale of taxation, to acquire
or retain the shares.   This rule will apply whatever pro-
portion of the whole block of shares the taxed shares should
constitute.

Thus a tax of this kind may prove an excellent instru-
ment for a government to use which wishes to cause the
transfer of the capital in certain industry to the owner-
ship of a less wealthy section of the population.

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C H A P T E R VII.

The Incidence of a Proportional Income Tax and of the Present Income Tax on South African Gold Mining.*

1. Some preliminary explanation of the situation of the gold mining industry of South Africa in the period after 1932 seems essential to the following discussion.

Gold mining occupies a position of cardinal importance in the structure of the national economy of the Union of South Africa. Without this valuable resource the national income of the Union would be considerably lower than it is. Gold mines, however, are a wasting asset; and the rate at which this asset wastes is such that, given a continuance of the existing trends, it had been expected, before the era of monetary disturbance set in in 1931, that the gold yield of the country would reach the peak of its development in 1935, and thereafter would enter on a period of decline.*[1] This, from the point of view of the economic structure of the Union, looked to be a very serious matter indeed.

A vital element in the determination of the length of the economic life of the Union's gold fields was going to be the mining of marginal ore, i.e., ore whose gold content was relatively small, or else ore whose content was fairly high but which had high costs of working. There were wide areas of ore which were of a grade just a little too low to render

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* Subsequent investigations on the incidence of taxation on gold mining, must be indebted to Dr. W.J. Busschau's work, The Theory of Gold Supply (Oxford), and to his two articles, "Gold Mining Taxation, a Method of Analysis", South African Journal of Economics, 1935; and "The Future of Gold Supply", The Incorporated Accountants' Journal, July, 1936.

*[1] See "The Rand's Vast Resources" by J.G. Lawn, in Gold, a reprint of the Special Number of The Times, Tuesday, June 20, 1933, at p.104.

their working

~~it~~ a paying proposition. Means therefore were frequently
discussed of the most feasible method of rendering the low
grade areas of the Union economically workable.

The suggestions put forward for assisting the Union's
gold industry and in particular for helping to raise the low
grade section of the field above the margin of profitability
need not be considered here. Chance, however, came to the
assistance of the Union when Gt. Britain left the gold standard
in September 1931, and other countries followed suit. South
Africa then experienced a period of indecision as to monetary
policy, during which the economic position of the gold industry
gained no added advantage. Late in December 1932 South Africa
took the step of devaluing her currency and pegging it to the
£. The country's gold industry received a tremendous fillip.

The reasons for this can be seen from the following
arithmetical example.

Suppose that initially the value of the South African £
had been £ = $5;

and that it is devalued so that finally £ = $4, the $
being supposed to remain of constant value.

We suppose the internal price level for South Africa to
remain constant.

Initially let one oz. of gold be worth £4 (=$20), and
cost £3.10.0. to recover; the company's profit from the re-
covery of one oz. of gold = £0.10. = $2,50.

After the £ has been devalued by 20% the costs of recovery
of the gold (from our hypothesis of an unaltered price level),
are the same as they had been initially.

I.e., costs of recovery of one oz. of gold = £3.10.

But the value of an oz. of gold is still $20 = £$\frac{20}{4}$ = £5
at the new ratio of exchange.

The producer's profit from the recovery of one oz. now =
£1.10 in place of 10/- initially; or in terms of foreign cur-
rency is now $6 in place of $2,50 initially.

2.

For reasons shown by this arithmetic, the gold industry of the country derived a great advantage from the devaluation of the S. African currency.

The two main economic results of devaluation for the gold industry were that already existing mines from a given quantity of production earned profits on a much higher scale than hitherto; and that much ore that had formerly been below the margin of production now began to be exploited. New shafts were sunk to open up low grade mines; some mines that had formerly been closed down were reopened: existing mines extended their workings to ore of a lower grade; exploration and prospecting for new gold areas was quickly begun.

The Gold Producers' Committee of the Union had estimated in the pre-1931 situation that a 4/- fall in working costs per ton would double the amount of ore economically workable.* Later Sir Robert Kotze calculated that if an average price of 106/- per fine oz. of gold could be maintained, this would be equivalent to a lowering of working costs by the 4/- per ton that we have mentioned, provided costs for labour and materials for the industry did not increase.[1] Indices for the price of labour and the price of stores to the industry are not available; but the index number of general wholesale prices in South Africa has moved only very slowly since 1932.[2] At the same time the price of gold has now risen above 140/- per fine oz. These facts serve to give some idea both of the causes of the very marked prosperity that South Africa has enjoyed since 1932 and of the very considerable extension in

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* <u>Report of the Low Grade Ore Commission</u> (1932) § 28, p.25.

1. Sir Robert Kotze, "The Gold Mining Position," <u>South African Journal of Economics,</u> 1933.

2. C.F. Richards, "Whence South Africa's Present Prosperity?" South African Journal of Economics, 1935; also De Kock, <u>The Economic Development of South Africa,</u> p.95, <u>et seq.</u>

life that has been given to her gold industry by the monetary changes that have taken place.

The South African Government has also considerably bene-fited directly* as well as indirectly from the prosperity of this industry. The Government had for a considerable time before this levied a special tax of 15% on the profits of gold mining companies, raised in 1932 to 20%. This was a partial income tax. So great however was the prosperity of the industry and so rapidly did the situation develop that after 1932 the Government altered its tax legislation in the industry year by year and sometimes even during the course of the financial year, in order to better adjust it to the developing situation. The Government realised at the time -- for the complaints on the score were numerous -- that tax measures which fluctuated rapidly were in all likelihood doing harm to the industry. It appointed a Departmental Committee of six persons to go into the question of taxation of the mining industry and make recommendations of a tax system for gold mining ~~for a system~~ which would be able to stand without amendment for a long period. The Committee drew up a report and its recommendations were accepted by the Government.

The tax on gold-mining down till 1932 had been a proportional income tax: that suggested by the Committee and adopted by the Government in 1936 was an income tax graduated after a special fashion which we later go on to explain. There is doubt and controversy however as to whether a proportional tax would not be better than the present form. We will examine in the following paragraphs, the incidence of a proportional tax and then of the present tax on the gold-mining industry in South Africa.

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* "Besides receiving a large revenue from mines in the form of direct and indirect taxation the State owns valuable mines and mining claims in the Far East Rand. These properties it wisely allows adventurous companies to develop and work, on a leasehold basis, receiving a share of the profits - a method which combines profitable returns with entire absence of capital risks," W.H. Dawson, South Africa, p.272.

2. For the purpose of analysing the effects of these taxes we are able to regard the gold mining industry of S. Africa as being a competitive one. There are a fairly large number of companies in it: in 1931 over 30, and considerably more now. All of the companies, with few exceptions, fall under the control of half a dozen large corporations. But despite this the most important decisions relating to the affairs of each company appear to be taken by its own shareholders, only a small degree of coercion being applied from above by the controlling corporation.*

Moreover, in the case of a gold mine it is producing a commodity, the price of which in the short period is fixed irrespective of the output of the mine itself: the demand for the commodity of each company (and of the industry as a whole) is perfectly elastic. In the long period it is less accurate, but sufficiently accurate for our purpose, to regard the demand for gold produced in S. Africa as being perfectly elastic over the relevant range of production; i.e., over the range lying between the output of the industry when there is no tax and the output of the industry when the tax has been imposed.

What is the position relating to the supply of the factors of production to the gold-mining industry ?

Funds supplied to the industry from home sources will probably be in less than perfectly elastic supply: because the industry forms an appreciable portion of the total of S. African industry; and local patriotism, a believed superiority of local knowledge, as well as ignorance of the opportunities of the wider market, will render the supply curve of capital to the industry an upsloping one.

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* J. Martin, "Group Administration in the Gold mining
    Industry of the Witwatersrand", an address before the
    Economic Section of the British Association in
    Johannesburg, 1929.

On the other hand investors abroad have so wide a market in which to invest their capital that only a small fraction of the supply of this money will be absorbed by South African mining. The supply of capital to gold-mining from foreign sources will therefore be perfectly elastic.

The larger part of the supply of capital has in the past, actually been provided from sources abroad. Thus the Low Grade Ore Commission state in their Report: "The Commission is informed that about three quarters of the dividends, say, £6,500,000 per annum, are paid to overseas shareholders."*

The supply of capital from one source (foreign), is perfectly elastic; the supply from the other source (home) less than perfectly elastic: it follows that the supply from both sources taken together will be perfectly elastic.

Labour to this industry, which forms so important a part of the economy of South Africa, will be, in the long period, in less than perfectly elastic supply. The short period supply of labour to the industry will be more rigid than the long period supply; and the shorter the period the more rigid will this supply be.

The stores that the industry uses may be in perfectly elastic supply: at any rate we should expect the elasticity of supply to be fairly great over the long period of time.1 In the short period the elasticity of supply of stores to the industry will be less than that of the long period supply.

Since these are the circumstances the technique of the previous chapter appears quite well adapted to dealing with

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* Report (1932) p.22. Lehfeldt had thought that the proportion in which capital was supplied to the industry from home sources was greater than this. "It is stated on good authority that more than half of the dividends from gold mining now go to South Africans": The National Resources of South Africa, (1921) by R.A.Lehfeldt,p.12. The estimate of the Low Grade Ore Commission however is presumably based on information from official sources.

1. P.Sraffa, "The Laws of Returns under Competitive Conditions" Economic Journal, 1926, pp.540-1.

the case.   In three major respects, however, the analysis
of a partial income tax that we give in the preceding
chapter, and the analysis that we give now of a tax on gold-
mining, may diverge from the reality of conditions through
over-simplification.   First an assumption that we make is
that the productive process in the industry is a continuous
one: in gold-mining actually, the process is not continuous,
but gradually runs down for each mine as its ore becomes ex-
hausted.   Secondly, we assume that both initially and
finally no uncertainty exists in the industry, and that un-
certainty only exists during the intervening process of
transition from the initial to the final state.   In reality
uncertainty plays an important part in gold-mining at all
times.   The theory that we give therefore, in each of these
two respects will be an adequate picture of reality.

In the third place, the theory of the incidence of a
partial income tax was developed in the preceding chapter
on the assumption that the industry affected was small
enough for the effect of the expenditure of the proceeds of
the tax, in disturbing the general economic equilibrium,
to be neglected.   On the other hand the proceeds of the
income tax imposed by the South African government on gold-
mining, have for long constituted a considerable portion of
the total revenues of the state.   In discussing the incidence
of this tax in the following paragraphs, we disregard the use
made of its proceeds, by the government;   we do so ~~however, only~~
in order to avoid the difficulties that would be entailed in
the more proper course of taking these tax proceeds into
account.   In this respect again, the procedure that we
follow is only of qualified accuracy.

3.   We discuss now the incidence of a proportional income
tax on South African gold-mining;   and for the sake of
definiteness we suppose that the tax is one of 30%.

In exact terms the question that we ask is this: If

7.

there has previously been no income tax on the South
African gold-mining industry, and if, after the industry
has attained a state of equilibrium, a partial income tax
of 30% is imposed on it, what will be the economic effects
produced (disregarding the effects produced by alterations
in the amount and structure of the government's public ex-
penditure)?

The new capital entering the South African gold-mining
industry after the tax has been imposed, must be able to
obtain the normal rate of return, which is, let us say, a
net 5%. New capital therefore, must be placed in lines of
sufficiently high productivity to yield a gross product of
$$5\left(1 + \frac{30}{100}\right) = 6\tfrac{1}{2}\%.$$

The volume of output over the long period therefore,
will now be cut down as compared with what it would have
been without the tax.   The lands which are now worked will
not be worked so intensively as they would have been had
there been no tax. And some lands, in part low grade
lands and in part high grade lands whose costs of working
are also high, which, in the absence of the tax, would have
been worked, will now not be worked at all.

Let us consider how the curves of cost and of revenue
of a gold-mining company, are affected by the tax. Since
the demand for gold is perfectly elastic, the horizontal
curve of marginal revenue to the firm, MR, will remain un-
altered in height after the tax has been imposed. (See
diagram I).   The curve of marginal variable costs to the
firm before the tax is $_iMVC_1$, of average variable costs
before the tax is $_iAVC_1$. These variable costs include all
costs entailed in the production of the commodity (among
others the cost of land), with the exception only of the
cost of fixed capital. The return to the fixed capital of
the firm is O M, R Q; and since no uncertainty exists,
this will represent the normal rate of interest on the

capital involved.
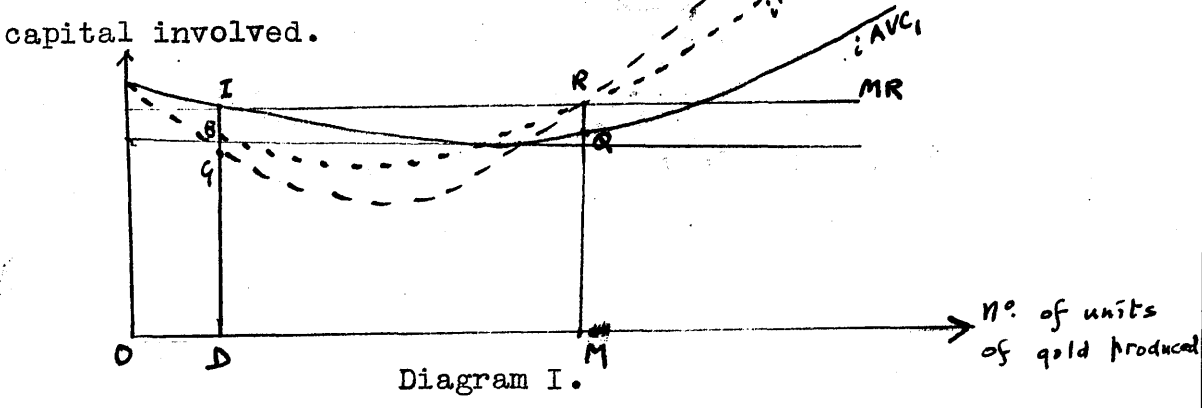
Diagram I.

When the tax is imposed, if we assume that technical
coefficients of production for the firm are the same at
each scale of production as before the tax, and that the
price of each factor of production remains unaltered, then
the new curve of marginal variable costs after the tax, will
be $_iMVC_2$ as shown: because all of the firm's former ~~lower~~ costs
of production have to be incurred, and as well, after the
output O D has been passed, 30% of the return to the firm
over and above its former variable costs, have to be handed
over to the government in income tax.

In these circumstances, the return to the fixed factors
of the firm will now, after the tax, be an amount BRI instead
of GRI (= OM, RQ), as formerly. This, however will not give
a possible state of long period equilibrium: the fixed
factors of the firm had initially been getting just a
normal return: after the tax has been imposed, if the firm
is to continue in existence in the long period, the fixed
factors again must get a return not less than normal. From
which source therefore, can the tax payment to the government,
G R B, be forthcoming ?

We have said that over the long period the supply of
gold-bearing land to the industry, can be taken to be per-
fectly rigid. This land will in fact consist of a number
of different classes of gold-bearing land; the supply of
land in each of these classes is perfectly rigid. Labour
to the industry will be in a supply that is less than per-
factly elastic; and stores to the industry ina supply, that,

9.

over the long period, is probably ~~only~~ nearly perfectly elastic.

Let us suppose, for the moment, that labour and stores to the industry are both in perfectly elastic supply. This will enable us to make clearer, by assigning definite magnitudes to the other variables, the main effects that are produced by the tax over the long period.

The factors, labour and stores, are, on this supposition, in perfectly elastic supply: their prices therefore, will bear none of the burden of the tax. Again the price of the commodity produced by the industry cannot rise. Hence, if the firm whose cost schedule is shown in Diagram I, is to continue in production into the long period after the tax has been imposed, the whole burden of the tax -- which on these suppositions can be borne neither by capital, by labour, nor by stores -- must be thrown on to the factor gold-bearing land. For the firm whose cost position is represented in Diagram I, the rent it pays for its land must fall by the amount B G R. Only thus will the fixed factors employed by the firm be able to get their normal rate of return and only thus will the firm be enabled to continue production into the long period.

Consider how this affects land in the three possible modes of ownership: (a) Some companies own the land which they work; (b) some buy or lease land from other companies or individuals: and (c) some again buy or lease land to work from the Government. (We consider here both distributional and production effects).

(a) Those companies which own the land which they mine, bear the burden of the tax in full. If the company whose cost schedule is shown in diagram I owns its own land then the rent of that land will, in the long period after the tax has been imposed, fall to the figure equal to the value that it would have had had there been no tax, minus an amount GRB (- supposing

that technical coefficients remain fixed). If the rent that it would have had, had there been no tax, were less than G R B, then the firm will not renew its plant as it wears out and will go out of production.

All those areas of marginal ore which the company itself owns, the working of which would yield between 5% and 6½%, would have been worked had there been no flat-rate tax; but on account of the tax it will now not pay to work them. Thus the production of the industry, or, to be exact, of both the low grade section of it and of that portion of the high grade section which is attended by high costs, will, as a result of the tax, go out of production. In this way the tax cuts down the activity of the industry.

(b) Since new capital that is invested in the industry must get its normal net return (5%), companies which buy new land to exploit will, once equilibrium has been re-established, offer a sum for such land, smaller to such an extent as still to allow them a net return on capital neither more nor less than normal. The tax, in this instance, is capitalised, and the whole burden borne by the landowner in the form of a fall in the price of the land which he owns. The tax in effect, for such lands as still change hands after it has been imposed, transfers a sum equal to the capitalized value of the tax from the landowner to the Government. The landowner would have received this money in a lump sum for the sale of his land. The Government receives it instead of him, in the form of a series of taxes that the mining company pays to it over a number of years. The capitalized value of this series of taxes is equal to the sum of money which the landowner loses when he sells his land.

As in the previous case, under this head a number of low grade areas which would have come into operation had there been no Income Tax will not now come into operation at all. All those lands which could have been bought for a small

11.

price, (in fact a price amounting to less than 1½% of the profit obtained from their exploitation), would formerly have been worked and would have yielded the normal return of 5% on the capital invested in them. But now, however low the price at which it would be possible to purchase these lands, it will not pay to work them. Under the head (b) therefore, production is again cut down.

(c) If the land is owned by the Government itself then the Government loses from the lands over which it holds mining rights, and <u>which it still finds it possible to lease out for working,</u> an amount of rental exactly equal to the sum which it gains from them by way of taxation, both being equal to area G R B. For such lands a transfer of money from one revenue heading in the budget, to another, is brought about; a book-keeping change this, that leaves total Government revenue unaffected.

But just as it will no longer pay mining companies to make an offer for certain of the low grade leases owned by private individuals, so it will no longer pay them to make an offer for the same class of leases which are in the ownership of the Government – viz: leases which afford a return of less than 6½%, but more than 5% on the capital used in their working. This class of areas owned by the Government, would have come into production had there been no tax, but now will not do so. Fromthem the Government would have received a revenue from mining leases had there been no tax. Now it receives nothing by way of lease, and nothing from tax revenue.*

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* Since it is realised that an increase in taxation will have the effect of reducing the return from the enterprise the mines have in many cases made allowance for this in the terms they offered for leases from the Government. Many leases contain a clause to the effect that if there be an increase in taxation above the existing level the amount extra that the mines have to pay will be offset by a reduction of equal amount in their payment for the lease. See <u>The South African Mining Year Book, 1935-36,</u> pp.15-19. Through clauses of this type in their leases in 1933 companies got a reduction of £384,000 in their lease payments and in 1934 of £527,000. (<u>Report of Departmental Committee on Mining Taxation,</u> § 30.)

12.

Under head (a) and under head (b) government revenue
is increased by the tax: under head (c) it is diminished.
On balance, needless to say, government revenue is increased.

Under all of the heads (a), (b) and (c) the output of
the gold-mining industry is reduced, through marginal lands
being forced out of production by the tax. This is note-
worthy in view of the emphasis always placed by South Africans
on the necessity for prolonging the life, and increasing the
output of, the gold mining industry.

This shows how the most essential step in the process of
movement towards long period equilibrium comes about. In the
long period the firm must be earning the normal rate of in-
terest on its fixed capital. It is enabled to do so by the
curve of marginal cost - excluding - tax moving from the
position $_iMVC_1$ into a new position denoted by $_fMVC_1$, say, $fMVC_1$
(no diagram is drawn), which is lower at all points than
$_iMVC_1$. The curve of marginal cost - including - tax to the
firm will likewise, at the end of the long period move into
a new position $_fMVC_2$ lower at every output than $_iMVC_2$.
Through this lowering of costs some firms - viz: those whose
rent payments had initially been high enough to permit a fall
of the requisite amount -- will be enabled to remain in pro-
duction into the long period. The firms whose rent payments
had initially been less than this amount will go out of pro-
duction.

We have been assuming so far however, that technical co-
efficients of production for this firm of necessity remain
fixed. This will not, in fact, be the case. When the
price of capital has risen, the price of labour and of
stores remaining the same, and the price of land has fallen,
producers will substitute the use of the factors labour,
stores and land for capital in some of its uses. On account
of this alteration in technical co-efficients of production

13.

the cost curves to the firm will, over the long period, under-
go a further fall.

Another supposition that we have temporarily made, viz:
that labour over the long period is in perfectly elastic
supply to the industry, is too extreme: its elasticity of
supply over the long period, will be less than perfect. To
the extent that it and the factor stores to the industry, are
in less than perfectly elastic supply, these factors will
share part of the burden of the tax with the factor gold-
bearing land. Yet in the final equilibrium it will un-
doubtedly be on this factor gold-bearing land that the great
part of the burden of the tax comes to be concentrated.

We may therefore summarize the effects that will be pro-
duced by a proportional income tax as follows:

Long Period Effects.

The greatest part of the burden of the tax will come to
rest on the factor land which is in rigid supply to the in-
dustry. Marginal lands whose rents would have been too low
to absorb the fall in them that would have been necessary
to render their working profitable, will not now come into
production.

If the supply of labour to the industry is less than
perfectly elastic, the wage rate of this factor will be lower.

So also in the case of the factor stores to the industry.
But the supply of this factor is more likely to be perfectly
elastic, than is the supply of labour.

Short Period Effects.

The plant of the industry had been invested in it on the
assumption that it would fetch the normal return of 5%. This
plant has been laid down in the industry and much of it is
difficult to disinvest or transform to other uses. Those
parts of the gold-mining plant that will fetch a higher net

return in other lines of production, taking costs of transfer into account, than they would do in gold-mining, will be transferred to these lines.

While in the short period the supply of gold-bearing land to the industry is perfectly rigid, the supply of labour and ~~perhaps~~ of stores also, will be to some extent rigid. Hence in the short period these factors, gold-bearing land, plant already in the industry, labour and stores, will share the burden of the tax among them. The more rigid the supply of any one of these factors to the industry and the shorter the period for which contracts have still to run when the tax is imposed, the greater will be the share of the burden that the factor bears.

4. Next let us consider the incidence of the present day tax on South African gold-mining companies.

The tax imposed on South African gold-mining companies at the present day (1936-7) is equal to (50% of the company's profits - 5% of its working costs) with a minimum rate on profits of 15%*

To recapitulate we wish to examine the economic effects that would be produced by the imposition of such a tax in an already existing system of economic equilibrium. And we — again ⚡ for reasons of the difficulty attaching to the more proper course and without any justification in pure theory for doing so -- are going to neglect the effects produced by the government's expenditure of the proceeds of the tax.

Following Dr. Busschau the effects of this can can be elucidated by means of mathematics as follows:[1]

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* See Busschau, op. cit., p.123.

1 See Ibid., Chapter VI.

Let total cost of producing x units of output (gold) = C

"   " receipts from " " " " " " = R

Then average rate of tax = $\frac{1}{2}$ average rate of profit - $\frac{1}{20}$

average rate of cost of production.

∴ Total amount of tax = $\frac{1}{2}$ (R - C) - $\frac{1}{20}$ C

∴ Marginal rate of tax = $\frac{1}{2}$ $\frac{d}{dx}$ (R - C) ◄ $\frac{1}{20}$ $\frac{dC}{dx}$

∴ Marginal cost of producing x units of output

$$= \frac{dC}{dx} + \frac{1}{2} \frac{dR}{dx} - \frac{1}{2} \frac{dC}{dx} - \frac{1}{20} \frac{dC}{dx}$$

Production ceases where

Marginal revenue = marginal cost of production, i.e. where

$$\frac{dR}{dx} = \frac{1}{2} \frac{dC}{dx} - \frac{1}{2} \frac{dR}{dx} \gamma \frac{1}{20} \frac{dC}{dx}$$

i.e., $\frac{dR}{dx} = \frac{dC}{dx} - \frac{1}{10} \frac{dC}{dx}$ .... (1.)

We are regarding the firm as producing gold. The marginal revenue per unit for this is constant since the price of gold does not vary with the output of the firm. The marginal revenue of the firm therefore can be shown as a horizontal straight line. The cost of producing gold at the margin must be increasing.

Let the curve ab (or $\frac{dC_1}{dx}$) and cd (or $\frac{dC_2}{dx}$) represent two possible rates of increasing costs where C_1 (x) and C_2 (x) are different cost functions. For simplicity the curves are shown in the diagrams as straight lines. With no tax in existence the equilibrium output in each case would be Oe.

When the tax comes into existence the equilibrium output is given by equation (1.)

16.
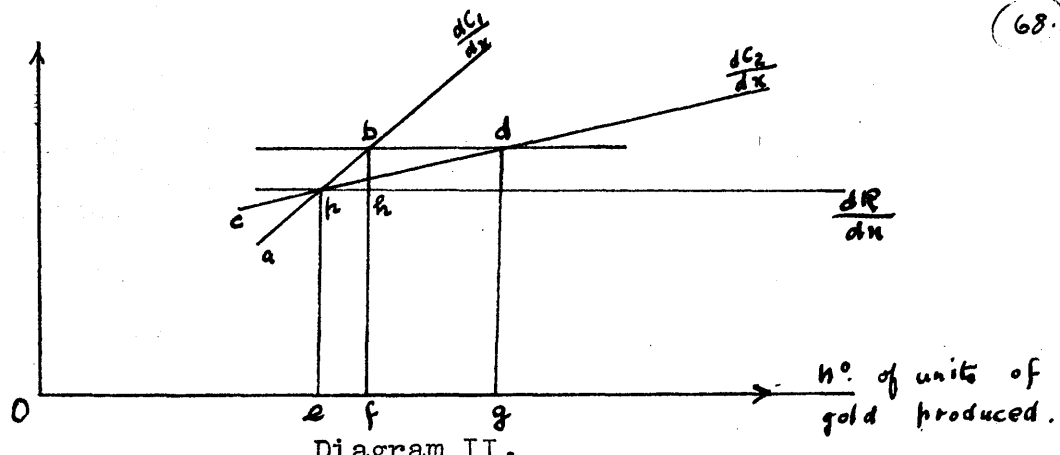
Diagram II.

Draw a straight line bd parallel to $\frac{dR}{dx}$ and at a distance $\frac{1}{9}$ p e above it, cutting $\frac{dC_1}{dx}$, $\frac{dC_2}{dx}$ at b and d respectively. Erect the perpendiculars bf, dg on to the x axis.

Then for a marginal cost curve of shape ab, Of is the equilibrium output.

Because $bf = hf + \frac{1}{9} hf = \frac{10}{9} h\,f$

$$\therefore \ hf = \frac{9}{10} bf = bf - \frac{1}{10} bf$$

and equation (1), is satisfied at the point b.

Thus for marginal costs increasing at the rate ab, there results an extension in production of ef as a result of the tax.

If the line of marginal costs be rising more slowly, as the line cd, then the extension in production brought about by the tax is greater, being eg in the diagram instead of ef.

This analysis bears a simple economic interpretation. The greater be the amount of ore in the mine which on account both of its gold-content and its cost of working it almost pays to mine then the greater will be the extension in the output of the mine brought about by the tax. As a result of the tax each mine will, in the short period at any rate, extend its production beyond what it would have been had no tax been imposed. But the amount of increase in production will vary considerably from mine to mine.

5. Before commenting on Dr.Busschau's method of analysis let us attempt an analysis of the case by means of diagrams.

We suppose as before, that technical coefficients of

production for the firm remain unchanged after the tax has been imposed.

The height of the curve of marginal revenue MR, to the firm, is unaltered after the tax has been imposed (See diagram III).

Before the tax is imposed let the curves of marginal and of average variable costs to the firm be $_1MVC_1$ and $_1AVC_1$ respectively; variable costs are here taken to include the cost incurred by the firm on account of the land and labour factors that it hires, but to exclude the cost of capital to the firm. Before the tax the return to the capital factors of the firm was equal to area I G R = OM, RQ in amount. The gold output of the firm was O M units.

Adopting the same terminology as before let us denote the total of the variable costs incurred by the firm when its output is x units, by C (x), and its total revenue from this output of x units by R (x).

The total amount paid by the firm in taxation

$$= \tfrac{1}{2} (R - C) - \frac{1}{20} C$$

.·. the marginal rate of tax

$$= \tfrac{1}{2} \{ \frac{dR}{dx} - \frac{dC}{dx}) - \frac{1}{20} \frac{dC}{dx}$$

When the firm's output is O,D (diagram III), the firm just covers its average variable costs of production and no more. Up to this output therefore, it gets no return on its capital and so pays no income tax. After the output O D has been reached the firm pays income tax on each increment of income that accrues to it over and above its variable costs. On the Oh[th] increment of output for example, the firm is getting a return to its fixed factors at the rate ln and pays tax on such return at the rate ml, where

$$ml = \tfrac{1}{2} nl - \frac{1}{20} lh,$$

corresponding to the equation —

18.

$$\text{marginal rate of tax} = \tfrac{1}{2}\left(\frac{dR}{dx} - \frac{dC}{dx}\right) - \frac{1}{20}\frac{dC}{dx}$$

Thus the curve of marginal variable costs to the firm immediately after the tax has been imposed, has the shape $iMVC_2$, shown in the diagram.
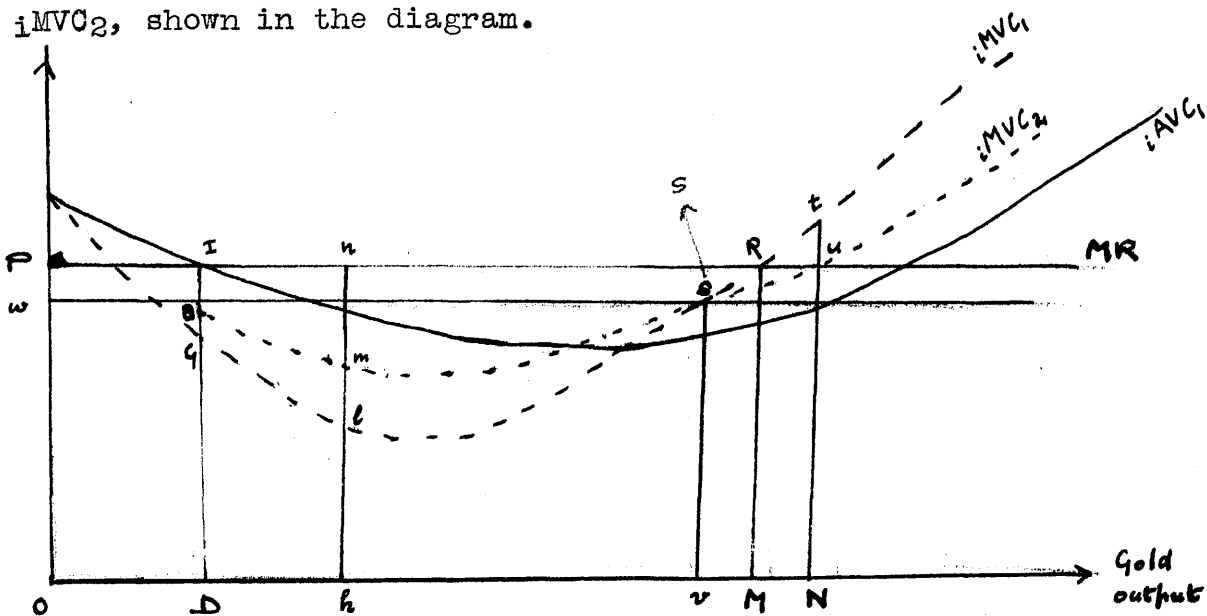
Diagram III.

$iMVC_2$ will not intersect the curve of marginal revenue M R in the same point R as does the curve $iMVC_1$ -- the point which corresponds to an output O M. Because when output is O M the curve $iMVC_2$ will lie at a distance $\frac{1}{20}$ R M below the point R. $iMVC_2$ indeed, will not intersect the horizontal curve of marginal revenue M R until an output O N, greater than O M has been attained, such that in the diagram,

$$\tfrac{1}{2} t u = \frac{1}{20} t N$$

that is $\quad t u = \frac{1}{10} (t u + u N)$

and $\quad tu = \frac{u N}{9}$ *

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* This will be seen to be the same condition as that
  stated earlier of raising the curve of marginal
  revenue hk in diagram II through 1/9th of its own
  height, and finding the resultant point of inter-
  section of the curve raised in this with ab or cd.
  Diagram III is, in fact, a fuller representation of
  Diagram II.

Diagram III shows that the firm in question will, immediately after the tax has been imposed, produce on a greater scale than formerly, extending its production beyond its previous level by an amount M N. M N will be greater the more gentle the slope of the curve of marginal variable costs $_iMVC_1$ to the firm. The units of output between M and N are now produced because their production is now subsidized out of government funds.

We can find out the point at which subsidization of output by the government begins by finding the point after which marginal variable cost to the firm in the new circumstances falls below the former cost of production of these units to the firm.

Marginal variable cost of the xth unit after the tax = former marginal variable cost plus marginal rate of tax.

$$= \frac{dC}{dx} + \frac{1}{2} \left(\frac{dR}{dx} - \frac{dC}{dx}\right) - \frac{1}{20}\frac{dC}{dx}$$

This becomes equal to marginal cost of production excluding tax, at the point at which

$$\frac{dC}{dx} = \frac{dC}{dx} + \frac{1}{2}\left(\frac{dR}{dx} - \frac{dC}{dx}\right) - \frac{1}{20}\frac{dC}{dx}$$

i.e. at which $\dfrac{dC}{dx} = \dfrac{10}{11}\dfrac{dR}{dx} = \dfrac{dR}{dx} - \dfrac{1}{11}\dfrac{dR}{dx}$

Through the point w on the y-axis at a height $Ow = \dfrac{10}{11} O P$ draw the horizontal straight line ws to intersect $_iMVC_1$ in the point s, corresponding to an output Ov. Until the output Ov is reached the curve $_iMVC_2$ lies above $_iMVC_1$: after the output Ov, $_iMVC_2$ lies below $_iMVC_1$:. Hence units of output lying between v and N, when ON is the new output of the firm, are subsidized out of government revenue; and their cost of production to the firm is less than the cost of the land and the labour employed in producing them.

The total amount of subsidy paid to the firm -- or

perhaps since no money actually changes hands it would be plainer to say "permitted" to it by the government -- is equal to area Rsu.

The total net payment of tax by the firm to the government is equal to (area B G s - area R s u)

The total net return to the fixed capital of the firm now, after the tax has been imposed, will be equal to area I B s u. This is less than the previous return and less than the return to these factors that had been expected, by the amount (area B G s - area R s u).   The price of gold is fixed: the prices of labour and stores to the industry will bear some part of the burden of the tax.   But it will be on the factors land and capital already invested in the industry that the burden of the tax will mainly fall.   The extent to which in the case of each gold mine, the loss is borne by the owners of the gold-bearing land and the extent to which it is borne by the owners of the fixed capital, will depend in the short period - if the land and the capital are in separate owner-ship -- on the outcome of the bargaining between the two groups of individuals concermed.   Hence the outcome is fixed to within a certain range but is not completely determinate.*

In the cases of many companies land and capital will be in the same hands.   Then the total loss borne by the owners of the factors will be determinate and no need will arise to apportion the loss as between the two factors.

These pieces of capital, that, taking into account the costs of their transfer, have a higher productivity in other lines of production, will be transferred to such lines.

In the short period immediately following on the imposition of the tax, the effect on the industry will be to extend its

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* See A.L. Bowley, Mathematical Groundwork of Economics,
          p.1

output as typified by the extension M N in the production

of the firm in diagram III.   But as plant is transferred

to other lines of production and, more important, as

capital in the industry which no longer fetches a normal

return in it, is not renewed, and as capital that in the

absence of the tax would have been laid down is ~~not in fact~~ no longer

laid down, then the output of the industry, instead of being

extended by the tax, will, in fact, be contracted.

If the firm whose cost situation is represented in

diagram III is going to continue production into the long

period, it will have to find some means of lowering the

positions of its curves of costs $_1MVC_1$ and $_1MVC_2$, into

~~some~~ new positions not shown in the diagram.   If it is

unable to do this it will go out of production.   How can

this lowering of costs on the part of the firm come about ?

To see more clearly how this fall in the costs of the

firm can come about, <u>let us temporarily assume</u> that all of

the factors except gold-bearing land are in perfectly

elastic supply to the industry over the long period.

Since in the circumstances that we now hypothesize

the price of the commodity that the industry produces cannot

alter, nor the prices of the factors other than land, there-

fore the total burden occasioned by the tax, will, in the

long period, come to be concentrated entirely on the shoulders

of the owners of the gold-bearing land.   For the firm whose

revenue and cost conditions are depicted in the diagram, if

the rent payment that it made initially had been X say, then

finally the rent payment that it makes will be X - (area BGs

- area Rsu). Through this the firm will be able to bring

about the fall in its costs of production necessary for it

to remain in the industry over the long period -- provided

that the rent the firm had originally been paying for the

factor gold-bearing land had originally been great enough

for a fall of this amount to take place in it. The rents

22.

of some lands would not, in the first instance, have amount-
ed to as much as the fall in them that we name.   The mines
that would have worked these lands will now, after the tax
has been imposed, be unable to get a sufficiently large
reduction in their rent payments to enable them to get the
normal rate of return on the capital involved.   They will
therefore not work the lands.   In this way the output of
the gold-mining industry will be reduced.

As regards the long period effects on output and as
regards the rents of land, let us, as before, distinguish
land in the three possible ownerships: (a) land owned by
the gold-mining companies themselves; (b) land owned by
individuals outside the gold-mining companies; and (c)
land owned by the government.

(a) If the land is owned by the gold-mining company it-
self, the whole loss of the amount stated falls on the
company.   If the value of the gold-bearing land in the
ownership of the firm would not in total have amounted to
a value as great as this loss, then the rent of the gold-
bearing land will not be able to absorb the whole loss:
the firm will not renew its plant as it wears out and in
time will pass out of production.

On this account therefore there will in the long period
be a diminution in the total output of the industry, a
portion of the marginal land in the industry going out of
production, which, but for the tax, would have continued to
be worked.   The entire loss in this first instance (a) is
borne by the firms already in the industry.

(b) Land sold in the market to gold-mining companies and
corresponding to the output O N in diagram III, will fetch
a price smaller by the capitalized value of an income equal
to (area B G s - area R su), than land corresponding to the
smaller output O M would have done in the absence of the
tax.   If the price of the larger area of land corresponding

to the output O N would originally have had a rent greater
than the capitalized value of an income equal to (area B G s
- area R s u), then the land will still change hands and will
eventually come into production. If however, the price of
this land would originally have been less than the amount
named, then the land factor will be unable to absorb the
whole loss occasioned by the tax and the land will not now
come into production.

Again under heading (b) there will be a certain amount
of marginal land which is forced out of production or else
never comes into production at all. The entire loss under
this heading (b) is placed on the shoulders of those firms
outside the gold-mining industry who own the gold-bearing
land.

(c) From lands owned by the Government and which it still
finds it possible to lease out after the tax, it will gain
an increased yield of taxation: but from the land that it
leases out in this way the Government will lose an exactly
equivalent amount in mining leases.

All those lands employed in the production of O N units
of gold, which the Government would have leased out for a
rent less than (area B G s - area R s u), it will now be un-
able to find people willing to hire. Government revenue
from this class of leases will drop to zero. Again, and for
this, the third time, there will be a corresponding falling
off in the output of the gold mining industry.

It follows from what we have said that diagram III does
not represent a position of long period equilibrium for the
firm concerned. In fact it represents nothing in regard to
the incidence of the tax except the conditions that hold
good in a period of time following the imposition of the tax
short enough for all factorial prices to have remained com-
pletely unchanged in it, E.g., the curves $_iMVC_1$ and $_iMVC_2$

were drawn on the supposition that the cost of land to the
firm had remained unchanged after the tax was imposed. Such
we have seen, could not be the case, for any length of time.
Had it been the case that the price of land to the industry
like the prices of the other factors of production, labour
and stores, had been perfectly rigid, then all the firms in
the industry would, in the long period have gone out of
production: because the fixed capital of these firms would
no longer be able to obtain the normal rate of return.

When the price of land alters, however, the shape of
both the curves of cost - excluding - tax to the industry,
and the curves of cost - including - tax to the industry
alter and assume different shapes from what they had had
in diagram III.   It was for this reason that we used the
suffix i in naming the curves $_iMVC_1$ and $_iMVC_2$ respectively.
There will in the final position of equilibrium be a differ-
ent marginal curve of cost - excluding - tax to the firm of
a shape that we may denote, let us say, by $_fMVC_1$; and a
corresponding curve of marginal cost - including - tax that
may be denoted by $_fMVC_2$.(No diagram is drawn).

The preceeding treatment, although it has been arrived
at on the basis of several far-reaching assumptions, repre-
sents the essential features of the long period effects of
the tax - viz: a fall in the rental values and prices of
gold-bearing lands, and a falling off in the output of the
gold-mining industry.   Let us now remove some of the assump-
tions that we temporarily made in the discussion.

Technical coefficients will not remain fixed. Capital
as a result of the tax has risen in price: land has fallen in
price. Land, labour and stores therefore will be substituted
for capital in some of its uses.

Labour will not, in fact, over the long period, be in

perfectly elastic supply to the industry: its supply will be less than perfectly elastic. Over the long period the output of the industry will be less and a result of the tax the quantity of labour less, and the wage rate lower. Further substitution of labour for capital will take place on this account.

The price of stores, if their supply is less than perfectly elastic, will also fall; though the fall, at most, will be of small amount.

6. If the above analysis be correct then it develops a criticism of the analysis given by Dr. Busschau, both in regard to a proportional income tax and with regard to the present form of income tax on gold-mining. Dr. Busschau's analysis appears to be an analysis of the short period and not of the long period.*

7. We explained in the initial section what roughly, the position of the gold-mining industry was in South Africa to-day. In the following portions of this chapter we have shown what both the long period and the short period effects of a tax on the income of that industry would be. From the point of view of choice of tax policy for South Africa, what matters is the set of effects produced in the long period: because we know the present position of the industry: if we know the final position of equilibrium then we know the path of development that the industry will follow: it will be the path connecting the initial with the final position.

Let us suppose that the choice of tax has been narrowed

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* At one or two places Dr. Busschau partially corrects the short period nature of his analysis and takes into account the effects of the longer period. See for example the passages "Obviously . . . exploitation", op. cit., p. 145; and Taxation will . . . gold mining", art. cit., Incorporated Accountants' Journal, p.372.

down to one between a flat rate income tax on the industry
and an income tax graduated in the fashion of the present tax.
Then in order to obtain a portion of the knowledge on the
matter that is most essential to the making of a rational
decision, the long period analysis of the taxes that we have
given above would require to be employed: and it would be
necessary to develop this analysis statistically in conjunc-
tion with geographical and technical information, in such a
way as to determine quantitatively which areas would be
worked under the one, and which under the other, of the two
taxes. Such information it is suggested, might be prepared
by the Government Department of Mining Engineering.

The fact that our analysis given above had been taken
no account of the expenditure of the proceeds would be no
disadvantage from the point of view of trying to arrive at
a decision as to which of the two taxes is the better. The
heights of the two taxes would have to be adjusted in such a
way that their yields were the same: and the distribution
of the proceeds would be the same in each case, giving iden-
tical economic effects.

Prima facie and in the absence of the information that
we mention, economists must, I think, feel a prejudice against
the present form of taxation. In it firms are subsidized
to produce portions of output that, had there been no tax at
all, would have been sub-marginal output and not worth pro-
ducing. To subsidize some portions of output in this way
by the tax, represents a transfer of resources from occupa-
tions in which they could get the normal rate of return, to
others in which their yield is sub-normal. Most economists
will look on such a proceeding with some abhorrence.

8.   Perhaps neither of the two forms of taxation that we
have discussed will be the best that it is open to the
country
~~community~~ to achieve. Certainly in the simplified condition

of affairs in which no uncertainty exists, forms of taxation can be devized which, while collecting the same amount of revenue as either of the two preceeding forms, will still do nothing to cut down the output of the industry as each of these two taxes does.   We can see how such forms of taxation can be devized in the following way.   Let

L = the rent of any area of gold-bearing land worked by a company,

R = the gross revenue of the company,

A = its total costs for labour and stores in earning this gross revenue,

n = the normal rate of interest,

K = the amount of capital employed by the firm,

and   T = the tax paid by the firm.

Then $L: R - A - nK - T$

If we desire to secure maximum production in the industry then we will wish to adjust the height of the tax so as to secure that any piece of land that would have been worth developing before the tax was imposed will still be worth developing after it has been imposed. That is, we require that when

L is just equal to $R - A - n\,k$,

T will be zero.

This condition is satisfied for example if

$T = R - A - n.K.$ In this case the whole of the rent of the gold-bearing land will be absorbed by the taxation and (theoretically), production will not be curtailed at all.

If T were equal to say, $\frac{2}{3}\left(R - A - n.K\right)$, then owners of gold-bearing land would still be left with 1/3 of the rent that the land would have borne if no tax had been imposed, and the production of gold would not be at all diminished below its level in the no-tax regime.

The tax on the rent-element that we describe, might be "assessed" either on the profits of the gold-mining company concerned or else on the rent payment that had been made by this company to the owners of the land.

The size of the fraction in the tax formula (2/3rds in the above case), could be adjusted according to the government's need for revenue and such other criteria as it was desired to take into account.   Or a more elaborate tax formula might be used.

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P A R T   III.

The Incidence of a General Income
Tax.

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CHAPTER VIII.

The Conditions Assumed and the Method to be followed.

1. What does the terms "incidence of taxation", and "effects of taxation" signify in economic discussion ? Difficulty over the meaning of these terms has caused a great deal of confusion in some of the more recent discussions, so that we will discuss the matter at some length.

Seligman explains his use of the terms thus: "First a tax may be imposed on some person; secondly, it may be transferred by him to a second person; thirdly, it may be ultimately borne by this second person or transferred to others by whom it is finally assumed. Thus the person who originally pays the tax may not be the one who bears its burden in last instance. The process of the transfer of the tax is known as the shifting of the tax, while the settlement of the burden on the ultimate taxpayer is called the incidence of the tax . . Incidence conveys to the mind the notion of the ultimate result of the shifting."* "Incidence . . emerges only when the tax finally settles, or comes to rest, on the person who bears it." [1]

Again, Seligman says, "By effects of taxation we may mean two things. In the narrower sense, it denotes the immediate consequence of each of the above-mentioned steps [of shifting and incidence, that is]. Thus shifting is an effect of impact, incidence is an effect of shifting, and the pressure of the tax is an effect, in turn, of the impact and of the shifting as well as of the incidence. In the wider sense, effect denotes any of the subsequent results of

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* E.R.A. Seligman, The Shifting and Incidence of Taxation, p.1. (His italics).

1. Ibid., p.2.

1.

taxation. A tax may have a great many effects. It May
diminish industry and impoverish individuals; it may
stimulate production and enrich individuals; it may be an un-
mitigated curse to society; it may be a necessary evil, it ·
may be an unqualified boon to the community regarded as a whole.[*]

When defining "effects", to speak of the term being used
in a narrower and in a broader sense, as in the above passage,
certainly seems to be very confusing. No exact distinction is
drawn between the two. Again it appears to be impossible on
Seligman's definition, to draw any definite line between
the incidence of a tax and an effect of the tax. None the
less he wishes the two, incidence and effects, to be kept
separate.

2. The definitions of incidence and effects given by the
Colwyn Committee are somewhat similar to those of Seligman.
For convenience we repeat the passage in full:

" We may explain the meaning we think it convenient to
attach to the term "incidence of taxation". In general usage
the term covers not only the initial burden of a tax, but also
the whole range of consequential effects. Economists, however,
have given it a narrower meaning. For them "incidence" is
only concerned with the question on whom the more immediate
burden of the tax as a tax rests. This is the first thing to
be decided about any tax. It is to be distinguished from
the question of further effects, which may be exceedingly im-
portant. For instance the burden of a tax may rest upon an
employer and in consequence he may cut down his staff; in
such a case the effects of the tax may be more serious to the
employees than to anyone else, but the incidence of the tax

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* Ibid., pp.13-14. Selgiman explains his meaning in the
   same sense in his article "The Effects of Taxation,"
   Political Science Quarterly, 1923, p.1.

is not said to be upon them."*

Similar again, is the definition of incidence and effects given by Silverman:

" Under the head of incidence we ask, Who actually bears the money burden of a tax ?   Under the head of effects we ask, What are the ultimate economic conditions to which a tax gives rise ?   In studying the practical problems of particular taxes it is sometimes very difficult to separate the two questions, especially as the nature of the incidence may have a considerable bearing on the determination of the ultimate effects.   But the distinction has to be made if one wishes to obtain a clear view of the money burden of taxation."[1]

As a result of the distinction that he draws between the incidence and the effects of a tax, Silverman is led to devote separate chapters of his book to a discussion of the incidence of the income tax and the effects of the income tax respectively.   If, however, as we suggest is the case in Silverman's definition above, the distinction between incidence and effects is vaguely drawn, this diminishes the clarity and the value of such a discussion.

3.   On the other hand Cannan had suggested that the term incidence of taxation should be cast overboard altogether and only the effects of taxation spoken about in the theory of Public Finance.[2]

In the discussion that follows, while we retain both terms, incidence and effects, our usage of them will almost

* Report of the (Colwyn) Committee on National Debt and Taxation, p.106. For a criticism of this definition see Chapter 3, supra.

1. H.A. Silverman, Taxation, its Incidence and Effects, p. 89.

2. Edwin Cannan, in Memoranda relating chiefly to the Classification and Incidence of Imperial and Local Taxation, of the Royal Commission on Taxation, 1899. p.166.

amount in practice to the adoption of Cannan's proposal:
because we will use the term incidence to refer simply to
the group or genus of effects of taxation. Effect is the
particular term: incidence is the general term.

The incidence of a tax is the group of economic effects
that it brings into existence. These economic effects will
mainly consist of alterations in commodity prices and in the
flows of commodities per unit of time; in alterations in
factorial prices and in the flows of the factors of production
into the production process: the economic effects, (and
therefore also the incidence) will consist also of changes in
revenue and cost schedules of firms, and in changes in the
distribution of wealth brought about by the tax. The theory
of incidence is concerned with all of these topics.*

4. It may have been gathered from the previous chapters
that the element of time is going to play an important part
in the discussion. In their theorizing on the topic of in-
cidence the Classical School of economists in England concerned
themselves only with the long period of time. It was for the
most part, indeed, with the long period of time that they were
concerned in their other branches of theorizing as well.
Following the same tradition, Bastable says, "The orthodox
theory of incidence professes to explain what will happen
in the long run." He continues, "'But taxes', as Leslie
well remarks, are paid immediately under the real conditions
of life and out of the actual wages and profits or other
funds, of individuals, not out of hypotheses or abstractions
in the minds of economists."1

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* This view of the meaning of incidence agrees with the
    usage of Marshall and Edgeworth. Edgeworth says at
    the beginning of his paper on Urban Rates, "Incidence
    here denotes all those effects of taxation with which
    the economist is concerned." Papers Relating to
    Political Economy, Vol. II. p.15f.
    Wicksell also had pointed out that the meaning of the
    word 'incidence', is wider than that of 'shifting'.
    Finanztheoretische Untersuchungen, p.5.

p.151.

1. Bastable, Public Finance, 3rd. edition, p.367.

4.

The usage of Marshall and Edgeworth however, was more general than that of the Classical School. They use the words "incidence", "burden" and "weight" of a tax, to refer to the effects produced by the tax after the lapse of periods of time of different lengths; the incidence of a tax will of course, in this case vary according to the length of time allowed to elapse after it has been imposed. These authors sometimes discuss the incidence of a tax in the long period of time, and in other places they discuss its incidence after the lapse of a short period of given length.* It is this usage that we will endeavour to follow in this book.

5. The problem in the theory of incidence to which we will address ourselves, is one in which there are a large number of economic variables; and the method par excellence for the solution of such problems, is general equilibrium analysis of the type of the School of Lausanne. In this type of analysis the related movements in all of the variables dealt with are shown; and full account is taken of the effect that each variable exerts on the others during the process of change. The partial equilibrium method of Marshall, on the other hand, proceeds on the assumption that only one variable alters at a time, while the others are supposed to remain constant, being impounded in "ceteris paribus". When a number of variables of the same order of importance are in question, the Marshallian method is, by comparison, very inferior.

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* See Marshall, Principles, pp. 414-5 and Appendix G.
   See also his "Memorandum on the Classification and
   Incidence of Imperial and Local Taxes" (1897) in
   Official Papers of Alfred Marshall, p.327.
     Edgeworth's treatment of the time element is more
   explicitly rigorous than that of Marshall. The reader
   who will mark each reference to the period of time,
   given by Edgeworth in the first 25 pages of his
   "The Pure Theory of Taxation", Papers, Vol.II, will, I
   think, find the number very striking.

Yet in the present instance we are, out of limitations
of intellect, driven back from application of general
equilibrium methods. An attempt to use these methods in the
case of this problem, it is true, was made by Sensini, who
applied mathematical methods to trace the effects of a general
income tax.* Despite the care and brilliance with which he
applied the technique, the outcome of the investigation was,
even in the author's own estimation, of little positive value.
In the first instance the simplifying assumptions underlying
his treatment were altogether too drastic: the firms were
assumed to have no overhead expenses and to have fixed co-
efficients of production: it was assumed that no use was
made of the proceeds collected by the tax. Then there was
the further difficulty, as he pointed out, that the solution
of the large number of simultaneous equations that the
Lausanne method yields, is not as a rule possible.

In these circumstances, for a solution of the problem
of the incidence of the income tax, we are impelled to the use
of the methods of partial equilibrium analysis, in which we
suppose things to vary one at a time. However defective the
logic of the method as compared with that of Lausanne, ex-
perience of it has shown it to be often the more suitable
method for obtaining information about the real world. At
the same time the realization of the interdependence of
variables that the Lausanne method gives, assists the mind
in an indirect way to the solution of the problem, even when
application is being made of the methods of partial equili-
brium.[1]

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* Sensini, "Le equazioni dell' equilibrio nell' ipotesi di
 sottrazione di richezza operate dal governo sù
 determinati individui della collettivita", Giornale
 degli Economisti, 1930.

1. See Ricci's discussion in "Pareto and Pure Economics",
 Review of Economic Studies, Oct., 1933.

6. In the following pages we are going to consider only
the very simplest type of economic community. It will be
a closed community carrying out no transactions with commu-
nities outside itself: there is no international trade.

We picture our community as being, to begin with, in a
condition of complete, stationary equilibrium. All tendencies
to change have worked themselves out: there are, year in,
year out, the same flows of goods from the productive processes
at the same prices.

In this stationary community we suppose that there already
exists a tax system which includes a general income tax -- gener-
al in so far as it affects income drawn from all of the in-
dustries and professions in the community. This income tax
may be either proportional or else graduated in height. <u>And
we suppose that a very small increase takes place in the rate
of this income tax</u>* The rise in the rate of Tax need not be
uniform as between all sizes of income. The rise in rate for
an income of £1,000 a year may be by $\frac{1}{4}\%$: the rise in rate
for an income of £10,000 a year may be by $\frac{1}{2}\%$: also some
sizes of income may be unaffected by the tax.

From this small change in the height of the income tax
a series of economic effects will follow. We are going to
suppose that the change that is brought about in each variable,
gradually works itself out to a state of equilibrium: so
that eventually, on this supposition, the community will again
attain a condition of stationariness similar to that from
which it started out. We will enquire What is the size of
population ? What is the level of real wages ? What is the
volume of capital ? and What the exchange ratios between
different goods ? in the new situation as compared with the

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* The importance of assuming a small or infinitesimal
    change in the height of the tax is well argued by
    Einaudi, in "Osservazione critiche . . " <u>cit.</u>

old.   When we have shewn what the level of each of these
things is in the new state of affairs as compared with what
it had been in the old, we will have shown the economic effects
of the rise in the income tax.   The method employed, that is,
is to be that of Comparative Statics.

The method that we follow we may describe in general
terms, as we have said, as the method of Marshall and of the
English Classical economists.   The main assumptions will be
that there are no wasting natural resources in the community;
that population gradually works itself out to a stable level
as the state of stationary equilibrium is approached; that
the system of wants, or scale of preferences of each individ-
ual, gradually works itself out to a stable configuration as
the stationary state is approached; while knowledge or
technique remains unaltered once the stationary condition of
things has been attained.

The breadth, as well as the narrowness of the methods,
deserves comment: because although once the state of stat-
ionary equilibrium has been attained each person's scale of
preferences remains unaltered, yet in moving from one state
of equilibrium to another this scale of preferences may
change.
~~fluctuate~~.   When the initial spell of stationariness for
example, is broken, a person may for the first time consume
new commodities which in the old conditions he had never
tasted; and on finding the actual utility of these goods
either greater or less than he had anticipated he may consume
either greater or smaller quantities of them.

The foregoing is an instance of a change in the indi-
vidual's scale of preferences as between one stationary state
and another.   It also furnishes an example of a case in which
it would be true to say that knowledge has altered as between
the two sets of circumstances: the individual's knowledge of
consumption goods was altering in the process pointed out.
When we open the door to the possibility of such changes taking

place from the side of consumption we see the possibility

of invention and technological change to come in also.

Because if we grant that the individual may re-arrange his

consumption in experimental ways, it will presumably likewise

be open to a manufacturer to rearrange his production methods.

After a period of transition from one stationary state to

another a manufacturer through the experimentation that had

been forced upon him by the changing industrial structure,

might choose to employ in the second condition of affairs,

even though factorial and commodity prices were the same as

before, a different arrangement of productive resources

from what he would have done in the first instance. Thus

a theory of Comparative Statics worked along the Marshallian

pattern, appears to include the possibility of technological

change, another name for which is invention or development

in the state of the arts.   The change in knowledge and

technology, however, that takes place during this process

of transition, need not be a positive one and in the direction

of progress. The change may also take the form of a for-

getting, of processes, for example, and be in the direction

of technical regression. Change of knowledge in either

direction therefore, is possible between one state of

stationary equilibrium and another; though none is possible

once a condition of stationary equilibrium has been attained.

The method we follow indeed, will be in some ways (viz:

with regard to uncertainty and changing wealth structure),

more general than would be the method of Lausanne. The

method of Lausanne would envisage, when a tax was imposed,

a jump being made instantaneously from the initial point of

equilibrium to the final position; or at least the process

of transition from the initial to the final stage would be

disregarded. No cognizance would be taken by it of the

changing wealth or changing tastes of the members of the

community: nor regard paid to the chance losses and~~or~~ chance

gains that would inevitably arise during any such process

of transition.

The method that we follow however, does trace price

changes throughout time: it is an economics of the transi-

tion process as well as of the initial and final stages of

equilibrium: and it does take into account the uncertainty

that would be expected to arise ~~at such times~~ during the transition process.

7. The industries in the community that we envisage are

taken to be working under conditions of perfect competition.*

By this we mean that

(a) the demand for the commodity supplied by each firm

is infinitely elastic, and

(b) each firm places only a negligibly small portion

of the total production of the commodity on the market.

Knowledge of prices in the market whether of buyers or

of sellers is not assumed to be perfect. When stationary

conditions have emerged -- i.e. both initially and finally

in the analysis that we make -- the knowledge of each individual

relating to prices is also taken to be stationary, though not

necessarily, even then, perfect.

The industries in the community are supposed to be suf-

ficiently large for some of them to employ appreciable fractions

of the total supply of certain of the factors of production.

An expansion or contraction of such industries therefore in-

fluences the prices of these factors.

Once these conditions have been hypothesized the key to the solution of the problem of the incidence of the income

tax would appear to lie in an analysis of the supplies ~~of the supplies~~ of the factors of production, when this analysis is

taken in conjunction with the theorem which we have already

established on pages 12-15 supra.

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* Joan Robinson, in the article "What is Perfect Competition?"
  Quarterly Journal of Economics, Nov. 1934, discusses some
  of the meanings that may be given to the term.

CHAPTER IX.

How Expenditure of the Tax Proceeds came to be Disregarded in the Theory of Incidence.

1.   If ten million pounds, say, be collected by a
government in taxation, this sum is not only collected but
is disbursed in the expenditure that the State makes on
social services, payment of interest on the national debt
and in other ways.   There is therefore a double aspect of
every tax, collection of the tax on one hand, which inflicts
a burden on the taxpayers, and disbursement of the proceeds
on the other.   Prima facie there is no reason to expect
that one of these aspects, in the economic effects it induces,
will be more important than the other.   Yet, by a certain one-
sidedness of economic reasoning in discussions of the subject,
only one of these aspects, that connected with collection of
the tax proceeds, has received consideration in the theory of
incidence.   For example Marshall or Edgeworth in considering
the incidence of a tax on a commodity, say, would suppose the
demand schedule for the commodity to remain unchanged and the
supply schedule to be raised throughout its length, through
a vertical distance equal to the height of the tax.   Cost of
manufacture had been increased by a specific amount, but al-
terations in demand schedules were taken to be negligible.

It is interesting from the point of view of the general
theme of this book, to trace the various forces and causes
that gave rise to this type of treatment of incidence which
took no account of the economic effects induced by expenditure
of the tax proceeds.   Of these causes the main were perhaps
historical in their nature.   The theory of Marshall and
Edgeworth was the direct descendant of the theory of the
Classical School.   This school of writers approached the
subject of taxation from the point of view of costs: much

1.

of their ~~this~~ work was of an exact nature and such that it could

be taken over and developed by subsequent writers.   On the

topic of public expenditure however, the work of the Classical

economists was less satisfactory.   Let us consider the

reasons for this.

2. Adam Smith*

~~22.~~ Adam Smith, the great founder of the school, treats the

subject of public expenditure at some length.   But his treat-

ment of it is never brought to a focus and much of it falls

within the sphere of political philosophy rather than that of

economics.

In Smith's view "the sovereign has only three duties to

attend to;   first the duty of protecting the society from the

violence and invasion of other independent societies;   second-

ly, the duty of protecting as far as possible, every member

of the society from the injustice or oppression of every

other member of it, or the duty of establishing an exact

administration of justice;   and thirdly, the duty of erecting

and maintaining certain public works and certain public in-

stitutions, which it can never be for the interest of any

individual, or small number of individuals, to erect and

maintain."[1]

Defence against external enemies and the internal ad-

ministration of justice, he considers, a government must

undertake. The public works he considers it desirable that

the government should set up are few in number: maintenance

of roads he reckons among them: and he emphasizes the im-

portance of the government providing educational facilities

for the people.   The children of the poor should be taught to

read, write and count in order to counteract the terrible

effects of division of labour on the minds of these people

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* The following §§ 2-6 were suggested by Tivarani's article
"Vecchie e nuove teorie relative alla spesa pubblica,"
Giornale degli Economisti, 1934.

1. Adam Smith, Wealth of Nations, Cannan's edition, Vol.II,
p.184.

of the working classes.   The public accounts should bear
most of the expense of this education;   only, to ensure the
efficient working of the system, a small contribution, well
within their reach of paying, should be forthcoming from the
parents towards the education of their children.   A govern-
ment might also maintain high roads and levy tolls -- though
such a system would lend itself readily to abuses.   And it
might give protection to its own merchants in barbarous countrie;
by permitting them to build forts;   i.e. by delegating to
them some of the minor rights of sovereignty.

So that his words shall have the greater destructive
force on the mercantilism of the times, he speaks as if he
regards none of these functions additional to maintenance of
external defence and justice, as of much importance.   His
treatment of them, it must be said, throws but little light
on the interplay of costs and benefits -- the grand economic
categories -- entailed in government finance.

For Smith's desire to narrow down governmental functions
to the extent that he does, a number of reasons, all of some
cogency, can be offered.   In the first place, there is his
doctrine of the "invisible hand".   Each individual, he con-
siders, is a better judge of his own interest than the
government would be;   and left free, each individual will
seek his own good.   In seeking his own good the individual
though "he intends only his own gain is in this led by an
invisible hand to promote an end which was no part of his
intention [viz., the public good].   Nor is it the worse for
society that it was no part of it.   By pursuing his own
interest he frequently promotes that of the society more
effectually than when he really intends to promote it."*

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* _Ibid._,   Vol. II.   p.421.   Smith believes that there
     are certain exceptions to this rule.

3.

A system of freely competing individuals in Smith's view therefore, tends to maximum production in the society; and, what is the same thing, to the maximum welfare of the society.

Another source of~~ or~~ Smith's preference for "natural liberty" as opposed to governmental interference had a philosophical origin: it arose from the distinction between that which is "by nature" and that which is not. This distinction had been taken over by early modern philosophy from the Greek thinkers, and the Stoics. Smith appears to have considered governmental activities with few exceptions as "contrary to nature".[*] The distinction was important to the mind of Smith and probably helped him to discover and to fill in, parts of his system. Yet in the completed thought of the Wealth of Nations views of so distinctively philosophical a character play but a minor part. His economic system was sufficiently self-complete for his successors to render it, with little effort, independent of any views of so specious a kind.

Again he considered that almost of necessity there was a lack of efficient management in corporate organization; there is profusion and there is dishonesty in both the main types of corporate administration, that by government and that by a company, whether it be regulated or joint stock. Regulated companies had been shown by history to be thoroughly inefficient and very often positively vicious as well. "To be merely useless indeed, is perhaps the highest eulogy that can ever be justly bestowed upon a regulated company.[1]"

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* Cf. W.R.Scott, "Adam Smith", Proceedings of the British Academy, Vol.X. 1921-23, p.435 et seq.
Also Cf. Viner,"Adam Smith and Laissez Faire", in Adam Smith, 1776-1926 (a collection of essays published by the University of Chicago Press); see especially Section V of Viner's essay, on Adam Smith's view of the functions of government.
1. W. of N. Vol.II, p.224.

Save in a few cases where business procedure can be reduced
to a routine (of which the main instances are banking, some
branches of insurance, canals and water supply), joint stock
organization is likewise inefficient. The company's servants
are ever ready to neglect or to plunder the interests of their
employers. ~~While~~ In the management of such a company "negli-
gence and profusion always prevail." * 1776 was a date not so
far distant from the collapse of the South Sea Bubble but that
this opinion would find a sympathetic response in many minds.[1]

Adam Smith's view of governmental administration bore a
strong resemblance to his view of the joint stock system. The
government in its decision-taking, as compared with the indi-
vidual, was incompetent and stupid. Moreover governments were
corrupt. On one occasion he mentions that he had had to rely
for his evidence on the matter under discussion, on the
"printed debates of the House of Commons", which, he says
parenthetically, are "not always the most authentic records
of truth."[2] His opinion of politicians as a class is well
known from his aphorism: "that insidious and crafty animal,
vulgarly called a politician, whose councils are directed by
the momentory fluctuations of affairs."[3] His judgment was
based on the governments of his own day. Concerning these
Viner has said: "Smith had encountered few instances in
which government was rendering intelligent and efficient
service to the public welfare outside of the fields of
protection and justice. The English government of his day

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* **Ibid.,** Vol.II. p. 233.

1. Smith's sources of information in regard to the earlier
   joint-stock companies also played an important part in
   determining his attitude to them. See W.R. Scott, The
   Constitution and Finance of English, Scottish and Irish
   Joint-Stock Companies to 1720, Vol.I, pp.445-9.

2. **W. of N.,** Vol.II, p.230.

3. **Ibid.,** Vol.I, p.346.

was in the hands of an aristocratic clique, the place-jobbing, corrupt, cynical and class-biassed flower of the British gentry, who clung to the traditional mercantilism, not so much because of a strong faith that it met the problems of a growing trade struggling to burst its fetters, but because they did not know anything else to do. Even when Smith was prepared to admit that the system of natural liberty would not serve the public welfare with optimum effectiveness he did not feel necessarily driven to the conclusion that government intervention was preferable to laissez faire. The evils of unrestrained selfishness might be better than the evils of incompetent and corrupt government."*

Smith's conversations with various members of the Physiocratic School during his stay in France and such acquaintance as he had with Physiocratic writings, invoking the maxim laissez faire, laissez passer, would confirm and strengthen his distrust of action by governments.1

One thing and one thing only governments were quick to learn from one another - that was the art of extravagance which so impeded the beneficent progress of capital accumulation. "The whole or almost the whole of public revenue," he thought, "is employed in maintaining unproductive hands".2 This is equivalent to capital wastage. The main cause of such wastage in the past has been the carrying on of wars by governments. But for this, the improvements of lands, manufactures, roads and houses would have been much greater than it had actually been. He regards these countries as most fortunate which enjoy "prudent and parsimonious governments". Capital left in the hands of individuals goes on fructifying and increasing. Capital taken by the government yields no return. This

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* Viner's article in op. cit. p.142.

1. The extent to which Smith's views were influenced by the Physiocrats, will remain, however, a matter of some doubt.

2. W. of N. Vol.I. pp.326-7.

reasoning relating to capital wastage by governments, as against the capital accumulation made by individuals, was to reappear and to grow in the writings of the later Classical economists. It was to become a main plank in the platform of those who advocated that government action should be restricted.

3. Ricardo.

When Ricardo was writing his Principles of Political Economy and Taxation, the state of the government finances was highly peculiar and must have greatly influenced his theorizing on the matter.* The Napoleonic Wars had been a period of an unprecedentedly high level of taxation. Notwithstanding, between 1793 and 1816 the size of the national debt had multiplied by four. Worse than either of these things there was the greatest confusion and uncertainty as to what projects should be financed by the government, and to what extent: and there was a complete absence of agreement as to what tax measures were best adapted to raise a revenue of a given amount. Experience of governmental finance had only begun to furnish the evidence, which, gradually accumulating, was eventually to furnish some basis for reasoned practical judgments on the matter.

The Parliament of the day was in the control of the dominant agricultural interest; all suggestions of agricultural protection received its solicitude. Outside Parliament the industrial and commercial classes clamoured for equality of treatment with the agriculturists and for the abolition of the income tax, the portion of the tax burden that rested most heavily on them. To Ricardo it appeared that it was on the profits and prosperity of these industrial classes that the prosperity of England depended. He always was a stout defender of their interests, and as such distrusted the

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* Cf. J.H. Hollander, David Ricardo, a Centenary Estimate, p.13, et seq.

Parliament of the day.

During the years preceeding the writing of the Principles, (1817), a considerable part of the country's income had been diverted to the purposes of warfare and had left no benefits of a tangible and enduring nature. There had been a destruction of the capital that the Classical economists were so keen to see increasing. "The revenue of the sovereign seldom maintains any but unproductive labourers, at the expense of the capital of the people, which maintains none but productive,"* says Ricardo, echoing Adam Smith. And though it was true that "notwithstanding the immense expenditure of the English government during the last twenty years, there can be but little doubt that the increased production on the part of the people has more than compensated for it . . . Still . . it is certain that but for taxation this increase of capital would have been much greater. There are no taxes which have not a tendency to lessen the power to accumulate."[1]

After the war the main government service in the land was the Poor Law. To Ricardo's mind, which had been deeply stirred by the dangers of an increasing population, as pointed out by Malthus, the Poor Law seemed to strengthen all the tendencies to evil. "It is a truth which admits not a doubt," he says, "that the comforts and well-being of the poor cannot be permanently secured without some regard on their part, or some effort on the part of the legislature, to regulate the increase of their numbers, and to render less frequent among them early and improvident marriages. The operation of the system of poor laws has been directly contrary to this. They have rendered restraint superfluous, and have invited imprudence, by offering it a portion of the wages of prudence and industry."[2] These laws, intended to

* Ricardo, Principles of Political Economy and Taxation, Gonner's edition, p.135.
1. Ibid., pp.132-3.
2. Ibid., p.84.

improve the position of the poor, had ~~insteasd~~ hurt both
rich and poor alike.   They had increased the birth-rate
and the number of improvident early marriages: they had
robbed the poor of their resource and forethought and had
reduced their productive effort.

His attitude to the poor laws of his time was there-
fore, quite unambiguous.   "No scheme for the amendment of
the poor laws merits the least attention, which has not
their abolition for its ultimate object;   and he is the best
friend to the poor and to the cause of humanity, who can
point out how this end can be attained with the most security,
and at the same time with the least violence."*

The cumulative effect of these factors was that Ricardo
came to believe firmly that "the produce of taxes is generally
wastefully expended."[1]   And more than once he approvingly
quotes Say's dictum that "The best of all plans of finance
is to spend little and the best of all taxes is that which
is least in amount."[2]

The practical attitude taken up by Ricardo when he sat
as a member in Parliament is not in itself important;   but it
emphasizes in an interesting way his attitude of mind.   He
voted against all increases in taxation, says Professor Cannan,
and in favour of all remissions of taxation.   He did so, as
he said "'with a view of compelling the observance of strict
economy in the administration of government'.   He only drew
the line at voting for such a reduction as would have caused
an actual deficit."[3]   Public expenditure Ricardo had in
effect come to regard as misdirected expenditure: and he
made no allowance in his theoretical scheme for State

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*.   Principles, p.85.

1.   Ibid., p.204 (my italics).

2.   E.g., Ibid., p.219.

3.   E. Cannan, "Ricardo in Parliament", Economic Journal,
        1894, p.420.

expenditure of the moneys collected in taxation. The depth
of the Ricardian impress on later economics, and particularly
on the theory of incidence, must have meant that the whole
of the later theory suffered from an incompleteness in its
attitude towards State expenditure.

4. Malthus.

The economic writing of Malthus, in so far as it relates
to the part to be played by the government in the economic
affairs of the community, is close in spirit to that of Adam
Smith. Like Smith he has a general belief in the virtues of
laissez faire. But even more than Smith he is willing to
admit exceptions to this rule. To determine whether govern-
mental intervention is desirable he is always willing to appeal
to practice and the widest reading of it of which he is capable.
He does not seek to constrain events so that they appear to
happen within the limits of the existing economic science:
rather he would seek to discover how that science should be
extended so as to cover events as they are understood to
happen in the widest reading of experience. The strain of
empiricism is much stronger in him than in Ricardo or the
Mills.

His principle of population led him to oppose the poor
laws of his day, which he believed were creating a harmful
proliferation among the peasant/ class, and that they were designed
to assist, and were sapping their spirit of independence.
But his attitude to governmental expenditure and taxation was
very different from that of Ricardo. A principal cause of
the post-Napoleonic depression in the eyes of Malthus, was the
remissions of taxation that had taken place in the post-war
period. "It is scarcely possible to doubt that at the end
of the war, when so large a mass of taxes would be at once
restored to the payers of them, the just balance of produce
and consumption would be completely destroyed, and a period
would ensue, longer or shorter, according to circumstances, in

which a very great stagnation would be felt in every branch of productive industry, attended by its usual concommitant general distress. The evil occasioned by imposing a tax is very rarely compensated by the taking it off."*

He considers that "An expenditure which would have absolutely crushed the country in 1770 might be little more than was necessary to call forth its prodigious powers of production in 1816."[1] In circumstances like those of the post-Napoleonic period, schemes of roadmaking and public works set afoot by the government and unproductive schemes for beautifying their grounds carried out by land-lords, would be the best remedies for the unemployment that had been occasioned by the disturbance of the balance of production and consumption.[2]

Malthus's views on the economic functions of the government in a community were an integral part of his economic views: but nowhere in his writings did he elaborate them into a systematic whole. "His views must be inferred from scattered hints," says Bonar.[3] On the other hand, as we have seen, Ricardo's views of govern-mental intervention, of governmental expenditure and of taxation raised by the government were nothing if not definite; and it was from Ricardo rather than Malthus that the subsequent views of the Classical School on this matter, were to trace.

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* Malthus, _Principles of Political Economy Considered with a view to their Practical Application_, 2nd. edition (1836), p.423.

1. _Ibid._, pp.422-3.

2. _Ibid._, pp.429-30.

3. Bonar, _Malthus and his Work_, 2nd. edition, 1924, p.344. These scattered hints are gathered together and shown in their relationship to one another in Book III, "Malthus' Moral and Political Philosophy," of Dr. Bonar's work.

5. McCulloch.

The more general aspects of McCulloch's thought need not be considered here,* but it is noteworthy that in discussing the incidence of a tax on profits he realizes that the expenditure of the tax proceeds should be taken into account. "The means of purchasing possessed by those whose incomes were derived from profits would indeed be diminished [by an income tax]," he says, "but as the means of purchasing possessed by the government and its dependents, who receive the tax, would be proportionally augmented, the aggregate demand of the society would continue the same."[1]

McCulloch sees that the problem exists: but his treatment of it amounts to no more than this passing reference. In the same paragraph he says that such a tax on profits would 'occasion no variation in the supply or demand of commodities'. He makes no effort, that is, to consider the changes in the demand structure to which the tax would obviously give rise.

6. John Stuart Mill.

It was, I think, a true instinct which made John Stuart Mill aim in writing his treatise, at "a work similar in its object and general conception to that of Adam Smith, but adapted to the more extended knowledge and improved ideas of the present age."[2] The main innovation in this regard at which he aimed, related to the influence exerted on the distribution of wealth and income by the government.[3]

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* For McCulloch's views on governmental interference see Leslie Stephen, The English Utilitarians, Vol. II, pp.334-5.

1. McCulloch, Taxation and the Funding System, 1845, p.75.

2. J.S. Mill, A Treatise on Political Economy with some of their Applications to Social Philosophy, Ashley's edition, p. xxviii.

3. J.S. Mill, Autobiography, p.234; cited by Ashley at p.xxi of his Introduction to the Principles.

"The laws and conditions of the production of wealth," in his view, "partake of the character of physical truths. There is nothing optional or arbitrary in them . . . It is not so with the distribution of wealth. That is a matter of human institution solely. The things once there, mankind, individually or collectively, can do with them as they like. They can place them at the disposal of whomsoever they please, and on whatever terms . . . The distribution of wealth, therefore, depends on the laws and customs of society. The rules by which it is determined are what the opinions and feelings of the ruling portions of the community make them, and are very different in different ages and countries; and might be still more different, if mankind so chose . . . We have here to consider, not the causes, but the consequences of the rules according to which wealth may be distributed. Those, at least, are as little arbitrary, and have as much the character of physical laws, as the laws of production."*

In the latter portions of his book the reason for its longer title Principles of Political Economy with Some of their Applications to Social Philosophy, becomes evident. Here Mill advocates taxation of the unearned increment in land values;[1] advocates that the State undertake elementary education;[2] would be willing that in certain circumstances the government should enforce restriction on the length of the working day;[3] and would even institute a taxation of inheritance more thorough-going than the suggestions of Rignano.[4] Laissez faire however, should be the general rule, save when the case made out for State intervention is overwhelmingly strong.

* Principles, pp. 199-200.

1. Ibid., p.819.

2. Ibid., pp. 954-5.

3. Ibid., pp. 963-4.

4. Ibid., p. 228.

Mill's discussion of these things is valuable for the wisdom that it contains. But his discussion does not fall within the domain of economic science: it is Social Philosophy and his work here is of a part with his other writings on <u>Utilitarianism</u> and <u>Representative Government.</u> Since it is philosophical in its nature it cannot be taken over by subsequent writers and extended and refined as a permanent branch of economic science: it could have been had it been scientific.

7. Thus we see that the tendency to regard money spent by the government as money wasted, had been present in the work of Adam Smith; and though he did say that money could be usefully spent by a government on certain objects of policy, his doctrine of incidence made no provision for changes brought about by government expenditure. In the work of Ricardo this tendency to take an unfavourable view of government expenditure was confirmed: in his work the Classical doctrine of incidence took its definite shape and ❁here again the effect of the expenditure of the proceeds of the tax was disregarded.

When we come to the later writers of the Post-Classical or Neo-Classical School, in particular of Marshall and Edgeworth, we are more at a loss to account for the continuance of this same type of one-sided analysis. A fairly definite view of government, which tended to minimize the importance of its place in society, had been common to Smith and Ricardo: but certainly Marshall and Edgeworth were far from sharing in such a view. That they realised in some measure the one-sided nature of their doctrine cannot, we think, be doubted.

Edgeworth in fact, at one point alludes to the problem when he is discussing a tax on house rent. He says: "Rates on houses when expended in improving the neighbourhood tend to increase the demand for houses. <u>Yet in measuring the burden of the tax to the owner it is allowable in pure</u>

theory to abstract its influence on demand."*   Doctrine

is allowed to retain its incomplete Classical form.   Again

he refers to the matter in connection with an income tax:

"In so far as it [the income tax] strikes those who are

entitled to a fixed payment from the proceeds of a going

concern, it affects economic margins only in so far as the

reduction of income may cause an alteration in the consu-

mer's scale of demand."[1]   But Edgeworth did not develop

these allusions.

Probably Marshall's well-known regard for tradition and

his very high esteem for the writings of the Classical

economists did much to determine his choice in the matter.

"The present treatise," he had said in the Preface to his

Principles, "is an attempt to present a modern version of

old doctrines with the aid of new work, and with reference

to the new problems of our age."[2]   Marshall's tendency to

avoid systematic discussion of the methodology of the

subject would permit the importance of the subject we are

dealing with to remain hardly noticed. His own awareness

of the question is made clear in his discussion of the

incidence of local rates.   He distinguishes two classes

of such rates: "Onerous rates are those which yield no

compensating benefit to the persons who pay them . . . On

the other hand beneficial or remunerative rates are those

spent on lighting, draining, and other purposes: so as to

supply the people who pay the rates with certain necessaries,

comforts and luxuries of life, which can be provided by

the local authority more cheaply than in any other way.

Such rates, ably and honestly administered, may confer a

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* Edgeworth, Papers Relating to Political Economy, Vol.II,
        p. 70. My italics.

1. Ibid., p.76.

2. Marshall, Principles, 8th. Edition, p.V.

net benefit on those who pay them; and an increase in them may attract population and industry instead of repelling it."*

Bastable also realized the limitations in this regard of the current doctrine of incidence. The doctrine of the time, he says, is a development of the Ricardian doctrine. As such, it starts out from certain "unduly simplified" assumptions such as mobility of capital and labour, and on the basis of these seeks to determine what the long run tendency to shifting will be. What the theory of incidence and indeed of Public Finance as a whole, is aiming to do, however, is to illumine the facts of everyday life in the departments of which it treats; its real intention is to show all the implications of any change that is introduced in the conditions assumed, e.g., through the introduction of a new tax. And in this respect "a doctrine of incidence that is confined to the receipt of income without regard to its expenditure is so far defective."[1]

While Bastable and other writers might regret the existence of this gap in the theory, they did not feel equal to the accomplishment of the difficult task that had been left by Ricardo, Marshall, Edgeworth and the other "tool makers", to use Pigou's phrase. A main difficulty confronting them must have been that when any given tax is collected, its proceeds are lumped together with those of all the others in the common fund of the Exchequer. The funds from the tax, e.g., from a tax on beer, are not, as a rule, allocated to particular objects of expenditure; they are not, as a rule, "ear-marked",[2] How, therefore, can we be able to name exactly the purposes to which the proceeds of the tax

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* Ibid., Appendix G, p.794.
See also Marshall's "Memorandum on the Classification and Incidence of Imperial and Local Taxes", in Official Papers by Alfred Marshall.

1. Bastable, Public Finance, 3rd. edition, p.367.

2. Before 1936 in Great Britain motor car licences were to some extent an exception to this rule, being ear-marked for the Road Fund.

on beer, or of the income tax, have been put ?   This is
a statement of the problem at issue.

8.   When the Colwyn Committee came to discuss the inci-
dence of the income tax, it felt the importance of this
aspect of the problem: and believing it to be too important
to gloss over, they alluded to it, rather uncomfortably, at
several places in their Report.

" In particular," they say in one place": so far as it
is applied in payment of pensions, unemployment relief etc.
it (the income tax) supports the purchasing power of the
worker and increases the total effective demand for neces-
saries."*

Again they say: "Especially in the lower ranges of
liability (to British income tax), the individual and his
family may benefit directly from the expenditure on health,
pensions, education, etc.,"[1]

And in another place: "The income tax clearly levels
down the higher incomes, although there is a counteracting
movement so far as it is applied in payment of debt interest.
Thus, to this extent, it redistributes saving power in
favour of the moderate and lower incomes."[2]

But the Committee quite fails to take any systematic
account of the expenditure of the tax proceeds in its theory
of incidence.

In the "Memorandum on the Incidence of the Income Tax"
that Mr. Coates had prepared for the Colwyn Committee he
alludes to this aspect of the matter thus. When a tax is

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* Report of the Colwyn Committee on National Debt and
      Taxation, Majority Report, § 439.

1. Ibid.,   § 343.

2. Ibid.,   § 380.

levied on the profits of a firm, he says, "As for demand, it is often hastily supposed that the purchasing power taken by taxation simply disappears into the void. The national balance sheet makes it clear however, that all the revenue collected is disbursed again."[*]   When the Government collects the money from a firm and then spends it, the whole process, he points out, is just the same as if the number of shareholders in the firm had been increased.   At this point he has drawn a demand and supply diagram and holds that "Certainly no change in the equilibrium of price indicated by the diagram would be anticipated from an increase in the number of share-holders in the companies concerned."[1] Yet surely Coates's theory is here essentially in contradiction with itself.   If the number of "shareholders" in the companies has been increased the scales of preference of the new shareholders will be different from those of the former shareholders; and so their money expenditure will be distributed, over the various goods, in a different way from formerly. Alterations in the demand curves for the various commodities will take place in both the short and in the long period and corresponding price alterations ought therefore to be expected.   But Mr. Coates's view is that the income tax leaves prices unaffected.

9. In 1930 Kendrick argued that in discussing certain cases of incidence, the use made of the resources collected

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[*] "Memorandum . .. " § 37.

1. Ibid., § 37.

by the tax ought to be taken into account, E.g., he said,
if a tax were to be levied on petrol and the proceeds used
to improve the condition of the roads for motor travel,
through this the number of cars in use and the amount of
petrol consumed might be increased. In such a case, he
said, it would be desirable to include consideration of the
expenditure of the tax proceeds in discussion of the inci-
dence of the tax.*

Later Fagan has also pointed out this gap in the exist-
ing Anglo-Saxon theory of incidence,[1]

10. On the Continent, however, writers were earlier
aware that consideration of expenditure of the proceeds of
a tax constituted a definite problem for the theory of tax
incidence. Credit for having been first to see the issues
involved and for having seen them clearly, belongs to
Wicksell,[2] There are, he showed, two distinct and sep-
arate questions that may be asked.

If it is a question of levying either one tax or
another tax, each with the same yield, public expenditure
will be left unchanged whichever is levied: and in this
case we may logically enquire what the economic effects of
either tax will be, irrespective of how the tax proceeds
may be expended. If the problem we are dealing with be of
this kind, then the type of discussion given by the Classi-
cal School is the logical one.

If, alternatively, the problem we are dealing with
is one, where,if a tax be remitted (imposed), at the same
time the expenditure of the State will be reduced (increased)

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* Kendrick, "Public Expenditure, a Neglected Consideration
   in Tax Incidence Theory," American Economic Review, 1930.

1. Fagan, "Tax Shifting and the Laws of Cost", Quarterly
   Journal of Economics, August, 1933.

2. Wicksell, Finanztheoretische Untersuchungen, 1896, p.6.
   See also Einaudi's review article on the appearance of
   the Italian translation of the book, Riforma - Sociale,
   July - August, 1934.

by an amount equal to the yield of the tax, then in this
case our treatment of incidence must take the expenditure
of the tax proceeds into account.

In fact when we are trying to assess the effect of the
income tax or of the complex of existing taxes, it is on
this broader type of enquiry and not on the preceeding
narrower type that we must embark.

Since there are these two separate types of enquiry,
the word Incidence may possess either of two distinct mean-
ings: and it behooves us to be clear in which sense we
use it. As we have said, in this book we use it in the
broader sense so as to include under it, effects brought
about by the expenditure of the tax proceeds.

11. Although Wicksell's words bore no fruit in Anglo-
Saxon literature, their importance was better understood
by the Italian writers. Einaudi, De Viti and others dis-
cussed the incidence of taxes in such a way as to take
into account the effects produced by the expenditure, as
well as by the collection, of the tax proceeds.* Never-
theless, the doctrine that the expenditure of the tax
proceeds should be taken into account in discussions of
incidence was not worked into the theory of taxation in a
definite and systematic way. A new beginning to this
attempt begon with the appearance of the 1928 edition of De Viti's

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* Cf. Einaudi, "Osservazioni critiche intorno alla teoria
    dell' amortamento dell' imposta e teoria delle
    variazioni nei redditi e nei valori capitali susse-
    quenti all' imposta," Atti della Reale Accademia delle
    Scienze di Torino, 1918-19, where he considers the
    expenditure of the tax proceeds in order to discover
    the effects of an income tax, Einaudi gives an important
    bibliographical note in "Contribute alla ricerca dell'
    "Ottima Imposta" Annali di Economia, 1929, pp.78-81.
    See also Einaudi's Introduction to De Viti's First
    Principles of Public Finance, p.29.

great work <u>I Primi Principii dell' Economia Finanziaria</u>.
De Viti says in a notable passage of this book :

" The current theory (of incidence) rests on two
traditional errors of classical economists.

The first of these, is the practice of considering the
problems of Public Finance as if they were completely inde-
pendent of the phenomena of Private Economics. As a result
no attempt is made to see what happens to the tax once it
has left the budget of the taxpayer; on the contrary,
there is a general disposition to suppose that the tax
represents a loss of wealth for the taxpayer and for society.

The other error consists in treating all economic
phenomena, and therefore also taxes, from the point of view
of the producer, who is directly subject to the tax and
translates it into an increase in cost or a diminution in
profits; whence it is supposed that the immediate effect
of the tax is to increase prices, through a reduction or a
threatened reduction in supply.

The combination of these two erroneous propositions
leads to the assertion that the tax disturbs the preceeding
equilibrium to the extent that it influences supply."*

De Viti's work has proved of enormous stimulus to
writers on Public Finance. A majority of the Italian
writers now appear to accept a view similar to his on this
aspect of the theory of incidence. As a result this aspect
of the theory has been further elaborated and systematized
since the appearance of the work.

In this book we accept and apply the thesis of De Viti,
which we believe to be thoroughly scientific. An analytical
discussion of the topic however appears to fall within the
other branch of the theory of taxation, the Theory of the

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* De Viti de Marco, <u>First Principles of Public Finance</u>,
    pp. 148-9.

Distribution of Taxation, rather than within the Theory
of Incidence.   Since we hope to treat this in another
book discussion of the topic will not be carried further
here.

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C H A P T E R   X.

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The Effect of the Income Tax in Direct Alteration of Demand Schedules.

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1. We take it for granted that it can be shown by the theory of Distribution of Taxation that the government of the community will allocate the money collected from the increment in the income tax that has been imposed, on determinate objects, e.g., defence, justice, etc., and that the quantity of money spent on each one of these objects will itself be determinate.*

2. Let us consider the money that the government distributes directly to individuals in the community, to be spent by these individuals themselves. The money may have been distributed, e.g. in the form of old age pensions, widows' pensions and in health insurance payments. There is no difficulty of analysis in this case in regard to the economic changes set up by such governmental expenditure. The usual analysis of marginal utility shows that in equilibrium each person concerned will distribute his total income between the different lines of expenditure in such a way as to make the utility per unit of expenditure, (e.g., per penny), the same in every direction.

A very concise analysis of such a case, where the income of the individual is either increased or decreased, has been given by Hicks and Allen.[1] Their analysis shows how the distribution of the income of the individual between a number of different commodities alters, when his income

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* In regard to the topics that follow see De Viti, op.cit., p.152 et seq.; Cabiati's review article, "La "Finanza" di Antonio de Viti de Marco", Giornale degli Economisti, 1928, and Fubini, "Sull' influenza dell' imposta sulla domanda e sull' offerta", Giornale degli Economisti, 1929.

1. Hicks and Allen, "A Reconsideration of the Theory of Value" Economica, 1934: and for a fuller explanation of some parts of this section, see Allen and Bowley, Family Expenditure, p.97, et seq.

itself alters. The case that they deal with is that in
which no uncertainty exists. The diagram shown supposes
the existence of only two commodities A and B: indifference
curves are drawn for the consumption of these commodities
by the individual concerned: these indifference curves are
supposed, since no uncertainty exists, to remain unaltered
in position throughout the whole process. In the initial
state of equilibrium the income of the individual at the
existing prices would be just sufficient for purchasing either
a total quantity $O A_1$ of the commodity A, or else a total
quantity $O B_1$ of the commodity B. All possibilities of con-
sumption open to the individual, it can be shown, so long as
the conditions of the problem remain unchanged, are given by
the co-ordinates of points on the line $A_1 B_1$. The individual
achieves the most desired consumption of commodities at that
point where the line $A_1 B_1$ just touches one of the indifference
curves: his consumption then lies on the highest indifference
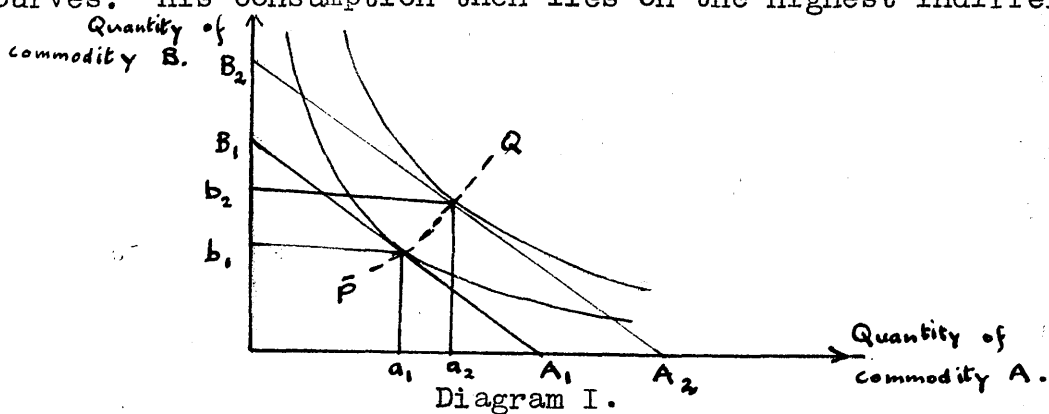
Diagram I.

curve that it is open to him to achieve. In equilibrium, the
diagram shows, his consumption of the commodities will be Oa_1
of A and $O b_1$ of B.

Let the individual's income now be supposed to be increas-
ed so that he would be able to purchase an amount $O A_2$ of
commodity A and none of commodity B, or else an amount $O B_2$
of B and none of commodity A. In the same way as before it
can be shown that if the prices of A and B remain constant,
the individual will now purchase Oa_2 of A together with Ob_2
of B (see diagram I). In fact the equilibrium combination

2.

of commodities for the individual as his total income
either increases or decreases, will be given by the co-
ordinates of points on the curve P Q.

The case where the individual purchases more than two
commodities, can be dealt with in a similar way by supposing
the diagram to be extended into n dimensions; *if there are n commodities;* or dealt with
on the same principle, by an algebraic treatment instead of
a purely geometrical one.

The case where savings exist is covered by this treat-
ment, also, by regarding savings as one of the commodities
that the individual desires.

The more general case is that in which uncertainty exists.
(It is this more general case that the theory of the income
tax that we give attempts to cover). In this case the dia-
gram given would only apply at each instant of time. The
shape of the indifference curves would be altering from moment
to moment: the shape of the curve P Q would therefore like-
wise alter from moment to moment. If a time axis were to be
added to diagram I in addition to the axes O A, O B, the
diagram would then show the variation in the individual's
consumption of the commodity through time.

Let us suppose that this time-axis has been added to
diagram I. We would still be able to go behind the diagram
and explain in more general terms the phenomena that it
represents. The explanation would show how the individual,
when his income circumstances alters, must feel uncertain
as to the proportions in which he can best combine the
consumption of commodities A and B. Only after a period of
experimentation in which he consumes the two commodities in
varying proportions, will he come to feel assured that the
combination of commodities that he consumes is the optimum
one. Once this stage has been reached, he will always,
ceteris paribus, consume the commodities A and B in the
same proportions.

3. The preceeding analysis of the case has been purely formal. If we look at the problem in a concrete way, then we will envisage the changes that have been explained analytically, as going on in the consumption of actual commodities, cotton shirts, wheat, milk, housing, etc., If e.g., the increase in the income tax leads to an increase in the incomes of old age pensioners, or of men who are out of work on account of sickness, then we will envisage an increase in the purchases of cotton shirts, of food, of housing and of the other goods that are usually consumed by the working classes. We should expect to find an improvement in the grades of food that these classes consume; and we should expect the amount of money saved by them to increase.

At the other end of the income scale, among the richer persons on whom the payment of the tax rests, we should expect to find a falling off in the consumption of the commodities that they customarily consume. There would be, presumably, a falling off in the demand for country houses, expensive flats, boxes at the theatre, yachts, the more expensive kinds of foods and wines, and so on. Perhaps instead of going to the Riviera -- to take a colloquial example -- and hunting and shooting, all in one year, certain of these people would now hunt one year, in the next go to the Riviera, and shoot in the next again. If this were the case the falling off in demand would be to some extent concealed from the observation of the readers of pictorial journals: but evidence of the change during the short period would still be visible in yachts that were laid up and in falling prices of country houses. There is reason to believe that this represents what has actually happened in regard to the wealthier sections of the population of Great Britain, since the heavy increases in the income tax were imposed during the last twenty years.

On balance therefore, on account of the increase in
the income tax and the corresponding increase in the type
of public expenditure that we have mentioned -- viz., a
direct distribution of money to certain classes of
individuals in the community -- there would take place an
alteration in the demand schedules for the various goods
in our imaginary community.   A larger proportion of the
national income would now be consumed by the working classes
in the form of clothes, food, housing and amusements, and a
smaller proportion of the national income would now be
consumed in the form of expensive luxury goods by the rich.

4. As well as an alteration in the demand schedules of
the individuals in the community as a result of the tax,
there will equally be an alteration in the demands made by
the government for different commodities and services. The
government may increase its demands for certain commodities
and reduce those for others. The demand for educational
services (which are, let us suppose, paid out of government
revenues), for defence, for health and welfare clinics etc.
may have altered.

Discussion of the case of defence is perhaps easiest
to follow; and it is sufficient to show most of the issues
involved. The government has decided, let us suppose, to
increase the size of its navy; orders will be placed with
the various shipbuilding firms. The firms already in the
industry and with an established reputation will in this
case, tend to benefit from the diversion of purchasing power
on to naval defence.   In the case of some other types of
governmental expenditure, new firms might perhaps tend to
benefit equally with the firms that had previously been in
the industry.   Such a case might arise, e.g., where a
government has undertaken a policy of introducing certain
changes _{very} gradually. If so there will be no ~~rush~~ ^{haste} to have

5.

orders carried into effect. New firms may, owing to the increased demand for a particular commodity, be induced to enter the industry in question. If the industry is one in which a long established reputation -- such as is essential in ship-building -- is not essential, this will facilitate the entry of new firms. In general terms, the lower the costs of entry into the industry, for whose produce, as a result of the tax, demand has increased, the greater will be the advantage to those factors which, before the tax, had been employed in other industries. This is true for labour and capital factors both.

To give an example, the costs of entry of new factors into the heavy industries are high: labour requires a long training before it becomes skilled; firms require a long existence before they gain a reputation. If a government hastens to rearm, to build a railroad, etc., it will be the already existing firms, and the labour factors already in the industry, that will benefit most.

It is plain therefore, that the alteration in the structure of demand in the community, through the alterations in the consumption of service and commodities on the part of the government, may play a large part in determining the path of the change towards the new equilibrium.

5. In the resulting process of economic change that is set in motion from the side of demand, the time element is likely to be of considerable importance. If battleships be ordered in a hurry, the already-existing firms and the factors that they employ will very quickly enjoy increased remunerations. To begin with these benefits will accrue perhaps, to the ship-building firms and producers of steel: after that perhaps, to ships' joiners, painters, electricians and suppliers of ships' furnishings. Positive quasi-rents accrue to ship-yard owners and to steel companies in the first

instance, and to all the factors employed by them.*   As
these positive quasi-rents reach their peak and begin to
fall, the quasi-rents for the second group, ships'_furnishers,
etc., will begin to grow.   In time the quasi-rents of these
ships'-furnishers will also subside, and those of the people
who constitute the personnel of the navy and man the battle-
ships that have been built, will begin to rise.   The waxings
and wanings of these different series of quasi-rents further
illustrates the importance of the time element in the whole
process.[1]

If the firms benefitting from these increases in govern-
ment demand bid away factors of production from other employ-
ments, then the capital-owners in these other lines of
production (e.g. the building of merchant vessels, the
building of steel bridges etc.) will tend in the short period
to experience negative quasi-rents which will vary through
time.

Perhaps, however, the extension in governmental functions
will be of a type more closely related to the system of pro-
duction than say, military preparations.   It may be, for
example, that additional road-making or road improvement
is undertaken.   In such a case the factors engaged in
making roads will benefit.   In addition some of the
factors of production which are best in a position to make
fullest use of the roads will benefit: the process of
production has been facilitated for these and they will now
be able to produce at a lower cost.   Not all of such
factors need benefit, however. For some of the factors

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* Using the term 'positive quasi-rent' to denote a return
    greater than normal.

1. Pugliese, "Un imposta sul reddito lordo delle imprese
    speculative e i suoi effetti," Giornale degli Economisti,
    1933, gives a good discussion of the time element in
    such economic changes.

when the change takes place, there may be a reduced demand.
To show both these possibilities of betterment and improve-
ment of the position of different factors, we may imagine
the case in which some of the road transport firms extend
their business, capturing part of the traffic of the rail-
ways.   But even so, these road transport firms, if the
passage of their goods have been rendered much easier, may
now employ fewer units of certain types of labour than they
formerly had done.   The position of these labour factors
will, in the short period at any rate, be worsened.

6.   In the long period it will still be the case that as
a result of the income tax the country's income is spent to
a greater extent by the poorer classes, and also by the
government on defence, justice etc., than would otherwise
have been the case.   The proportion of the community's
goods that these classes consume will have increased: the
proportion that the rich classes consume will have diminished.

In regard to prices over the long period, by then the
plant of the community will have become adapted to the new
state of demand: some industries will be on a greater scale
than initially, others on a smaller.   The industries for
whose commodities demand is relatively greater, will have
drawn factors of production away from the industries for
whose commodities demand has fallen off. If in the long
period factorial prices have come to stand at the same levels
as initially, then those goods that are consumed by the poorer
classes and by the government, and that are produced under the
law of decreasing costs, will have fallen in price: those
produced under the law of increasing costs will have risen
in price: those, and they are likely to be the most important
classes, that are produced under the law of constant costs*,

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*   See Sraffa, _Economic Journal_, 1926, pp.538-541.

will be at the same prices as they had been initially. In the same way the most important classes of goods consumed by the wealthier classes will be likely to be the same in price as initially.

Actually, we go on to show, over the long period the supply of the factor labour and the supply of the factor capital will alter. One of these will become more plentiful relatively to the other than it had been initially.* In this case a good, whether consumed by the rich or by the poor, will fall in price relatively to another good, if it uses in its production a greater proportion of the factor which has become more plentiful.

A simple algebraic proof of this can be given.

Consider the manufacture of two commodities a and b. Let $a^n l$ and $a^n c$ be the number of units of labour and capital respectively, both before and after the tax, employed in the manufacture of a; and let $b^n l$, $b^n c$ be the number of units of labour and capital respectively employed in the manufacture of b.

Let the initial price of labour and of capital be $_1P_l$ and $_1P_c$ respectively; and their final prices $_2P_l$ and $_2P_c$ respectively.

Let the initial price of a be $_1P_a$, its final price $_2P_a$; and the initial price of b $_1P_b$, its final price $_2P_b$.

The ratio of the price of a to the price of b initially

$$= \frac{_1P_a}{_1P_b}$$

$$= \frac{a^n l \quad _1P_l + a^n c \quad _1P_c}{b^n l \quad _1P_l + b^n c \quad _1P_c}$$

The ratio of the price of a to the price of b finally =

$$\frac{_2P_a}{_2P_b}$$

$$= \frac{a^n{}_l \; 2^P{}_l \; + \; a^n{}_c \; 2^P{}_c}{b^n{}_l \; 2^P{}_l \; + \; b^n{}_c \; 2^P{}_c}$$

From the above,

$$\frac{1^P{}_a}{1^P{}_b} \gtrless \frac{2^P{}_a}{2^P{}_b}$$

according as

$$a^n{}_l \cdot b^n{}_c \cdot 1^P{}_l \cdot 2^P{}_c \; + \; a^n{}_c \cdot b^n{}_l \cdot 1^P{}_c \cdot 2^P{}_l$$

$$\gtrless \; a^n{}_c \cdot b^n{}_l \cdot 1^P{}_l \cdot 2^P{}_c \; + \; a^n{}_l \cdot b^n{}_c \cdot 1^P{}_c \cdot 2^P{}_c$$

i.e., according as

$$\left(a^n{}_l \cdot b^n{}_c \; - \; a^n{}_c \cdot b^n{}_l \right) \left(1^P{}_l \cdot 2^P{}_c \; - \; 1^P{}_c \; 2^P{}_l \right) \gtrless 0 \qquad (\delta)$$

This expression will be > 0 *if* ~~we~~ either both factors are positive, or both negative.

This is if

$$\frac{a^n{}_l}{a^n{}_c} > \frac{b^n{}_l}{b^n{}_c} \qquad \ldots\ldots \qquad (1)$$

and

$$\frac{1^P{}_l}{1^P{}_c} > \frac{2^P{}_l}{2^P{}_c} \qquad \ldots\ldots \qquad (2)$$

or else if

$$\frac{a^n{}_l}{a^n{}_c} < \frac{b^n{}_l}{b^n{}_c} \qquad \ldots\ldots \qquad (3)$$

and

$$\frac{1^P{}_l}{1^P{}_c} < \frac{2^P{}_l}{2^P{}_c} \qquad \ldots\ldots \qquad (4)$$

10.

Let us suppose that labour has become relatively more plentiful than capital, so that the price of labour in relation to that of capital is lower than in the initial situation. Then condition (2) is satisfied. And the condition that the price of a in relation to that of b will be less than it has been initially is that (1) will be satisfied, that is that

$$\frac{a^n \ell}{a^n c} > \frac{b^n \ell}{b^n c} \quad ;$$

that is that the manufacture of a employs a relatively greater proportion of labour to capital than does the manufacture of b.

The other cases of the inequality (8) yield conclusions that have been the same import.

7. The populace of each community consumes not one but two sets of commodities, divisible goods and indivisible goods. Divisible goods are those goods that are bought by individuals in the market, and for which a market price exists. The other type of commodity, indivisible goods, consists of goods which are not demanded and supplied in the market by individuals in this way: they are the goods supplied by the government and consumed by the people in the community. Instances of such goods are justice as administered by the law-courts, and defence against an external enemy.

As a result of the increased income tax the government out of its increased revenues may supply more[*] of such indivisible commodities to the community. At any rate the constellation of supplies of such indivisible commodities will have altered. The navy may have been strengthened, let us say, and more law courts built. This shows that <u>people</u>

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[*] "More" is intended simply in the sense that the total cost of rendering such services has increased.

11.

now consume these indivisible commodities supplied by the
government to different extents from formerly.   This in-
deed may have been one of the most important economic effects
of the increase in the rate of the income tax.

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12.

C H A P T E R XI.

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The Effect of the Income Tax on the Supply of Labour per Individual.

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1. We will suppose in this Chapter that the number of individuals in the community remains unaltered; and that the industrial and employment opportunities with which each individual is confronted also remain unaltered after the tax in imposed.

When the increment in the income tax is imposed the people in the community who have to pay it, experience a reduction in the amount of income that they receive from each unit of their labour output. For example a doctor who formerly had received ten shillings for a visit to a patient may now receive after paying two pence in income tax to the government, only a net nine shillings and tenpence. A barrister for the last or marginal brief prepared by him in the initial state of equilibrium perhaps had received £30. Now, after payment of income tax he may only receive for the same brief £29.15.0. A worker again, may perhaps now receive for a day's labour nine shillings and elevenpence in place of ten shillings as formerly. Will the people whose incomes are reduced by the tax in this way work longer or shorter hours than they had done formerly ?

Professor Knight has argued that when an income tax is imposed, each individual, as a result of it, will necessarily increase his supply of labour. His argument can be summarized as follows ⚹ In the condition of affairs after the tax has been imposed, he says, each individual, if

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⚹ F.H. Knight, Risk, Uncertainty and Profit, pp.117-8. This bird's eye view of Knight's argument is due to R. Frisch, New Methods of Measuring Marginal Utility, p.100. Frisch's work is the outstanding treatment of the whole problem.

he continues to work the same number of hours as before
will have a smaller net income. The marginal utility
of a unit of this smaller income will therefore be greater
than the marginal utility per unit in the initial state of
affairs. Hence in the new situation the last unit of each
commodity that he purchases will have to afford him a
higher utility than the last unit of that commodity had
done to begin with. This can only be the case if the
individual purchases less of each commodity.

One commodity that the individual purchases, however,
is leisure. The individual as a result of the tax there-
fore, must consume a smaller quantity of leisure than he
had done to begin with. His hours of leisure are fewer;
that is he works longer hours than he had done to begin
with.

Knight's argument, it is true, recognizes that when an
income tax is imposed a change takes place in the utility
of a unit of income to the individual. But it does not
take into account that when the tax is imposed, among all
the commodities consumed by the individual one, and one only
has altered in price - the price of leisure has fallen. The
doctor in the arithmetical example can now purchase leisure
equal in amount to the time of one visit, for nine shillings
and tenpence instead of ten shillings as formerly. Similar-
ly, the price of leisure to the barrister and the workman
has fallen. Because of this fall in the price of leisure
the individual may possibly be induced to purchase not
less but more leisure, after the tax, than he had done to
begin with.

2. Work for the individual is fundamentally an exchange
of leisure in return for income. It is just as if he were
giving away some of the commodity A which he possesses,
(leisure), in return for the commodity B which he wishes
to acquire, (income).

2.

Now the price or exchange ratio at which the individual is able to effect this interchange between leisure and (net) income, will depend on the gross wage rate that industry pays to him, wage per hour say, and the amount of this wage rate that the government absorbs by its income tax. We will neglect at this stage of the argument, difficulties arising from the fact that, in the real world, an individual finds it difficult to obtain work except for a definite length of working day, say an 8-hour day; and our supposition will be that it is open to him to work whatever length of day he may choose on the same conditions as to wages,etc., as he would do for the 8-hour day.

In these circumstances the individual's gross rate of remuneration is a constant quantity, perhaps two shillings per hour, and is independent of the number of hours that he works. Yet his net rate of remuneration will vary with the number of hours per day that he works: because the rate at which he pays income tax, if it is a graduated tax, will depend on his size of income; which in turn depends on the number of hours per day that he works. When he is deciding the number of hours per day that he will work, it will be this net rate of remuneration that individual takes into account; in the same way as it is its net earnings and not its total receipts that matters to a firm in any line of business.

The effect of the tax on the number of hours per day that an individual works can be shown by means of indifference curves. Let leisure be measured along the axis Oy; along the axis Ox let net income be measured. The diagram has reference to a day's time. In it the indifference curves of the individual, showing his scale of preferences as between leisure and income,are drawn. (See diagram I).

There are 24 hours in the day; so that the maximum possible quantity of leisure that the individual can enjoy

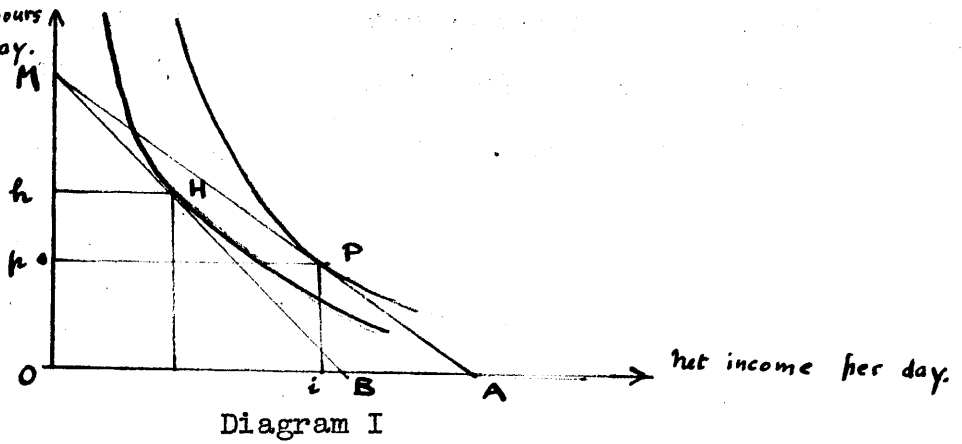will be 24 hours = O M in the diagram

n⁰. of hours leisure per day.

Diagram I

In the initial state of affairs, at the existing wage
rate if the individual were to devote the whole 24 hours of
the day to labour,(supposing this to be physically possible),
he would gain a total net remuneration per day equal to
O A in the diagram. Now it can be shown that in the ini-
tial state of affairs, if there be no income tax,* all of
the possibilities of exchange for the individual between
leisure and income are represented by points on the line
A M, joining the given points A and M.[1] Of the choices
that are open to him in this way the individual will select
that one which he most desires by coming to rest at the
point on the line A M at which this line becomes a tangent
to an indifference curve. It can be shewn that there will
be only one such point. When he comes to rest in this way
the individual will then be choosing as between leisure and
income in such a way as to reach the highest indifference

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* The case where in the initial state of affairs an income
tax, ⍵ither proportional or graduated, is in existence,
can be ˅~~taken into account~~. See the next footnote.
similarly dealt with.

1. In diagram I and also in diagram II the exchange ratio
between leisure and net income is shown as the slope
of a straight line. This corresponds to the case
where a proportional income tax is levied, from which
no income is exempt. In the case in which the mar-
ginal rate of the tax is progressive (or regressive),
the 'line' showing the exchange ratio between leisure
and net income will be a curve that is concave, (or
convex), to the x-axis. But the treatment will remain
substantially unchanged.

4.

curve in the system that it is possible for him to reach.
The individual with the system of indifference curves of
diagram I will attain equilibrium at the point P.

When he is in this position the number of hours worked
per day *by the individual can be got by taking* (24 hours - the quantity of leisure he consumes),
that is (O M - O P) = p.M. Initially the number of hours
worked per day = p M.

The effect of the imposition of the tax is to alter the
rate at which it is possible for the individual to exchange
leisure for net income. The gross rate of remuneration,
ex hypothesi, remains constant. He now pays income tax on
such remuneration: *his* net rate of remuneration is reduced
~~to him~~ as a result of the tax; and if, in these new circum-
stances, he were to devote 24 hours of the day to labour,
his total net income per day would be O B instead of O A
as formerly. All possible positions of equilibrium open to
the individual, now lie on the line B M. As before, the
position of equilibrium that the individual will select
will be that at which B M becomes a tangent to an indifference
curve. This, for the system of indifference curves of
diagram I, is at the point H.

After the tax the individual of diagram I will work h M
hours instead of p M as initially. That is, as a result of
the tax he will curtail his supply of labour by p h units.

Let us, however, draw another system of indifference
curves, as in diagram II, corresponding, say, to the tastes
of another individual in the community. And let the points M^1,
A^1 and B^1 have the same significance as M, A and B respective-
ly in diagram I. In diagram II the initial position of
equilibrium for the individual corresponding to the line of

Diagram II.

5.
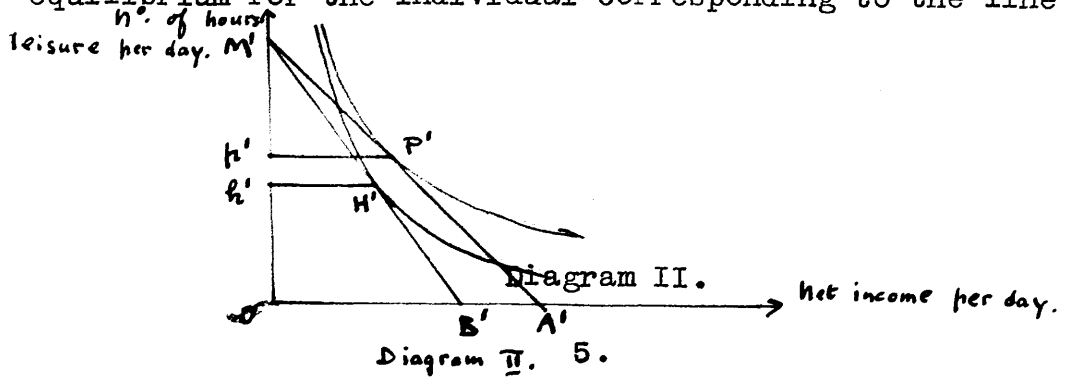
exchange $A^1 M^1$, between leisure and net income, would be the point P^1.   As before, the individual's line of exchange after the tax would be $B^1 M^1$ and his position of equilibrium the point H^1.

In diagram II the individual had, to begin with, worked $M^1 P^1$ hours per day: after the tax he works $M^1 h^1$ hours. In the final situation after the tax has been imposed, he works $h^1 P^1$ hours per day more than to begin with.*

Thus the individual whose indifference curves had the constellation of diagram I would contract his supply of labour when the tax was imposed: but the individual of diagram II would extend his.

No general rule therefore, can be laid down.   The outcome, whether towards a contraction or an expansion in the individual's supply of labour, depends on the shape of the indifference curves for the individual concerned.

3.   From an indifference curve diagram of the type that we have been considering, a further diagram can be derived in which only the two variables appear that directly interest us, viz: number of hours of labour worked per day and wage rate.   For example in diagram I if the point of equilibrium be P whose co-ordinates are (Oi, Op), we know that the number of hours worked per day $=$ p M .   Total income per day $=$ Oi.   The corresponding (net) wage rate is therefore given by $\dfrac{Oi}{pM}$.

Let us construct a diagram along whose y-axis net

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* The treatment we have given assumes that the system
  of indifference curves for each individual remains
  fixed and stationary: this is equivalent to the
  assumption that no uncertainty exists. To take into
  account the effects of uncertainty we would recognise
  that when the tax is imposed experimentation is forced
  on the individual, as regards the consumption of
  indifferent combinations of leisure and other goods.
  A consequence of this is that his scale of preferences,
  i.e. his system of indifference curves will itself alter
  through time; and the direction in which, or the rate
  at which his labour supply tends to alter, will itself
  vary with time.

wage rate is measured, with number of hours worked per

day along the x-axis.   This gives us a curve of supply

of labour for the individual concerned.(See diagram III).

net wage rate
per hour.

Diagram III.

n°. of hours
worked per day.
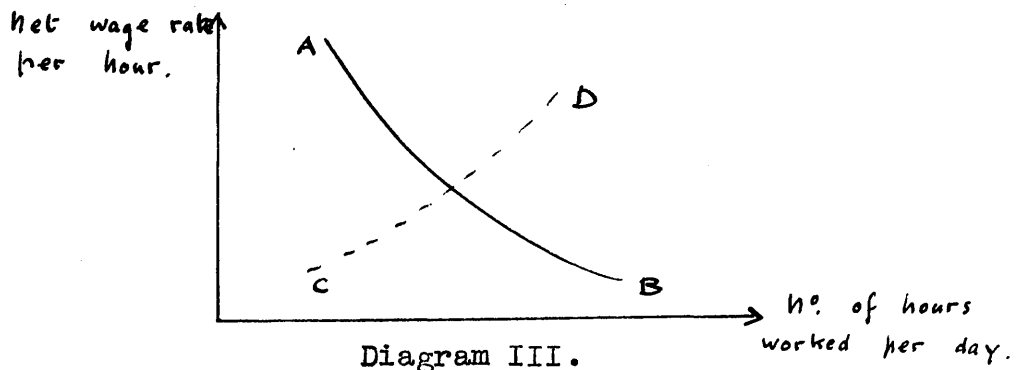
A B is the supply curve of labour for one individual:

C D that for another individual.

Our analysis relating to indifference curves has shown

that when a tax produces a reduction in the net wage rate

per hour, then the number of hours per day that the indi-

vidual works may either rise (curve A B) or fall (dotted

curve C D). Each of these cases is theoretically quite

possible of occurrence. The case applying to the individual

will depend on the shape of his indifference curves.

4. While it is theoretically possible that the labour

supply curve for any individual should be either downsloping

or upsloping, in fact, for people in the lower income strata,

the curve is, on the average, downsloping. This has been

shown by Douglas for populations in the lower income

strata, in the United States.*   No statistical information

has yet been collected as to the response of people in the

middle and upper ranges of income to changes in their rates

of remuneration.

It need hardly be said that Douglas's findings in this

regard apply only to industrial workers on the average, and

are not necessarily true for all workers. Individual

* Paul Douglas, Theory of Wages, Chapter XII.
  Frisch, op. cit. pp.98-9 and Pigou, The Economics of
  Stationary States, Chapter XXXI also take the view that
  for the average individual in the lower income classes
  the supply curve of labour is downsloping; although, like
  Douglas, they emphasize that the statistical information
  available on the point is of the scantiest.

7.

persons, we should expect, will be affected by a given wage alteration to different extents; and some individuals may even react in an opposite way to the average.

Since on the average the curve of supply of labour for the lower income classes is downsloping, people in these classes will be willing to work longer hours when an income tax, <u>ceteris paribus</u>, is placed on their wages. In practice, however, the workers in most countries pay but little towards the income tax. Exemption from the tax is usually granted until the person's income attains a certain height; deductions in payment of the tax are permitted for children in the person's family; and taxes are for the most part imposed at a less rate on "earned" income as compared with "unearned". In this way it comes about that in a country whose tax and income distribution is similar to that of Great Britain or the United States, a majority of the workers are exempted altogether from payment of income tax; and many of those who do pay the tax on the wages that they earn, are affected to only a very small extent. The extension in the supply of labour of such workers on account of income tax therefore will be of small amount.

From the other side of the equation, when the government distributes the tax proceeds in its public expenditure, the benefits will go in some measure to the working classes, perhaps taking the form of different kinds of subsidized insurance, cheaper medical services, cheaper houses, and pensions of various kinds. Each person who benefits from this expenditure, whether through the receipt of increased purchasing power, or through the cheapening of certain services, to him, will be in possession of a larger real income than before. Money will now possess for him a lower marginal utility than it formerly had done. He will tend to increase his consumption of the different commodities that he enjoys, and one of these commodities is leisure. Most

individuals in the community will, through the expenditure of the proceeds of the income tax, tend to diminish the number of hours that they work.*

On balance the income tax, taking into account both its collection and its expenditure, will tend, _ceteris paribus,_ to reduce the supply of labour in the community.

5. Let us examine the further economic effects that will follow when a reduction in the supply of labour per individual comes about in this way. Owing to a number of rigidities, such as psychological inertia and the difficulty of altering existing wage and hour agreements, it is unlikely that the hours of labour worked in industry will be reduced from say, 8 to $7\frac{1}{2}$, until a fairly considerable period of time has elapsed. Instead, to begin with, various methods of slowing down work and making it less intense, are likely to be adopted. Piece-work may be abandoned in favour of time-work; "bonus" systems may be abandoned and more holidays introduced as an indirect means of reducing hours of labour per day on the average. These changes will secure to the workers a fuller satisfaction of their desires in relation to income and leisure.

Acting over the long period, the reduced willingness on the part of the workers to supply labour will succeed, through a gradual remodelling of the terms of bargaining, in bringing into existence a shorter working day. The workers will then take out a larger portion of their incomes in the form of leisure and a smaller portion in the consumption of material goods.

In each industry there will be a number of workers probably, who will experience, when the tax is imposed, a

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* The effects of education and some other factors are
    neglected in this discussion.

change in their willingness to supply labour that is
different from that of ~~the~~ most other men in the industry.
To such workers this new difference from their fellows
will be a source of psychological strain: it will diminish
the attractiveness of their own industry to them and in-
crease the relative attractiveness of some others. This
factor will tend to bring about a change in the personnel
of each industry and will act as a tendency towards change
in the numbers employed in each industry. Its quanti-
tative importance, however, is not likely to be great.

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The size of population of any group, in any locality, will depend on two factors, the birth rate and the death rate for that class. Its net fertility rate (birth death rate) and given the rate at which the population of that class increases in size.

C H A P T E R XII.

The Effect of the Income Tax in Changing the Size
of Population in Short Periods and in the
Long Period.

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1. The Income Tax will exercise an effect on population
through the redistribution of purchasing power that it brings
about in the community.   Some classes are rendered richer
by it, other classes poorer than they were before.   The
classes that are richer will on that account tend tò produce
a larger or a smaller number of children than they had done
formerly.   There will be a reaction also on the numbers in
the classes that are poorer.

The size of population of any given income class in the
community, will depend on two factors, the birth rate and the
death rate for that class. Its net fertility rate = (birth
rate _ death rate), and gives the rate at which the population
of the class increases in size. Initially since the com-
munity that we are considering had been stationary in numbers
and of a stable age composition, the birth rate for each
income class must have been equal to the death rate for that
class (neglecting possibilities of immigration into and
emigration out of that class).

Let us examine the time-variation in population caused
by the income tax, both by its collection and by the expendi-
ture of its proceeds, on the birth and death rates of the
different income classes.   For convenience we speak as if
the community concerned were fairly similar in its government
and state of development to England or the United States at
the present day.

This time-variation of population is more complicated than
the usual case in economics, in which the tendency for each
variable is to move progressively from its initial level

towards the long period adjustment. In the case of population, we will see, the movement is not always in a straight line towards the final position: sometimes the movement is in one direction, sometimes in another, depending on the period of time that has elapsed since the imposition of the tax.

2. Effect on the Death Rate in the Short and in the
   Long Period.

The revenue that has been provided by the new tax increment that has been imposed, is used partly, we assume, to help to finance such things as improved schemes of sanitation, welfare clinics and other measures designed to improve the community's health. They will produce an effect in lowering the death rate that will be felt gradually and will gain slowly in strength. Over the long period the money devoted to these schemes will bring about a determinate lowering in the death rate and a determinate increase in the average length of life of people in the community. Old age and other pensions, will also exercise some effect in lowering the death rate.

There will therefore in the short and in the long period be a movement, as a result of the income tax, towards a lowering in the death rate. The movement in death rate will be continuous until the final position is reached when the death rate stands at a new level lower than that from which it set out.

3. Movements in the Birth Rate of the Lower Income Classes in the Short Period immediately following on the imposition of the income tax.

The redistribution of purchasing power brought about by the income tax is equivalent in its effects to an increase in the wage rates of the poorer sections of the population whom the expenditure of the tax proceeds largely benefits,

coupled with a reduction in the net incomes of the richer sections of the community, on whom, to a large extent, the tax is levied, and who receive little direct benefit from it.

The effect in the short period of an increased purchasing power that had come into the hands of the lower income classes, either through, say, higher wage rates, or through increased governmental expenditure favouring these classes, would appear likely to be to increase the number of marriages that take place in the income strata affected, and to increase the number of births per family for the couples who already are married.

It has been verified by Douglas that a positive correlation exists between short period movements in wage rates and short period movements in the birth rate. He did this by fitting a straight line curve to the statistics of wage rates in the United Kingdom, traced over the period of time 1861-1912, and in Massachusetts for the period of 1889-1929. The ratio of the actual value of the wage rate for any year, to the trend value for that year, he defined as the "trend ratio" of wages. In the same way he fitted a straight line curve to the statistics of the birth rate over the same period and obtained the series of trend ratios for the birth rate. He then found the following correlations to exist between the movements of the statistics in the two series.

Table I.

Coefficients of Correlation between Trend Ratios of Relative Real Wages and of Birth Rate.*

Country.	Period.	No lag.	Births lagged one year.	Births lagged two years.
England & Wales.	1861-1877	+ .23	+ .28	+ .22
	1878-1912	- .38	+ .05	+ .36
Massachu-setts.	1889-1929	+ .58	+ .55	

* Douglas, The Theory of Wages, p.391 and pp.396-7.

This confirms our expectation that short period rises in wage rates would be followed by short period increases in the birth rate. Thus we may take it that in the analagous case of an increase in the income tax, when its proceeds are partly expended so as to benefit the economic position of the poor, there will likewise be an increase in the birth rate of these classes.

. In the initial state of equilibrium the number of births per year had been equal to the number of deaths per year for each income class. In the short period immediately following the imposition of the income tax, the death rate will have changed but little, while the birth rate of the lower income classes has increased. The population of these classes, therefore, will be increasing.

Even though the birth rate of the richer classes were, during the short period immediately following on the imposition of the tax, to fall somewhat, these classes are not so important numerically as the lower income classes. On balance therefore the population of the country as a whole in the short period immediately following on the imposition of the tax, will show an increase.

4.   Effects on the Birth Rate of the Lower Income Classes, and of the Higher Income Classes, after the lapse of a Further Period of Time and in the Long Period.

It is a well known feature of modern vital statistics that the birth rate for different social classes is negatively correlated with the income or social rank of these classes. The explanation of this falling off in birth rate, as income increases, appears to be that a family, when its income is increased, comes to appreciate more keenly the advantages that attach to an improved standard of living. It comes also to be more ambitious to extend a better education and a better start in life generally to its offspring. To achieve this the

parents limit the size of their family, either by the exercise of moral restraint, or by an increased use of the methods of contraception.

The increase in the welfare of the lower income classes as a result of the tax, has the same effect as a displacement of these classes upwards on the scale of income: and, given a longer period then we had initially envisaged, there is reason, both from the side of statistics and from general reasoning to expect a fall in the birth rate of these classes to set in.

An historical digression, in elaboration of this view, may here be of some assistance. Investigations that have been made into population show that in England before 1877, rich people and poor people had approximately the same number of children in their families.* In that year the trial of Bradlaugh and Besant on a charge of publishing a piece of indecent literature caused it to be known among the reading public, which was considerably narrower then than it is now, that methods of contraception existed. To begin with this knowledge was confined for the most part to the rich and well-to-do classes: only gradually did the knowledge filter downwards to the poorer classes: with the result that even at the present day the richer the class of people concerned the more use does it make of contraceptive methods. This is well brought out by a table of statistics quoted by Himes and based on conditions in the U.S., English experience may be presumed to be fairly similar. The table shows the percentage of the very poor, the poor etc., out of a large sample, who make use of contraception.

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* G.U. Yule, The Fall in the Birth Rate, p.22.

Table II.[*]

The Practice of Contraception in relation to Economic
  Status.

	Very Poor.	Poor.	Moderate Circumstances.	Rich.
No contraception.	67%	61%	49%	22%
Using contraception.	33%	39%	51%	78%
Totals:	100%	100%	100%	100%

The table shows e.g., that two thirds of the very poor
people in the sample were making no use of contraception
and only a fifth of the rich in it were not using it. Of
the imtermediate groups in the sample, it was true, that, the
higher the economic status of the group, the more the use did
it make of contraception.

As a result of this feature of social life it has come
about that in the period following 1877, the richer the class
of people and the higher its economic status the smaller has
been the average size of family. Stevenson gives the follow-
ing table based on the figures of the Population Census of
1911. Social status descends as we move from Class I in
the table to Class V. At the top Class I comprises the
rich and middle class; and at the foot of the scale Class V
represents unskilled labour.

Table III.[1]

Fertility of marriage distinguished by social
  Class, for England and Wales.

Social Class.	Children born per 100 families.
I.	190.
II.	241.
III.	279.
IV.	289.
V.	337.

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[*] N.Himes, "New Light on the causes of the Declining Birth
   rate"in Economics Sociology and the Modern World, Essays
   in honour of T.N.Carver, edited by N.Himes, p.314

The higher the social class and the higher the income the smaller the number of children born to the average family in it.

Let us now apply this knowledge to the theory of the effects of the income tax over the long period. When, through the collection of the tax and the expenditure of its proceeds, the poorer classes in the community benefit, the figures that we have cited strongly suggest that once they have become adapted to the new higher standard of living, extended to them by the income tax, the poorer classes will tend to restrict the number of children in their families more than they had done in the equilibrium position from which the population had started out.

Hence we consider that although in the short period immediately following on the imposition of the tax there will be a rise in the birth rate of the population, after the lapse of a further period of time this rise in the birth rate will be more than annulled by the opposite effect of a fall in the birth rate. And it seems that the fall in the birth rate will, in all probability, carry sufficiently far to cause, even taking into account the slight downward movement in the death rate, a fall, on balance, in the size of the population.*

It is of some interest to trace the probable course of the birth rate for the richer classes during the same period

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1. Footnote from previous page:
   Stevenson, "The Fertility of Various Social Classes in England and Wales from the Middle of the Nineteenth Century to 1911", Journal of the Royal Statistical Society, 1920, p.410.

* In view of the emphasis with which the Classical economists reiterated that the social services – then the Poor Law -- would increase population, it is interesting that neither Griffith nor Blackmore and Mellonie can find evidence of it having in fact led to such increase. See W.T. Griffith, Population Problems of the Age of Malthus, pp.151-165; and Blackmore and Mellonie, "Family Endowment and the Birth Rate in the Early 19th Century", two articles in the History Supplement of the Economic Journal for May 1927, and January 1928. See also Clapham, An Economic History of Modern Britain, Vol.1,p.54.

of time. These classes will be in receipt of lower incomes
than they had been formerly. Table III. again shows that
a negative correlation exists between income and the birth
rate. Would this lead us to expect a rise in the birth rate
for those classes whose incomes, due to the income tax, have
now fallen ? The answer would seem to be No. The existing
negative correlation has come to hold good in a community in
which all classes, including the higher income classes, have
been coming into possession of continuously increased incomes,
and have been coming to possess a wider knowledge of the
methods of birth control. But the process is not a reversi-
ble one. If, as now, we envisage the incomes of the rich as
being diminished by the imposition of the income tax, the
knowledge of birth control of these richer classes will not
on that account, tend to diminish and become closer to that
of the class next in order below them in the social scale.
Thus we cannot accept the correlation between class and birth
rate given in Table III   as holding good in the case of
taxation of income of these richer classes. Indeed neither
statistical nor historical investigation affords any direct
parallel. Thus as regards the effect on population in the
upper income classes whose money income has been reduced,
we feel that we must shun the existing correlations and
rather rely, for our estimate of the future, on general reas-
oning.

If we consider the notions and feelings of the rich
people concerned, they have suffered a fall in standard of
living of which they will be acutely aware. We should expect
them to endeavour so far as possible to attempt to conserve
their standard of living; and this would lead them to further
restrict the number of their children. Knowledge of the
methods of birth control is certainly widely enough diffused
among the rich classes at the present day to enable them to
give effect to any desire they may have to restrict numbers.

8.

Our conclusion therefore is, that when an income tax is imposed, both in the short period and in the long period after the imposition of the tax, numbers among the richer classes should be expected to fall.

5. Summary of the Movements in Birth Rate, Death Rate and Size of Population.

The movement that will take place in the death rate of the community as a result of the imposition of the tax and the expenditure of its proceeds, will be a slow fall. The movement that will take place in the birth rate will be, in the initial stages a rise: after that a fall will set in. For a time we envisage birth rate as being below death rate in the population and the total population as declining.

In the long period, however, size of population must be constant: birth rate must then be equal to death rate. Hence in the intervening period either birth rate must fall to a sufficient extent as to be equal to death rate, and this seems improbable of occurrence in practice: or else birth rate must, after a time, rise so as to be equal to death rate. We accept this, which seems the more likely of occurrence, as being what actually does happen in our community. We give in diagram I a sketch of the movements in birth rate, death rate and total population that we expect to take place. In particular the total size of population in the final situation is smaller than that from which it had started out; and the average length of life in the new state of affairs is longer than it had been to begin with.

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* An assumption that we have made is that the population starts out from a certain stable size and finally attains to another stable size. Chapter VIII, section 6, supra.
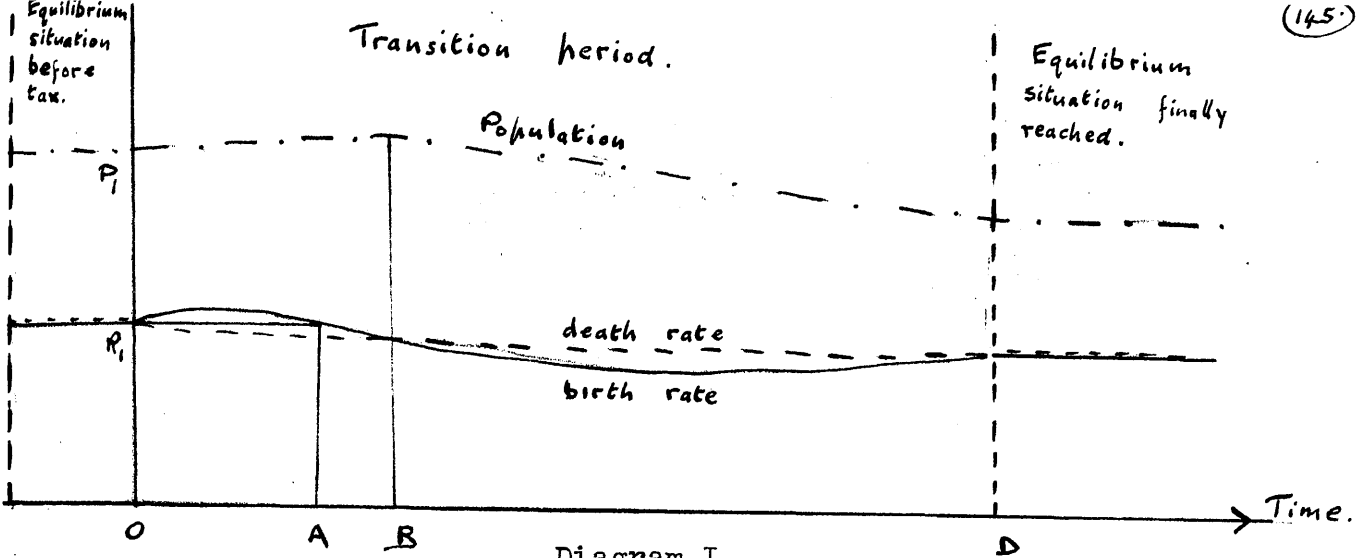
Diagram I.

The tax increment is imposed at time O.

The horizontal straight line drawn through the point R_1 meets the curve of birth rate at time O A. Birth rate has then fallen again to its initial height.

Population reaches its maximum at time O B, the point at which birth rate is equal to death rate.

The view that we take in regard to the effect produced on population in the long period agrees with that expressed by Wright, who says that, apart from direct propaganda in favour of birth control, if it were desired to bring about a reduction in the numbers of the class of unskilled labourers then "the most effective means towards that end appears to be a rise in the standard of life, improved social conditions and better housing accommodation, as long as these benefits are not obtained at the expense of parental responsibility."[*]

When we estimate that the behaviour of the size of population will be of the fashion described we are being, of course, purely empirical: we are stating the result that appears most likely to occur in a country about the present stage of economic and cultural development as Great Britain and which is ruled by a democratic government. The manner in which the tax proceeds are spent as well as the stage of cultural development of the country will influence the size and nature of the population change. In countries subject to

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[*] H. Wright, Population, p.165.

dictatorships a rise in population might even take place over a considerable period of time, owing to the nature of the public expenditure financed by the tax. Such a population increase is likely at any rate to be an aim of the dictators, though their instruments for carrying out this aim may prove inadequate.*

6. In the period during which the size of the population is altering, the age composition of the population will be altering as well; and from the point of view of the economic results it produces, the altering age composition of the population, while it is taking place, may be hardly less important than the altering total size. In the initial stages after the tax has been imposed, babies and young people will be more plentiful in relation to people in the other age groups, than had been the case to begin with. Producers whose goods are purchased or used mainly by young people will experience to begin with an expansion in the market for their goods. Later they will find their markets contract. In particular where these goods are durable and not readily put to other uses, the fall in the incomes of the people concerned will be heavy. If in the early stages there had been correct adjustment, then in the later stages there will be "excess capacity" in the plant of such industries. Such industries will include the school-teaching profession and others that cater for the needs of babies, nursing mothers and young people.[1]

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* See D.V. Glass, The Struggle for Population, especially Chapters II - IV.
Glass mentions that the earliest Act of the German Government to stimulate birth and marriage rates, the Marriage Loan Act of 1933, was financed by an income tax. Op. cit., p.22.

1. L. Robbins, "Some Probable Consequences of the Advent of a Stationary Population in Great Britain, Economica, 1929.

CHAPTER 13.

The Effect of the Income Tax on the Quantity of Capital in the Short and in the Long Period.

1.   In order to analyse the effect on capital of the increment of tax that has been imposed, we make the following assumptions.

(i) We assume that no unit of the labour force in the community is unemployed; in the sense that if any unit of labour is willing to accept work at a certain weekly wage and if an employer is willing to hire it at that wage, then it is open to both labourer and employer to contract accordingly.

This hypothesis, on account of certain trade union regulations, would not be quite true of the situation as it exists in Great Britain today.

(ii) In order to render the conditions of the problem definite and get a determinate solution, we must make certain assumptions as to the nature of the policy pursued by the banking system in the community.   The banking system might quite logically be supposed to pursue any definite policy whatever.   The price movements, capital and population movements would differ with each different policy that was assumed. Let us in fact make the supposition, that the banking system of the community maintains M, the volume of money, constant.   We suppose, that is, that the banking system always lends out to industry just that quantity of money that its depositors entrust to its keeping.

2.   Let us choose any individual whatever in the community. He will have definite tastes and definite family responsibilities. It seems reasonable to suppose that, if the individual's income had been greater, then in the long period and given time for his consumption and expenditure to become adapted to their equilibrium level, he would have saved either the same amount or else more than he actually does do at his present level of

1.

income;   and that of all the individuals in the community there
will at any rate be some who will save more in ~~this way~~ *such circumstances.*

Hence if net income be measured along the x - axis,
i.e. income net of all expenses necessarily entailed in the earning
of it, and total savings per year along the y -axis, then the long
period curve of supply of savings S_{ℓ} for any individual will either
be horizontal or else slope unwards, and for some individuals at
any rate at their pres&nt level of income the curve will be upward-
sloping.   For the individual in the diagram, (see diagram 1), the
long period curve of savings S_{ℓ} is shown with a horizontal patch.

Let us now consider the situation in the short period of
the person on whom the increment of income tax has been imposed.
He has, for a number of years before the levy, been in receipt of
an income OI_1 say, (diagram1).   He has become accustomed to living
at a certain standard and saving a certain sum per year.   His tastes
and his mode of life have become adapted to that level of expenditure.
In the early stages after the imposition of the tax the person will
find it difficult to contract his standard of expenditure.   He will
tend to postpone the day of a reduced standard, and at this   early
stage after the imposition of the tax will prefer to meet his tax
payment by a reduction in his rate of saving.   Only gradually and
as further time passes will he curtail the amount of his customary
expenditure and restore the level of his savings nearer to its
former level.   That is the ~~move~~ *curve* of supply of savings, S_S, of the
individual for any short period, will, to the left of the point I_1,
lie below the long period curve S_{ℓ}.   The greater the length of the
short period of time that has been allowed to elapse, the nearer will
the position of the curve S_S be to that of the curve S_{ℓ}.

DIAGRAM 1.

2.
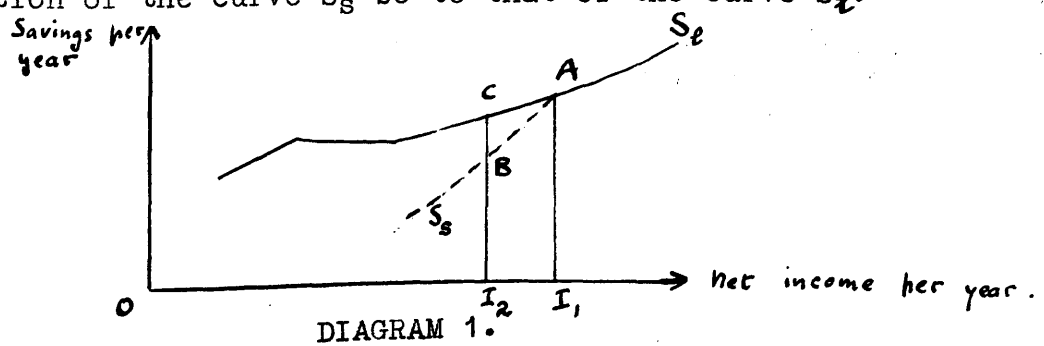
3. In these circumstances let us consider the influence that the tax will have on the short period supply of savings.

The tax assessment on the particular individual concerned, reduces, let us suppose, his net income from the level OI_1 to OI_2. In the short period of time to which the curve S_s has reference, the individual's savings will fall from the level I_1A to I_2B.

Total savings in the community had been initially at the rate ΣI_1A. After the lapse of the short period to which the curve S_s has reference, the total rate of savings of the community = ΣI_2B, which is below the initial rate. Hence as a result of the imposition of the income tax the community's rate of saving will decline. [*1]

It is true that as a result of the expenditure of the proceeds of the tax, incomes in the lower income strata of the population will have increased. The money incomes of the people in these classes will have been increased by sums distributed to them directly e.g. as pensions or insurance payments, by the government: their real incomes will have been further increased by services rendered to them by the government either free or below their competitive market prices; e.g., medical or educational services. On account of these increases in their incomes the poorer classes will now tend to save more than they had done formerly.

[*1] An assumption underlying this method of reasoning is that gross rate of remuneration of each individual in the community remains unchanged, as between the date when the tax was imposed and the point in time to which the curve refers. The treatment only holds good for the length of time for which this assumption can be made with fair accuracy. The shorter the period the more nearly fulfilled will the assumption be.

Yet the movement from this source, towards restoration of the level of savings of the community, as compared with the movement towards a decline, will be small: because in a community situated like Great Britain or the United States, say, the poorer classes make only a comparatively small fraction of the community's total saving. Increased savings by the poorer classes will only annul in small part the tendency we have found towards a reduction in the savings made by the richer classes.

As a result of this contraction in the rate of saving there will be, in the short period, a contraction in the volume of the community's capital and a rise in the rate of interest.

In calculating the extent by which the rate of interest will rise in the short period owing to the reduced flow of savings, two further factors must be taken into account. The current savings of a country form only a small portion of the country's capital --- and the rate of interest is determined by the intersection of the community's supply curve of capital and its demand curve for capital. Thus Stamp has calculated that the national wealth of Great Britain amounts to about £21,000 millions,[1] while the annual savings are about £500 millions;[2] 2½%, that is of the national wealth. But it is, broadly speaking, the national wealth that constitutes the supply of capital: so that even though the income tax were to cut down the flow of savings by say 10%, it would not on that account cut down the supply of capital by anything like the same percentage; but instead only

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[1] Sir J.C. Stamp, "The National Capital", Journal of the Royal Statistical Society, 1931, p. 21.

[2] Adopting the estimate of Mr. Coates. See Colwyn Report, p. 17, §47.

by 1/10 th of $2\frac{1}{2}\%$, that is by .25%. At the same time the
reduction in savings will, _ceteris paribus_, act in a
cumulative fashion, the effect brought about say, in a 5 year
period, being roughly 5 times as great as that in a one year
period.[1]

The second factor in the situation is that owing
to the changes in demand conditions brought about and the
uncertainty created in the new situation there is likely to
be, in the period before equilibrium is re-established a
considerable wastage of capital. The older capital instruments
and durable goods, (whose value in the arithmetical example
was £ 21,000 millions), will, many of them, be less well
adapted to the new system of production and demand, than they
had been to the old. On this account their value will fall.
In the new conditions too, producers'forecasts will undergo
a long period of variation and gradual correction before each
producer achieves the optimum adjustment of his productive
resources to the demand and cost conditions of the market.
The demands exercized in the market by individuals for goods
will also be undergoing change as part of the wide system of
variation set in the movement by the tax. Even if producers'
forecasts had always been correct and producers had been
endowed with perfectly accurate foresight, the changing numbers
and changing age composition of the population would often
have rendered machinery valueless after it had been in use for
some time, though it was still physically in good condition.
Because of this and because it renders forecasting more
difficult, the changing numbers and age composition of the
population will be a potent force, additional to the falling
off in savings, towards a reduction in the supply of capital.

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[1] See Douglas _op. cit._, pp. 421-2; Calandra,
La ripercussione dell' imposta sul reddito, pp. 52-3

We have thus shown that the supply schedule of capital in the community at the end of the short period will be raised above its initial position; and on this account the rate of

Rate of interest

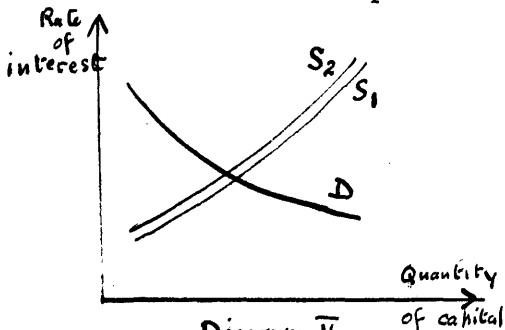S_2 S_1

D

Quantity of capital

Diagram II.

interest at the end of the short period will tend to be raised. The extent of the resultant rise in the rate of interest however, will depend further on whether or not a change has taken place in the shape of the demand curve for capital in the community. If the demand curve should have fallen, through people after the tax concentrating their demand to a greater extent on commodities whoae manufacture requires but little capital, then this would tend to reduce the resultant rise in the rate of interest. But the chance of induced changes lowering ~~raising~~ the demand curve for capital in this way would appear to be no greater than their chance of raising ~~lower-ing~~ it. We will therefore suppose that the alteration in the height of the demand curve for capital is sufficiently small for it to be neglected. Demand conditions for capital are the same as before: the supply of capital has fallen off as compared with the initial situation. Hence the rate of interest in the new state of affairs will be higher than it had been initially.

4. The longer the period of time allowed to elapse, the less satisfactory does a partial equilibrium treatment of the kind we have given, become. This treatment would suggest that over the long period the rate of saving of the community is equal to $\Sigma I_2 C$. Initially it had been $\Sigma I_2 A$. But for every individual in the community $I_2 C$ is either equal to or less than $I_2 A$. And for some individuals at least $I_2 C$ is less than $I_2 A$. Hence $\Sigma I_2 C$ is less than $\Sigma I_2 A$ and the rate of saving in the community is lower than to begin with. The rate of saving in the long period is less than the initial rate but greater than that ($\Sigma I_2 B$) of the short period.

6.

Too many other changes however have taken place in the community, of which no account is taken, for a theory of this kind to be very meaningful. Peoples' gross incomes (before deduction of income tax) have changed as a result of the tax: the number of persons over whom the summation is made has altered as a result of the tax: their scales of preference, in regard, among other things, to savings, have undergone alteration as compared with the initial equilibrium state. And a partial equilibrium treatment is no longer a satisfactory one.

Yet I think that in this case also, save in very unusual circumstances, we may be satisfied that the total rate of the community's saving and the total volume of its capital, will have declined. Of the incomes that people receive they pay away to the government, a larger amount in taxation than they had done initially: over the intervening period capital wastage has been taking place through a changing size of population and a changing age grouping. Both of these population changes tend to upset producers' expectations, and reduce the quantity of the community's capital. Even if producers in these circumstances, had had perfect foresight there would have been a certain loss in capital values from this source: because a piece of capital that is adapted to satisfy the demands of a population of a given size and of a given age grouping must, in many cases, lose value when the population from whom the demand comes, undergoes a change with the lapse of time. Even had producers been gifted with perfect foresight, the value of the community's capital would have been reduced on this account.

We accept the conclusion therefore, that in the long period as well as in the short, a fall in the quanity of the community's capital will have come about.

Yet what matters from the point of view of wages rate and real income per head of population, is not the total quantity of capital in the community, but the quantity of capital per head. The total quantity of capital it is true, has declined. But so also has the population of the community. Hence although total capital has declined it is not necessarily the case that capital per head has declined: this may have declined, have remained constant or increased. What matters is the percentage amount of decline in the total capital of the community in relation to the percentage decline in population. If the proportionate fall in population has been the greater, then even though the total quantity of capital is less, the quantity of capital per head will be greater than it had been initially.

Which of the pair, capital or population, will have declined the more? It is not possible, on the basis of the reasoning given, to return a definite answer to this question. The quantity of the community's capital had begun to decline immediately after the tax was imposed: and the decline had been continuous until the position of final equilibrium was reached. The mumbers in the population had increased to begin with after the tax and then had begun to decline. The decline in numbers may have continued so far as to leave the quantity of capital per head greater than it had been in the initial position of equilibrium: or the decline in population may have been less great than this, leaving the quantity of capital per head in the community on a reduced level from initially. Both cases are theoretically possible of occurrence.

5. Einaudi, although he is not at the time discussing specifically the question of the income tax, has arrived at certain conclusions bearing on the point under discussion [1]

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[1] Einaudi, "Osservazioni critiche intorno alla teoria dell' amortamento dell' importa", 1919.

A highly important question, he says, is that of the use made
by the State of the financial means that the tax has placed at
its disposal.   The use that it made of these financial means may be:

(α.)   just as advantageous and no more,

(β.)   more advantageous,

(γ.)   less advantageous,

than the use that would have been made of the funds by the private
individuals concerned.

Case (β.), Einaudi thinks, ought to be envisaged as a possible
case in economic analysis.   When it is realized,then although in
the short period the tax may cause the flow of goods and services
in the community to contract, still, over the long period, owing
to the building of streets,bridges, schools and railways it will
cause the national income to expand.   He envisages population
as remaining constant the while.   Thus his conclusion is one
opposed to that at which we have arrived.   We do not envisage
an expansion of the national income as a result of a tax, as
being possible of occurrence.

The source of our difference of opinion from Einaudi in
this regard arises partly from a different conception of the
State that we entertain,and partly from our following a
methodology that has more explicitly reference to the conditions
of the stationary state.   Einaudi's conception of the State is
the same as that of his great teacher, De Viti.   De Viti in
an important passage of his work says that a tax instead of
raising cost of production may lower it.

"Let us take as an example an association of proprietors
who at their own expense maintain a private road for the
transportation of their merchandise.   The transportation is a
part of the cost of production.

Let us now suppose that these proprietors agree to pay the
State, in the form of a tax, as much as or less than they used to

spend for their private road, and that the State builds and maintains a better road, on which transportation is more convenient and faster.

It could not be said in such a case, that the tax increased the previous cost of transportation. It must be said to have decreased it.

From this special example we may pass to the general case --- namely, that the introduction of public services and their growth and improvement have reduced the cost of all the productive activities of the country. Hence it is necessary to discuss the problem on the most general hypothesis that the substitution of public enterprise for private enterprise results in advantages for the taxpayers. But even if the contrary hypothesis is adopted, it will always have to be admitted that it is not the tax paid by the producer that decides, but the nature of the public services produced and the degree to which each individual enterprise can in fact make use of these services.

To sum up: the previous cost of production may have been increased, left as it was, or diminished by an increase in taxes. In pure theory it must be said to have decreased."* 1

In a later work of his, Einaudi, after quoting from this passage, speaks thus in the same vien as it:

"When the tax is in fact what it is in theory, it inevitably increases and does not diminish the flow of social income; it increases saving and increases capital values. And when the tax is truly such, the discussion of incidence and of losses is a figurative way of speaking, which confuses ideas, because it applies to the affairs of perfect States, words which men rightly used at those times when governments were enemies, oppressors, spoilers and

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*1   De Viti, op.cit., p. 151

plunderers of the populations." [*1]

6.   As opposed to this view of De Viti and Einaudi, it appears to us that there are only three sets of circumstances worthy of mention in which the imposition of a tax could lead to an increase in the national income.

The first of these is where the government is wiser than the people from whose pockets the tax extracts the money, so that it makes better or "more productive" use of the money.   An example of this would be where, in the example of De Viti, the government drew up a better plan of a road than would have been drawn up by the private individuals in the country, had they been left to themselves.

Under the conception of perfect competition, which is used for example by Knight,[*] in which it is assumed that each individual knows the prices of all factors and of all commodities in the market, such a contingency as this viz., that the government is wiser than the individuals in the community - would not be possible of occurrence.   Because, to take the example given by De Viti, why should not the manufacturers in the industry concerned come together and decide to maintain the road in the way eventually done by the State?   Ex hypothesi they must have had sufficient knowledge to enable them to do so.   Or else why should not another company have undertaken the provision of such road services, either making lump-sum charges on the manufacturers concerned or else charging tolls to the traffic that used it?   The example chosen by De Viti in fact, when we make the assumption of the existence of the type of perfect competition that involves perfect knowledge, seems sufficient to establish the opposite conclusion from what De Viti arrives at: it establishes the conclusion, namely, that the proceeds of a tax, when employed by the government, could never, in these circumstances, be more productive of an income of

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[*1] Einaudi, "Ottima Imposta", p. 81. footnote.
[*] Knight, <u>Risk Uncertainty and Profit</u>, pp. 76-80.

divisible commodities, than if it had been employed in industry
by the persons who had paid the tax.

The assumption regarding knowledge which we ourselves have
made in this book, is not so far-reaching as the one we have
mentioned.   We do not assume that each individual has a perfect
knowledge of all market prices: but only that "when stationary
conditions have emerged --- i.e. both initially and finally in
the analysis that we make---the knowledge of each individual
relating to prices is also taken to be stationary, though not
necessarily, even then, perfect."[1]   Thus on our assumption it
is not formally impossible that the government should be wiser in
regard to matters like road-building, etc., than are the private
individuals in the community: though it is impossible, we have
shown, on the assumption of perfect knowledge.   Yet while, on our assumptions, the
possibility is not formally ruled out ~~by our assumptions~~, that the
government should be wiser in these matters than the people
directly concerned, we consider that the likelihood of this being
true in practice is so remote that the possibility can be
disregarded in our analysis also.

The second set of circumstances in which the production ve type
of State action envisaged by Einaudi and De Viti might come about,
would be where the imposition of the tax in question caused an
increase in the net investment of the community.   This might come
about say, partly because the government had used the proceeds of
the tax in a way that was productive, directly or indirectly, of
divisible commodities, and partly because the tax had induced
people to cut down their consumption expenditure, giving as the
upshot of the whole process, the equivalent of a greater amount
of yearly investment than then would have been had there been no tax.

Now if we were considering the imposition of an extra increment
of one tax to replace an increment of another tax---e.g. if an

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[1] Supra, Chapter 8, §7.

additional increment of the income tax were imposed in order to enable the government to abolish a portion of the tax on inherited estates --- then it seems not improbable that as a result of the adjustment the net investment of the community would be increased. But if the problem, as in this book, is that of the imposition of an increment of the income tax, in addition to the rest of the existing system of taxation, the possibility that the effect of this additional increment of income tax should cause an increase in net investment seems sufficiently remote in most circumstances to make it convenient that it should be disregarded in theory.

One type of public expenditure however, does appear to exist which may prove very productive and which only a government and not private individuals could well undertake: we refer to the case of public expenditure on education. For special reasons, although expenditure on education may prove very productive from the point of view of the national income of a country, it is not likely to be undertaken by private enterprise. The reasons are that in the case of juveniles who had been educated, difficulties would arise in regard to the ascertainment of the value of the improvement or the increased productivity that had taken place in the individual, through the education. As well difficulties of legal contract would arise, which would render private enterprise rather impotent in this matter.

In this, the case where the tax proceeds are spent on education, and in this case only, it appears to us, would it be useful to introduce the conception (in our own analysis), that it is possible that the imposition of a tax might lead to an increase in the national income of the community. At most, however, the occurrence of the particular points in the expansion of the public expenditure of a country at which the money raised by taxation is going to be devoted in sufficient proportion to education, and where this education is going to be sufficiently

productive of income in the form of divisible goods and services
as to cause the national income to rise, will be rare in practice.
This possibility, it is true, has not been included in the analysis
we have given in the earlier paragraphs of this chapter, in which
we state that a necessary consequence of the tax will be to
reduce the total national capital and the total national income.

The criticism we have given of the views expressed by
De Viti and Einaudi goes to strengthen the conclusion arrived at
earlier, that the national capital will be reduced as a result of
the tax---save possibly in one instance, that in which the
proceeds of the tax are devoted in part to education.   The
dynamic phenomena that would result in this case are complex
and would be difficult to deal with in exact economic terms.

CHAPTER 14.

Some Conclusions in regard to the Incidence of a General Income Tax.

1.   To present a synthetic picture of the incidence of a general income tax, we require to combine the effects from the three sources of change on the side of supply --- change in labour supply per individual, change in size of population and change in capital structure --- and to take along with these the changes that are going on in the demand schedules of the government and of the different income classes in the community. Further it is the moving picture of the variation of change through time that is important.

Let us take first in conjunction with each other, the movements in population and capital in the community. The movement in population after the tax has been imposed, is first an increase and then a decline until a new stable level of population is reached, lower than that from which the population had set out. In the meantime after the tax is imposed, a fall in the total volume of capital sets in that continues into the long period.

If we refer to diagram I on page 145 SUPRA, birth rate is higher than the old rate, as a result of the income tax, during the period of time between zero and OA. Let us suppose that the school education of most children covers the period of their lives between their 5th and 15th years. Then between the date zero and the date (OA + 15) years[1] there will be a tendency to

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[1]   This and other dates assigned are only rough, depending on a number of variables additional to those mentioned, e.g., age of marriage of young people, changes in death rate among adults and among children respectively, etc.

1.

decline in average standard of living through people having to maintain a larger number of children per family than they had in the initial equilibrium state of affairs. During this period of time, standard of living will also be falling on account of the gradually contracting total volume of capital.

On the other hand in this short period of time between years zero and (OA + 15) years after the imposition of the tax, the governmental expenditure of the tax proceeds will be acting in the opposite direction towards an increase in the standard of living of the poorer people in the community; and if a considerable portion of the tax proceeds is spent in social services and in other ways benefitting the poor, the forces towards a rise in standard of living will outweigh those towards a decline. Particularly will this be so in the early stages after the imposition of the tax when the forces towards decline in standard are only commencing to operate and those of assistance to the poorer classes are strong.

After the date (OA + 15) approximately, the standard of living of the lower income classes will show a tendency to rise, through the smaller number of children per family; governmental expenditure of the tax proceeds will act in the same direction. The force of a smaller quantity of capital per head of population still acts in the opposite direction towards a fall in the standard of living; and the force by this time, through the smaller quantity of savings over a period of years and the capital wastage taking place in these years, will have gained in strength.

The years following the date 15 years after the imposition of the tax, will witness the arrival of the increased labour force (through the increased birth rate between dates zero to OA), on the labour market. The total labour supply in the community in

fact, will have begun to increase before this, through the gradual lowering that had set in in the death rate.

The increase in labour supply will tend to increase the productivity of capital. But it is improbable that the volume of savings will attain to its old level: because the period after the imposition of the tax is one of a changing size and age composition of population, of changing demand schedules, of entrepreneurial uncertainty and reduced savings. During this period there must be a contraction in the total amount of the community's capital. Although the productivity per unit of capital will be higher at, say, the date (OA + 15) years than it had been initially, the total quantity of capital on which this higher rate of interest is earned will be smaller: and total savings will be lower than it had been initially.

During this time there will be two independent forces tending to reduce the value of capital goods as compared with what they had been before the tax was imposed. The change in demand schedules through the altered distribution of income, through the changing size and age-grouping of the population, will on the average, render plant less suitable to the new state of affairs than it had been in the past. Again in the short period, we have seen, the rate of interest will tend to increase: capital values will therefore, be reckoned at a smaller number of years purchase of annual income. Both these causes will act so as to reduce the capital value of plant that had been in existence when the tax was imposed.

Probably shortly after the date (OA + 15) years the total quantity of labour in the community will attain its peak and thereafter will begin to decline. The decline will continue until it comes down to its initial quantity, then it will fall below that. This fall in the labour force will tend to cause a

fall in the marginal productivity of capital and will entail a reduction in the incomes of the rich.

A much more important aspect of the contraction in labour force that sets in, is that it tends to increase the quantity of capital that is being combined with the labour of each worker. Thus it tends to increase wage rate per head of the population.

How far will the fall in numbers carry in relation to the fall that has taken place in capital?   Will it carry far enough to raise quantity of capital per head to its initial figure, or will it not go as far?   This, we said, is the crucial question to which no definite answer can be given.

2.   Now let us take in conjunction with capital and population movements, the movement in supply of labour per individual in the population.   The analysis that we gave, taken along with the existing statistical evidence, was sufficient to establish that, in the short period, there would be, due to the expenditure of the tax proceeds, a tendency towards reduction in the number of hours worked by the average individual in the lower income strata.   In the short period following on the imposition of the tax, we should expect probably, not actual reductions in hours of labour worked, but instead various tendencies towards a slowing down of the pace of work, hours of labour themselves, because of various frictions, remaining unchanged.

For the higher income strata, which would include works managers, higher administrative staff, company directors, etc., as well as professional men like lawyers, doctors, authors, no statistical material exists on which to base a judgment of fact. Since our analytical treatment had shown that the reaction on the

part of any individual might be towards either a lengthening or towards a shortening of working hours, in the absence of statistical evidence for these higher income classes, no judgment as to the probable direction of change in their supply of labour can be expressed.

Over the longer period, when population and capital both alter, if quantity of capital per head of population alters in such a way that, taken in conjunction with the altered distribution of the national income more in favour of the lower income classes, the real income per head for the classes is greater than before, then the supply of labour per head for these classes will be less than before, so introducing a tendency towards reduction in standard of living. <u>Vice versa</u>, if it should be the case that taken by themselves, the movements in capital per head combined with the distributional effects of the income tax, would be such as to tend to a reduction in standard of living per head, then members of the industrial classes will tend to work longer hours. This will help to counteract the fall in the standard of living.

3.   As to the part played by changing demand schedules in the community, the disbursement of a greater proportion of the national income on the goods and services consumed by the poor, will involve a rise in the short period in the prices of these goods, and positive quasi-rents for the factors engaged in ~~working~~ making them. The factors catering for the wants of the rich will, at the same time, be getting negative quasi-rents. With the lapse of a further period of time, factors of production will gradually transfer from the one set of industries towards the other. New factories will be built that cater for the wants of the poor.

Certain firms that had catered for the wants of the rich will not renew machinery as it wears out and will go out of production. Gradually a larger proportion of the community's plant will come to be concentrated in the one set of industries than had been the case to begin with.   Gradually also, as the transfer takes place, the price rises that had taken place in the goods consumed by the poor will subside: the positive quasi-rents of the factors engaged in the manufacture of these goods will likewise subside. Similarly in the case of goods consumed by the rich, the prices of these goods and the rates of remuneration of the factors making them will, in the short period immediately following the imposition of the tax, fall below their previous levels.   But with the lapse of a further period of time the prices of these goods and the rewards of these factors, will begin to move upwards towards their former heights.   The price movements upwards, for both goods and factors, will be the quicker,

(a)   the less durable are the goods concerned, and

(b)   the more readily are the factors engaged in making them transferable to other industries.

A corresponding system of transfers of income and capital among the individuals in the community will be set up.   Some individuals will profit in a way that had not been foreseen, from the changes that take place: others will lose.   The talents and capital of some men will be better adapted to take advantage of the new state of affairs than they had been to take advantage of the old;   of others, less well adapted.

4.   Finally a larger proportion of the community's income will now be consumed in the form of indivisible goods such as justice, defence against an external enemy (if the community be not an isolated

one,) as compared with divisible goods, than had initially been the case.

In the short period of time the factors of production engaged directly and indirectly in the manufacture of State goods of this kind will reap positive quasi-rents.   Given the lapse of a sufficient period of time the rewards of these factors will reach the level normal to the long period condition of equilibrium.

PART IV.

Additional Problems.

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CHAPTER 15.

THE INCOME TAX, PROFITS AND UNCERTAINITY.

1. There are two kinds of risks that a company is
confronted with, ppedictable and unpredictable risks.   To begin
with let us consider predictable risks.

Against these predictable risks a company may or may not
have insured before the imposition of the additional increment of
income tax .   The risks being predictable, the manufacturer knows
beforehand what their average weight is going to be: but a period
of weeks or months or of years may be required to elapse, before
the process will have worked itself out sufficiently to permit him
to regard the average weight of the risk as having been attained.
In the last case the risk becomes a known cost or expense of
production, but only over a period of working of the firm covering
several years.   For example breakages of plate glass in a chain of
retail establishments owned by a firm, or danger due to fire in the
small country stations of a railway company, or compensation paid
by a firm to its workmen on account of accidents, may work out at a
very stable figure in a period of time of some years.   In the case
of a risk or expense of production of this type it may be more
profitable for the company concerned not to insure against the risk
but to bear the risk itself. [1]

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[1]   "If a business has a large enough number of risks and
if the risks are independent of one another, it is likely to be
cheaper not to insure, for unless the insurance company receives
a great deal more in premiums than it pays out for losses it
cannot continue to do business."   Hardy, Risk and Risk-bearing,
p. 68

(1)

Let us suppose that in a given firm the assessment to income tax is made on the income of one year ,and that the weight of a certain predictable risk does not attain its average until after the lapse of several years .Suppose,for example,that to a certain manufacturer a risk of this kind amounts on an average to £500 a year,but only approximates closely to this average after a series of about 20 years.Let the manufacturer's income,apart from this risk,be £X a year.The risk,we suppose,is the only source of variation in his income.On the average his income works out at £(X-500),per year:but in the first year his income may be £X,in the second year £(X-1000),and so on.

In the diagrams I and II this manufactuter's income is taken to be measured along the x-axis and the rate at which the additional new increment of income tax is ~~measured~~ imposed, along the y-axis.

Let the successive amounts by which the person's income falls short of the average £(X-500),be £α_1 ,£α_2 ,£α_3 ,... and so on; and the successive amounts by which it exceeds its average be £β_1 ,£β_2 ,£β_3 ,... and so on.

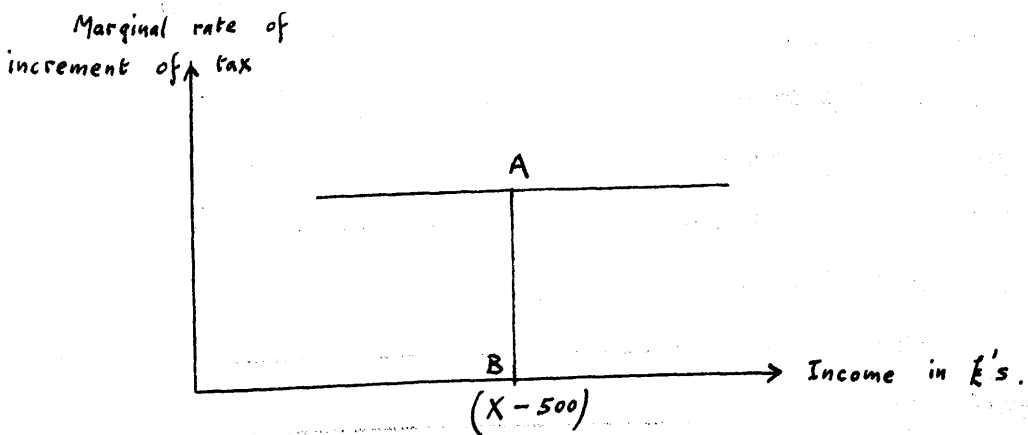Since £(X-500) is the average income, therefore $\Sigma\alpha = \Sigma\beta$.

Diagram I.

Diagram I represents the case where the additional increment of income tax is imposed at a flat rate of say,2per cent.

In the years when the manufacturer's income falls below $(x-500)$ he will pay an amount of income tax less than he would have done had his income remained at a steady level of £$(x-500)$. The total amount of taxation that the individual escapes in such years is $\sum \alpha \cdot \frac{2}{100}$, £'s. On the other hand in these years when his income exceeds its average figure, he will pay to the Exchequer more than he would have done had his income been steady. The amount extra that he pays in such years will be in all $\sum \beta \cdot \frac{2}{100}$, £'s.

But $\sum \alpha = \sum \beta$. Hence it will be just as if on the average the person paid income tax on an income of £$(x-500)$.

Marginal rate of new increment of tax.
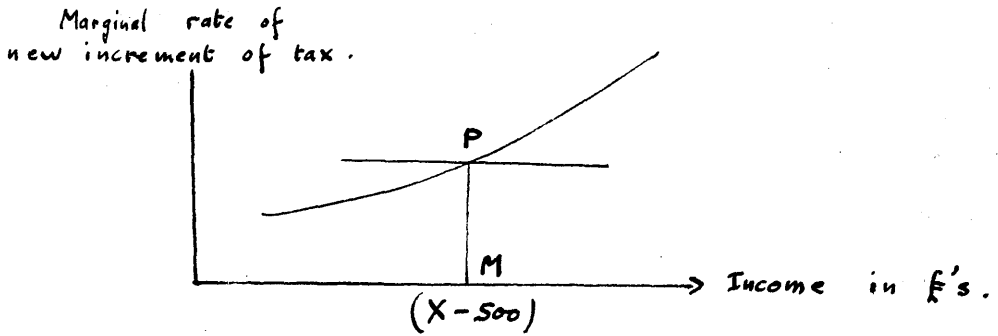
DIAGRAM II.

If the additional increment of income tax that has been imposed is progressive in amount, being higher the higher the size of income concerned, then the curve of marginal rate of the tax will be upward sloping as in diagram II. Let the rate of tax which corresponds to the persons average size of income be R, which is equal to P M in diagram II. When his income falls below its average size £$(x-500)$, he will escape payment of income tax on the amount by which it is deficient. If we adopt the same terminology in regard to the meanings of α's and β's as before, then the total amount of tax payment that the person will avoid paying in these years when his income falls below its average, will be a payment on a total amount $\sum \alpha$, £'s of income. The rate of tax payable on each unit of this income is at a rate less than R. The total tax payment that the person avoids therefore, will be less than $R \sum \alpha$ £'s.

In the years in which his income exceeds its average amount, he will make a tax payment on an additional amount of income equal in all to $\sum \beta$. The rate at which tax is paid on every unit of such amount is greater than . His total tax payment on such amount of income therefore, is greater than $R.\sum \beta$ £'s.

Hence
the amount of tax payment that the person makes in these years when his income exceeds its average size is greater than the amount of tax payment that he escapes in the years when his income falls below its average size. That is, as a result of the fluctuation in his income the person pays income tax at a higher average rate than he would have done had his income been of constant size.

If the tax increment imposed be progressive therefore, it will tend to become more strongly to the interest of the individual to insure against this fluctuating but predictable risk than it had been formerly: because if he do not insure against the risk, the individual will suffer, as before, a risk of an average weight of £500; and in addition he will bear a payment of income tax higher than that corresponding to his average size of income, $£(X-500)$. If he does insure against risk he will be able to avoid any income tax payment above that corresponding to his average size of income $£(X-500)$; because insurance will have rendered his income steady. Hence a person who, before the imposition of the additional increment of income tax, had preferred not to insure against this predictable risk, may, after the tax has been imposed, choose to insure, if the additional tax increment be progressive in amount. Thus the imposition of an increment of income tax that is progressive in amount will tend to increase the amount of insurance taken out against risks whose average weight is predictable for the individual business. If the increment of tax be at a flat rate, such tendency to increase in

(4)

the insurance of predictable risks will not be present ∎ 1

2. The other type of predictable risk is one whose average weight per year is predictable, ~~however~~, not ~~only~~ for the individual business *however,* but *only* ʌfor a group consisting of a large number of such businesses. This is the type of risk par excellence dealt in by insurance companies. Let us speak as if the insurance of this type being made were against fire. If we consider the cases of a large number of similar businesses, we will be able to state, using information collected in the past, that the loss through fire for the group as a whole over a period of a certain length, will be of a certain and fairly definite, amount. This is an instance of the "law of inertia of large numbers," the principle lying at the basis of all insurance.

The amount of loss for the group as a whole may be the same from year to year, or it may perhaps vary as between one year and another, ∎ 1 but have a certain fairly steady average value per year when the averaging is made over a 10 or 15 year period, say. If it be the

case that the weight of the risk for the whole group of businesses *varies from year to year, then it follows from our previous reasoning that the group of businesses* ʌas a whole, will ~~to~~ succeeded in battering its position, by taking out, should the additional tax increment be progressive in amount, a greater quantity of insurance against the risk than it had formerly done. Hence if the tax increment is progressive there will tend to be an increase in the amount of insurance taken out

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∎ 1   The rise or fall in the charge for insurance in the period after, as compared with the period before, the tax, will, of course, also be relevant.

∎ 1   A year is the period of assessment of income for purposes of income tax. If income assessment be reckoned in regard to a length of time of a month, or of 3 years say, then it is then in regard to this period that the weight of the risk for the group must be considered.

by the community against fire, burglary, marine risks, etc. ͻ
provided the cost of insurance has remained constant.   If the tax
increment is at a flat rate there will be no such tendency.   **✕ 2.**

3   In addition to risks of this kind whose weight, either for the
individual or the group, is known, there exist also in business
unpredictable risks.   The probable burden of these, people may guess
at ; but they cannot know what the burden will eventually run out to
be.   Unpredictable risks of this kind are referred to as uncertain-
ties; and such uncertainties are mainly borne by the purchasers of
ordinary shares, or of other shares whose yield is not of a guaranteed
amount, but fluctuates according to the degree of success or failure
attained by the company which had issued them.✕ 1

Let us consider the process that goes on when a company makes a
new issue of ordinary shares.   The success of the firm lies in the
future, and in the present can only be guessed at.   Each person
concerned will form a different estimate of what its success is likely to be.
It is as if each person formed an estimate of the chance that the
share had of each different rate of return in the future.   The set of
estimates of any given individual in relation to any given share can
be represented in the form of an uncertainty - curve as shown.

✕ 1
        See in regard to the following, Hicks, "The Theory of
Uncertainty and Profit," Economica, 1931.

✕ 2.   Stamp suggests that an increase in the amount of industrial
insurance has been taking place. "Taxation, Risk-taking and the
Price Level," Economic Journal, 1928, p. 209.

(Diagram I.)   The scheme of chances or uncertainty schedule etc.

Chance

Return on share
(net of income tax)
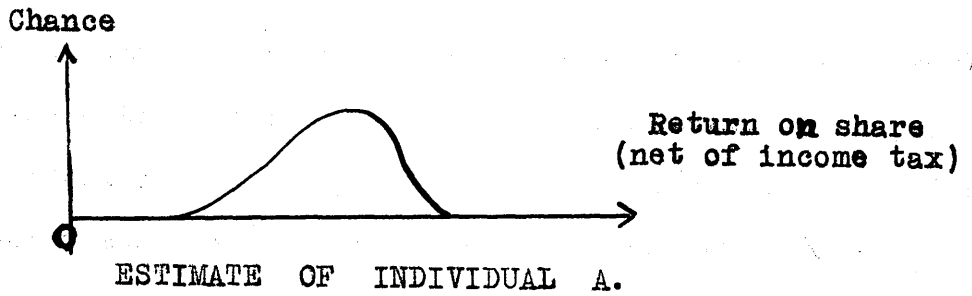
ESTIMATE OF INDIVIDUAL A.

DIAGRAM I.

or uncertainty schedule, in relation to a given share will differ

for each individual in the community.   Some may, for example, be

optimistic about a certain share for which others entertain but

little hope.   Uncertainty schedules that is, are subjective in nature

Owing to the views that they take ^{o}f the chances of the

different degrees of success of any given share, and as well owing to

their scales of preference for uncertainty schedules of different

types, the people in the community will be willing to absorbe a

certain definite quantity of that share when it appears in the market,

By varying the terms of issue of the share a demand schedule for it

similar in nature to a demand curve, can be obtained.

Now suppose that in the circumstances we envisage, an additional

increment of income $_{tax}$ is imposed.   The course of events at each

subsequent moment of time will be different from what it otherwise

would have been.   But for shortness let us speak as if we pictured

the same firm as before, issuing at $_{any}$ particular moment in time, the

same share as it would have done had there been $_{no}$ income tax.

When the income tax is imposed it alters the whole complex of

business conditions at all subsequent times.   Each individual

will form an estimate of the company's chances of gain, different

from what $_{he}$ would have done had there been an increase $_{no\ additional}$ tax.   The

uncertainty - curve corresponding, in the mind of the person, to the

~~given share, will, that is, be different in shape from what it would~~
~~have been had there been no increase or additional tax.~~ Also, part
of each gross return on the share is absorbed by the new tax. This
causes a further distortion in the shape of the uncertainty - curve
of net return, corresponding to the given share.

~~Secondly~~ Again the distribution of income and of capital, and
therefore the ability of individuals in the community to purchase
shares, will have altered as a result of the tax imposed. The
alteration so endured will be one which varies throughout subsequent
time. Since people's incomes are different, their scales of relative
preferences for uncertainty - curves of given shapes, will also be
different.

As a result of these changes, an alteration will have been
brought about in the demand schedule for the shares of the "given
company" at each subsequent moment of time. The company will find it
either easier or more difficult to issue shares. Through the tax its
business will come to be on a different scale from what it would have
been otherwise. The pools of capital available for the different
types of businesses in the community will have altered as a result of
the tax, both in absolute and in relative size. Some kinds of
business will find it relatively easier to get capital, others will
find it relatively more difficult. The relative size and development
of different kinds of businesses will therefore be altered as a result
of the tax.

A formal analysis of the kind we have given however, does nothing
to suggest whether, in relation to safe businesses, businesses that
involve considerable risk will find capital easier or more difficult
to get in a given income tax regime.

CHAPTER 16.

The Theory of Double Taxation of Savings.

1. The author of this theory was John Stuart Mill. The theory tries to show that in the case of a general income tax from which savings are not specifically exempted, savings are taxed twice as compared with income spent, which is taxed once only. We quote the famous passage in which Mill sets out this view.

"Unless savings are exempted from income tax, the contributors are taxed twice on what they save, and only once on what they spend. A person who spends all he receives pays 3% to the tax, and no more; but if he saves part of the years income and buys stock, then in addition to the 3% which he pays on the principal, he pays 3% annually on the interest itself, which is equivalent to on immediate payment of a second 3% on the principal. So that while unproductive expenditure pays only 3%, savings pay 6%: or more correctly 3% on the whole, and another 3% on the remaining 97".[1]

Irving Fisher gives the theory an interesting formulation by selecting the case of three brothers A, B, and C, each of whom has a different attitude to saving.[2] Each brother inherits the same fortune, £10,000. A is a spendthrift: he spends his money at the rate of £2,000 a year and so his fortune lasts only 6 years. B adopts the conservative

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[1] J.S.Mill, _Principles of Political Economy_, edited Ashley, pp. 813 - 4.

[2] Irving Fisher, _The Nature of Capital and Income_, p.250.

policy of spending only the interest on his money, maintaining

the capital ~~interest~~. *intact.* While C lets interest accumulate at 5%

on his fortune for 14 years, and thereafter is able to derive

from it a perpetual income of £1,000 a year instead of £500 a

year as does B.

If a flat rate tax of 10% exists, of these 3 brothers,

Fisher shows, A the spendthrift could compound for all his tax

payments by making an initial payment of £157 at the time when

he inherits the fortune. To compound similarly B would have

to pay £1,000: and C, the most careful of the brothers would

require to offer a payment at the same date of £1714. Under

such a system, says Fisher, savings are penalized.

Pigou also upholds the view set forth above. His

treatment is directly in the tradition of Mill; and since the whole

theory and discussion of it tend to revolve round subtleties

and the meanings of words we also quote from the passage in

his works.

"An income tax ... differentiates against savings, by

striking savings both when they are made and also when they yield

their fruits. Thus a general permanent income tax at the

rate of x per cent strikes the part of income that is spent at

this rate. But if £100 of income is put away for saving, it

removes £X from it at the moment and, thereafter, removes also

some part of the fruits yielded by it ... Let us suppose that

the saver's investment is a permanent one, so that the principal

is never withdrawn. Then the secondary taxation amounts every

year to $\frac{x}{100}$ *ths* of the fruit of the £ $(100 - x)$ that are

actually turned into the investment. The total effective rate

of tax per cent is therefore $\left[x + \frac{x}{100} (100 - x) \right]$; that is

2.

$x\left(2 - \frac{x}{100}\right)$. Thus, the effective rate on saved income is practically double the rate on spent income when the tax is small." [1]

2. The theory which we have summarized however, would seem to be unsatisfactory. If we accept the proposition that money saved is taxed twice as compared with money spent on consumption goods, then since taxation reduces a capital sum of £100, if it be spent on consumption goods, to £$\left(100 - x\right)$, adopting Pigou's terminology, we should expect that in the case of money saved it would reduce the capital sum to £$\left(100 - 2x\right)$; or in the more exact form, to £$\left(100 - 2x + \frac{x^2}{100}\right)$. <u>This we know it does not do.</u> <u>£100 on which income tax has to be paid has the same capital value whether the money taxed is destined to be devoted to consumption purposes or to savings.</u> If the money is to be devoted to consumption purposes, the net capital value of £100 to its owner will be £$\left(100 - x\right)$; and if the money is to be saved, the net capital value of £100 to its owner will likewise be £$\left(100 - x\right)$.

Thus the theory that money saved is double - taxed is unsatisfactory at this point.

It is mainly on this ground likewise, that Guillebaud dissents from the theory that savings is double - taxed. He puts it thus:

"If a man has saved £100 and placed it on deposit in his bank the value of his holding continues to be £100, irrespective of whether he pays no income tax at all, or income tax at the rate of 2s.6d. or 5s. on the £. The opposite view would lead to the absurd result that the investment of £100

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[1] Pigou, <u>A Study in Public Finance</u>, p.139.

is no longer worth £100 the day after it has been made, but some smaller sum."[1]

Ricci has said (if we put "£" in his argument instead of "a loaf of bread" so as to bring out the meaning of the passage): when a new tax has been levied, "<u>Nothing has altered as regards the rates of exchange between £'s that are to be consumed and £'s that are to be saved</u>: <u>one</u> £ that is to be consumed immediately is always worth <u>one</u> £ that is to be saved."[2]

3. Can a more satisfactory view of the facts be advanced in place of the ~~wrong~~ theory of double taxation of savings? A theory in the following terms would seem to be a preferable way of regarding the whole matter[3].

Suppose an individual to inherit the sum of £200, £100 of which he spent on consumption goods and the other £100 he saves. Let the rate of income tax as before be x %, and let i % be the gross rate of interest. The net capital value to him of the £100 which he spends on comsumption goods is £ $(100 - x)$.

From what we have said in criticism of the theory of double taxation of savings this also must be the net capital value to him of the £100 gross which he saves. It comes about in this fashion. The gross rate of interest is i %.

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[1] Guillebaud, "Income tax and the Double Taxation of Savings," <u>Economic Journal</u>, 1935, p. 486.

[2] Ricci, "La taxation de l'epargne" <u>Revue d'Economic Politique</u>, 1927, p. 879.

[3] See Ricci, <u>art</u>. <u>cit</u>.; and more particularly his article "L'imposta unica sui consumi non necessari," <u>Giornale degli Economisti</u>, 1913.

But since of every £i that a person receives as interest on the money he saves he must pay $x°/_\circ$, ie. £$\frac{ix}{100}$ in the form of taxation, the <u>net</u> rate of interest that he receives after the tax has been imposed is $\left(i - \frac{ix}{100}\right)°/_\circ$. Each year he will receive on the gross capital of £100, or net capital of £$(100 - x)$ that he saves, a <u>net revenue</u> of –

$$£(100 - x)\, i \left(1 - \frac{x}{100}\right) \frac{1}{100}.$$

A net revenue of this amount capitalized at the net rate of interest mentioned, will be, (since we are simply reversing the last step in the reasoning),

$$£\frac{(100 - x)\, i \left(1 - \frac{x}{100}\right)}{100} \cdot \frac{100}{i\left(1 - \frac{x}{100}\right)}$$

$$= £(100 - x).$$

This view of the matter appears to be more self-consistent and more free from misleading implication than the theory that saving is double-taxed.

Moreover different individuals in the community––– whether this community be that of real life and graduated taxation, or else the hypothetical community that we envisage––– will be required to pay income tax at different rates. Another individual e.g., may be required to pay tax at the rate of $y°/_\circ$. The net value of a gross income of £100 to him, whether he were to save it or spend it, would be £$(100 - y)$: the net rate of interest on it should he save it, is $i\left(1 - \frac{y}{100}\right)°/_\circ$. But this introduces no new complication into the theory.

4.　　The view of the facts stated can be illustrated by a diagram[1].

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[1]　　　Ricci, <u>art. cit.</u>, <u>Giornale</u>, § 14.

Still thinking in terms of the individual who obtains an increment of income of £200, and pays income tax on it at the rate of x %, let OA, AB in the diagram each represent £100. Let BC, AD each = £x. Measuring time along the horizontal axis let OI equal one year, I2 equal another year, etc.

The capital value of the £100 which the person consumes is, after the tax, equal to AC.

DIAGRAM I
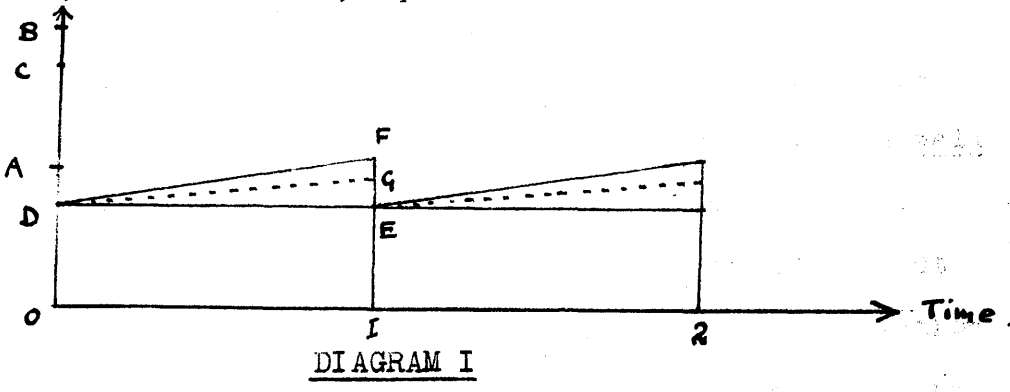
If the gross rate of interest is 5% let DE be drawn parallel to the time axis. Let FE equal 5% of OD and FG equal x % of FE. (We are assuming simple interest to be paid on the capital sum: the case where interest is reckoned at a compound rate needs only a small adjustment).

In the diagram the net capital value of the £100 which is saved, is, after the tax, equal to OD (which is equal to AC). It is shown to be growing at the gross rate given by the slope of DF, but at a net rate given by the slope of DG.

At the end of the 1st. year, the person if he choose, may consume GE, the net interest on the capital, leaving the capital value IE at that moment of time, the same as it had been to begin with; and the whole process can be repeated in the 2nd, 3rd etc., years. This would be represented by placing a succession of geometrical figures similar to the 1st in order along the axis of time. (Cf. diagram I in which one additional

6.

such figure is shown.)

5.   Pigou speaks of an income tax from which savings
is not exempted, as differentiating against saving and in
favour of spending[1].   He is envisaging a case such as that
of a community in which a tax of 10% is imposed, and in which
prices and incomes remain unchanged.   This reduces a gross
income of £1,000 to £900 if the money be spent: but if the
money be saved it reduces the sum invested to £900 and as well
reduces the interest on it from 5% say, to 4.5%.

        Yet even in this, the most definite instance that
can be cited in favour of retaining the title "double taxation
of savings," the economic significance of what takes place is
obscure;   sufficiently vague and obscure indeed, as to render
any title so definite as double taxation misleading in the
definiteness of the phenomena that it suggests.

        Let us consider the tax of 10% just cited.   As a
result of it an individual will cut down both the amount of
his saving and the amount of his expenditure.   He may cut
down the amount of his saving more than the amount of his
expenditure: or the reverse may be the case.   There is nothing
in theory to suggest that either of these two alternatives
is the more likely.   As much as we can say is that it has
been the prevalent view that the supply curve of saving, over
the relevant portion, slopes upward: so that the average
individual will save less when there is a fall in the net
rate of interest on his savings.   There will be some

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[1]   Pigou, op. cit., p.140.

7.

individuals, it is true, who are in the opposite case from this: e.g. a person who is saving to purchase an annuity of given amount will now require to save a larger capital sum than he formerly would have done. But individuals of this kind, it is generally believed, will be the exception. Only, as we have said, theory does nothing to suggest whether for the average individual and for the community as a whole the contraction in the amount saved or in the amount spent on consumption goods will be the greater[*1]. If it were to be the case that when the tax is imposed the amount saved by the community as a whole falls in a less proportion than the amount spent on consumption goods, would it still be considered desirable to retain the title "double taxation" of savings as compared with income spent? One would at any rate use the title with less assurance than if the reverse had been the case.

6. Quite independently of the reasons given, a further set of reasons quite different in nature exist, some of which in themselves might well be considered of sufficient importance for discarding the theory that savings is double-taxed. This is because the theory of double taxation has a number of different aspects. The aspects of which we have just treated may be referred to as the accounting aspect and some portions of the theory in its economic aspect. Other portions of what may be broadly termed the economic aspect of the theory

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[*1] For a further analysis of the reaction of the tax on the amount of income saved and consumed respectively, see MacGregor, "Taxation and Savings", _Economica_, Nov., 1936 pp. 391-2

have been treated elsewhere in the text, e.g. where we consider the effect of the income tax on savings and the volume of capital, and the effect of the income tax on the savings made by joint stock companies.

But as well the theory has what may be termed an interpretive aspect and a moral which is a logical or analytical aspect relating to the meaning of words, analyzes the nature of the capital, of the interest, and of the tax concerned, in such a way as to bring out the manner in which saving is or is not double-taxed. Some writers put forward a very elaborate interpretive scheme. Einaudi does this to show that savings is double-taxed: De Viti does it to show that savings is not double-taxed*/. Criticism of the interpretive aspect of these theories need not be given here. The interpretive aspect of the view we have put forward emphasizes that money saved is not taxed twice, but that what happens is that the savings is taxed once, and that then the interest on it, which represents new wealth produced at subsequent periods of time by means of the savings, is also taxed. This view is illustrated by diagram I, which shows the nature of the process that takes place through time, and the amount of capital, the rate of gross interest and the rate of net interest, at each moment in time.

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*/ See Einaudi's main writings on the subject, "Intorno al concetto di reddito imponible e di un sistema d'imposte sul reddito consumato", <u>Memorie delle Reale Accademia delle Scienze di Torino</u>, 1919, and "Contributo alla ricerca dell ottima imposta", <u>Annali di Economia</u>, 1929; and De Viti de Marco, <u>First Principles of Public Finance</u>, Book II, Chapter 10.

7.   Of the writers whose views we quoted, holding that savings is double-taxed, for example, Mill Fisher and Pigou agree that it is morally undesirable that savings should be taxed more heavily in this way than money spent.

J. S. Mill says "No income tax is really just from which savings are not exempted." [*1]

Fisher speaks of taxation of this kind being "inequitable taxation---double taxation to the saver and remission of taxes to the spendthrift."[*2]

Pigou says that an income tax from which saving is not exempted, is inferior from the standpoint of least sacrifice to one from which saving is exempted.[*3] [*4]

On the other hand De Viti who considers, from the point of view of analysis, that that there is no double taxation, likewise considers that there is no moral problem of how to exempt savings from taxation.

These and other examples that might be given of this coincidence of economic and moral viewpoint, suggest that the two strands of reasoning, the moral and the analytical, have not been held as clearly separate as would be desirable. We ourselves wish to express no view on the moral aspect of the problem, but merely to point out that the moral aspect exists as something distinct and different from its purely economic aspect.   It would be quite possible to take the view that no

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[*1]   Op. cit., p. 814

[*2]   Op. cit.,p. 255

[*3]   Op. cit., p. 142

[*4]   In the case of Einaudi's work it is not the aim of this author to show that savings ought not to be taxed.   Einaudi employs the theory of double taxation of savings as a means to a general discussion of the problem of taxation.   See Fasiani, "Sulla teoria dell'esenzione del risparmio dall'imposta", Memorie della Reale Accademia delle Scienze di Torino, 1926, p. 1, footnote; and Benham, "Notes on the Pure Theory of Public Finance," Economica, 1934, p. 445 et seq.

double taxation exists, and yet to affirm that savings ought to be less heavily taxed than under a certain given system of taxation: or _vice versa_ to hold from the analytical point of view that double taxation of savings does exist, but that morally the situation is quite satisfactory. The coincidence of the economic and moral judgment in most discussions suggests some confusion between the two aspects. In itself the title "double taxation of savings" is far from being the purely neutral and scientific term which it is so needful to have in economic analysis. The term suggests ethical implications to the mind: this in itself is an argument against its use.

8. The formulation alternative to accepting the theory that savings is double taxed, which we have given in the preceeding pages, is due to ~~RICCI~~ _Ricci_; yet in the most recent article in which he sets forward his views on the matter, he leaves himself open to certain criticisms.

In this RICCI speaks as if the State aided in the creation of the new wealth produced by means of the savings _and therefore as of right_ claimed a share in such new wealth, by way of the income tax.[*1] He commences his analysis with the supposititious case where a railway is conducted by private enterprise and charges traders for the services it renders. Then the railway is taken over by the State, which charges the same amount as before for the same services as before; but this time the charge is made by means of the income tax. This tends to introduce the implication that it is right that the State should levy such a tax, including a tax on the yield of savings.

Argumentation of this kind is unnecessary, and when introduced can hardly help being misleading. It would be desirable that all

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[*1] _Art. cit., Revue_, 1927, p.864

the relationships pointed out in economic analysis should be purely neutral or scientific; that is, they should be statements of quantitative relationships existing between different economic variables.

The second objection to RICCI'S argument would relate to its form but not to its substance: sometime moral aspects of the question are introduced in the middle of a piece of economic analysis. The effect on the mind of the reader is not clarifying.

Both of these objections attach also to the discussion of double taxation given by Guillebaud, who after some argumentation, states the conclusion that "to exempt savings from taxation would be to differentiate unfairly against the non-savers, whose burden of taxation would become correspondingly heavier." [1]

It might be argued in favour of Guillebaud's treatment that he has already, earlier in the article, dealt with the economic analysis of the problem; and that having thus examined the issue he now states his moral judgment upon it. To some extent this may be true and would afford some justification of Guillebaud's treatment. Yet on the whole, I think it would fall short of a complete justification. The aim of economic analysis, as Robbin's points out, should be to show all the implications of each choice of policy.[2] And it is only after he has expressed this moral judgment that Guillebaud goes on to consider the effects of an income taxes on total income and on income spent respectively, on the rate of interest, and by implication, on prices and on distribution. Logically such analysis, designed to show some of the major implications of the different possible lines of policy, should, I think, come before the expression of the moral judgment on the question. This criticism may appear to be hair-splitting. But in practice the admixture of economics and ethics, that is so

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[1]   Art. cit., p.490

[2]   Cf. Robbins, The Nature and Significance of Economic Science, Chapter VI, Section 5.

frequent in the subject is undoubtedly retarding the progress of the science of Public Finance.

Guillebaud introduces a conception of the State similar to that held by ~~RICCI~~ Ricci, both authors in ~~their~~ this point following De Viti.

"The State", says Guillebaud, "through the exercise of its general function as a co-operating factor in the productive organization of the community, and through the expenditure of the revenue which it receives from the taxpayers, will increase the productivity of the capital accumulated by the action of the savers above what it would have been in the absence of the State. The State is accordingly entitled to a share in this additional income. [*1]

This conception of the State in public finance is not a tenable one. Reasons for rejection of the concept need not be given here, beyond showing its unsuitability by a single example. Suppose that the State raises the rate of income tax in order to increase the pensions given to old people. No necessary increase in the productivity of the factors employed in production need result. A more purely scientific view of the State is needed that that advanced by De Viti and accepted in this regard by RICCI and Guillebaud.

9.   Finally some criticism may be attempted of Professor MacGregor's paper "The Taxation of Savings", in particular as regards his interpretation of the argument of J. S. Mill. To quote from Mac Gregor's argument:

"Mill says that if a tax of R per cent is imposed on an income, part of which is going to be saved, the result will be that the tax payer will reduce both his expenditure and his savings by exactly R per cent. This assumption is <u>essential</u> to his argument . . .

I do not understand why none of his critics have pointed out this obvious and quite disqualifying objection to his formula,

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[*1]   Art. <u>cit</u>., p.489

which is thereby at once dissolved." [*1]

After a perusal of the relevant portion of Mill's work I am
unable to agree that Mill either states or suggests that when a
tax is imposed on income each person will cut down the amount of
his saving and the amount of his consumption by the same percentage.
Nor does Mill's argument appear to me to rest on such an assumption,
any more say, than Professor Pigou's does.

I think, in this same regard, that Professor Mac Gregor is
rather unfair to RICCI.   In the article of RICCI'S that Mac Gregor
cites, [*2] it is true that a long algebraic example is used in which
each one of a large number of persons is assumed to cut down his
saving by 10% and his consumption by 10%, owing to the imposition
of a tax.   The reason for this however, if I understand it rightly,
is not because the assumption is necessary to the argument but
only because it simplifies the arithmetic.   Later in the article
RICCI says, before proceeding to discuss an arithmetical example
that had been given by Einaudi:

"Si un _nouvel_ impôt general sur let revenus de 10 p. 100
survient, il frappe Titus en lui enlevent 1,000 francs ou pains.
Quelle répercussion exercess ce nouvel impôt sur la distribution
que fait Titus entre consommation et épargne?   La question est
importante et sera analysée tout à l' heure, mais ici, pour la
discussion de l'exemple d' Einaudi, elle n'a pas d'intérêt."[*2a]

Later he points out that

"Dans une étude que j'ai recemment publiée, j'ai montré
comment, sous certaines conditions, une _diminution_ dans le taux
d' intérêt peut induire un _homo_ _ecconomicus_ a _augmenter_ son épargne"[*3]
When we are dealing with a large number of people, however, he
considers it probable that the imposition of a tax will lead to a

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[*1] Art. cit. p. 391. (Author's own italics)
[*2a] Mac Gregor art. cit., pp. 400-401
[*2a] Art. cit., REVUE, 1927, p. 878
[*3] IBID., p. 881. (Author's own italics in both quotations)

fall in the amount of savings supplied and so cause a rise in
the rate of interest.

Moreover in the earlier article[1] in which RICCI had developed
his views on double taxation more fully than he does in the later
article, he makes no reference whatever to the assumption to which
MacGregor refers.   RICCI'S investigation therefore appears to be
more general in its scope than Professor MacGregor considers it.

MacGregor further criticising Mill says:

"Mill's formula leaves unanswered a serious inference from it.

That inference is that the government must be getting more
taxation than it requires.   For if the rate of taxation is R per
cent, and this represents the cost of the public services, then R
per cent of the expenditure, plus nearly twice that proportion of
the savings, is more than R per cent of the whole income.

I see no escape from an impossible conclusion, so long as we
adhere to what Mill and other supporters of his argument actually say.[2]

Again I would be unable to agree that Mill anywhere expresses
this meaning.   Rather what he has in mind, it appears to me, is
that the government raises by taxation just as much money as its
public expenditure requires;   but that a larger portion of its
revenue is traceable to moneys that have been saved than is
traceable to moneys that have been spent:(that is in so far as its
revenue is derived from a general income tax).   ~~Because~~ Money
earned at the present moment say, and spent at the present moment,
is only taxed once, viz., at the present moment;   yet if this
money had been saved it would have yielded fruits which would have
been taxed again at later dates.   Thus in this sense money saved
seems to bear more taxation than money spent.   If this in fact be
Mill's meaning then he does not commit the confusion in thought to

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[1]
[2]   Giornale, 1913
       MacGregor, art. cit., p. 393

to which Professor MacGregor alludes.

Frequently in the course of his discussion MacGregor alternates
between arguments that are economic in their nature and others
that are moral.   This alternation we have held, has an obscuring
effect, and we have made a plea for separation.

C H A P T E R XVII.

The British Income Tax and Company Reserves.

1. A joint stock company in Great Britain pays only the standard rate of income tax on the portion of profit which, instead of distributing as dividends to its shareholders, it places to the company's reserve.

The Colwyn Committee was gratified at the extent to which it was found that company reserves had been maintained in the years following the Great War. "On the whole question" it said, "we agree with the view expressed by more than one witness . . . that, when a concern is well managed, it will not be deflected by high Income Tax from a sound policy in the matter of reserves."

As we have already seen in our general review of savings . . . the statistical evidence available does not show any sign of reserves having been sacrificed to dividends. It tends rather in the opposite direction; for it indicates that companies, regarded en bloc, have maintained their reserves even at the expense of dividends".*

2. To see the consequences of this rule in British income tax legislation, let us consider the position of a person who is an ordinary shareholder in a joint stock company. The company after meeting the outgoings necessarily associated with its trading over the year, comes into possession of a given amount of profits, part of which it will distribute as dividends to its ordinary shareholders and the remainder it will place to reserve. There is a certain region of play

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* Report of the (Colwyn) Committee on National Debt and Taxation, § 395, pp.146-7.
  For statistics showing the percentage of undistributed profits in recent years, see Colin Clark, National Income and Outlay, p.187.

within which one of these amounts may be increased and the other correspondingly diminished.

If a shareholder A say, is a rich shareholder who pays income tax on his yearly earnings at a higher rate than the standard rate -- in the language of the Inland Revenue Department, he pays surtax as well as income tax -- then he will be keener to see an increase in the portion of the company's profits that is allocated to reserve. If the standard rate of income tax be, say, five shillings in the £, and the rate at which he himself pays income tax be eight shillings in the £, then after payment of the tax on £1 that accrues to him as payment of dividend, he will be left with a net amount available for investment of only twelve shillings. If the company were to have invested this £1 for him, however, it would pay five shillings of it to the Government as standard rate of income tax, and invest the remaining fifteen shillings in the development of its business. The shareholder A, therefore, will, so far as this aspect of the matter is concerned, benefit through the company's placing money to reserve.

Let us suppose that no uncertainty exists and that the market rate of interest is R%. The individual A will be content to get a lesser rate of interest than R on the larger amount of income that he is able to invest via the company's reserves. Indeed he will be content that his money should be placed to reserve in this way, so long as the rate of interest accruing from its investment is not less than an amount L%, where

$$15 \frac{L}{100} = 12 \frac{R}{100}$$

that is $L = \frac{4}{5} R$

If the curve of marginal productivity of capital of the company be only gently downsloping, this represents an

advantage to a rich shareholder of this type, in so far as the ability of the company to employ additional capital at profit is increased.   If this curve of productivity of capital be steeply downsloping, the company can use less capital in placements to reserve, with profit to its richer shareholders.   The fact however, that companies are legally entitled to purchase the shares of others out of these re-serves, or to purchase government securities, tends to make the curve of productivity of capital more gently down-sloping for each of them.

The above deals with the case of the shareholder who pays surtax on his income as well as the standard rate of income tax.   The case of the shareholder who pays income tax at a rate less than the standard rate can be similarly dealt with.   Suppose that such a shareholder, B, pays income tax on the moneys that accrue to him at the rate of two shillings and six pence in the £, five shillings being as before the standard rate of income tax.   Before this share-holder will desire £1 of the company's profits to be placed to reserve, rather than distributed as dividends, he will require to expect a rate of return on it not less than $G\%$ which is greater than $R\%$, the normal rate of interest.   G will be given by the equation

$$15 \frac{G}{100} = 17/6d. \quad \frac{R}{100}$$

that is $G = \frac{7}{6} R.$

If it were always possible for the company to raise fresh capital in the market at zero cost over and above the normal rate of interest R   -- i.e. if the cost to issue houses, to underwriting of a share issue, etc, were zero -- then the individual B would desire the company's entire business to be financed by hiring capital in the market. He would desire the whole of the company's profits to be

distributed as dividends and no portion of them to be placed to reserve.

In practice companies only find it possible to raise fresh capital by incurring money and trouble costs additional to the 'normal rate of interest' that they pay on this capital. This necessitates modification in our last conclusion; and the company through the existence of such additional costs of raising capital will tend to find it profitable, even though all the shareholders pay income tax at a rate less than the standard rate, to maintained a certain financial reserve.

The example we have given, although it is cast in the most simplified of terms, suffices to show that the amount of profits that the company places to reserve, will depend on the incomes and rates of income tax of the shareholders in it. If everything else in connection with the company were to remain unchanged, but the composition of the body of its shareholders were to alter, then the company's policy in regard to dividend payments and reserves would likewise be required to alter, in order that a position of maximum profitability to its shareholders should be maintained.

3. The foregoing examples show that in the matter of allocation of profits to reserve, the interests of the poor and of the rich shareholders, and of different individuals among the poor and of different individuals among the rich shareholders, are in conflict. If the company has shareholders in both categories rich and poor, then whichever policy it pursues in regard to reserves will be opposed to the interests of at any rate one of these classes. If, after the lapse of a period, it becomes clear that the company's policy is going to be dominated by the interests of the rich shareholders, then the poorer shareholders will tend to sell out their shares to richer persons, and will tend to purchase shares in other

companies whose policies accord more with their own interests.
Thus the existence of the provision in British income tax law,
requiring companies to pay the standard rate of tax on moneys
put to reserve, introduces a force which tends to bring into
existence a situation in which the shareholders in each
company are people who pay the same rate of income tax.
Other forces, needless to say, are at work, which tend to
lessen the importance of the force we mention: such as, for
example, lack of clearness of knowledge and of foresight,
industrial uncertainty, and difference of policies in regard
to saving and investment pursued by individuals with the
same incomes.

4. In order that a state of maximum productivity should be
attained in a community, economic science shows, a necessary
condition to be satisfied is that the investment of an addi-
tional £1 of capital should afford the same yield in every
line of production. The above reasoning shows that the
provision of British income tax law whereby a company pays
income tax at standard rate on the moneys that it places to
reserve, tends to frustrate this condition from being sat-
isfied. A result of the legal provision, we have shown, is
that the interests of different individuals require the
productivity of the same unit of capital, £1, to be different
in different occupations: in some occupations the productivity
of capital will be greater (G% in the example we chose), and
in others less (L%), than the normal rate of interest. A
condition of maximum productivity in the country thus tends
to be frustrated.*

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* See R.F. Fowler, The Depreciation of Capital, Chap.VI. on
"The Effects of Joint Stock Organization on the Mobility
of Capital".
A further argument from the side of equity exists
against the legal provision that we have been discussing.
The earnings of the company are really the property of
the shareholders: part of these earnings are ploughed
back into the business in the form of company reserves.

(Continuation of footnote from previous page)

The fraction of the reserves belonging to the poor man, who
pays income tax at only a very low rate, and the fraction
belonging to the rich man who pays at a much higher rate,
are both of them taxed at the same rate per £ when they
are placed to reserve.   This type of taxation is impersonal
and contrary in nature to the principles underlying the rest
of the British income tax which is a personal tax, att empt-
ing to adjust the weight of the burden on a person to his
ability to bear it: to do so it takes into account his
family circumstances and raises the rate of the tax with
increases in the size of the person's income.   The legal
provision relating to company reserves abandons this
principle.

CHAPTER 18

A Subsidy in respect of Income Tax granted to British Farming.

1. British farmers have the privilege of being assessed for purposes of income tax in whichsoever of two ways they choose. They may choose to have their incomes assessed by the Department of Inland Revenue, as being the actual amount that they have earned during the year. It is on this basis, viz., actual earnings, that all other classes in the country are assessed. British farmers may however, if they so desire, have their income assessed for purposes of taxation, as being of an amount different from this: they may choose to be assessed as if the amount of their earnings were equal to the rent that they pay for their farm lands and buildings. Should a farmer have chosen at some date in the past, to be assessed on the basis of the rent that he pays, and discover later that the income he has actually earned, e.g., due to bad weather, fallen below this amount, then he may alter his decision, choose to be assessed on the basis of income he has actually earned and obtain a corresponding repayment of tax from the Department of Inland Revenue. It is always open to the farmers therefore, to choose whichever of the two bases has been the lower for the year in question[1]. The effect is exactly the same as if farmers in Great Britain were paying income tax at a lower rate than other classes in the country[2]. It acts as a kind of subsidy.

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[1] The alternative basis of assessment came into existence in the early nineteenth century, because it was felt at that time that farmers would be unable to keep books of account giving a record of their business profit. Today this reason has largely lost its force.

[2] The vast majority of farmers choose to be assessed on a rental basis rather than on the actual income that they earn.

The owners of land who let it out to tenant farmers will derive no <u>direct</u> benefit: because these owners are assessed for purposes of income tax on the amount of whatever income is transmitted to them by the tenants[x1]. The people who benefit directly (viz., through omission of a portion of the tax), are those who engage in the farming of land, whether they own the land that they farm or have hired this land from others.

2.   To see the effect of this privilege on those who carry on farming, let us represent in diagram I the cost conditions to a farmer who grows only one crop. In the diagram the horizontal line of price through P is taken to be fixed, corresponding fairly well to the case where the farmer concerned produces a crop like wheat say, for which there is a world market. The curve MVC (ABHP), shows the farmer's marginal variable cost of production for different outputs of the crop, where variable costs are taken to include all expenses of production, excepting the rent he pays for the fixed quantity of land that he occupies, excepting the return the farmer gets to the fixed capital he employs in the farm, and the return to the farmer's own labour which, for simplicity we take also to be a factor whose quantity is fixed.

Technical coefficients of production we suppose to begin with, are fixed at each scale of output and independent of the height of the tax.

[x1]   In terms of the well-known schedules of the British income tax, property owners are assessed under Schedule A of the income tax and in this there is only one basis of assessment, viz., income actually received. It is income arising from the <u>occupation</u> of land that is assessed on the alternative basis.

If there be no tax the amount of produce placed on the market annually by this farmer will be OM, given by the point of intersection of the curve of marginal costs with the horizontal line of price. The total annual return to the farmer's land capital and labour
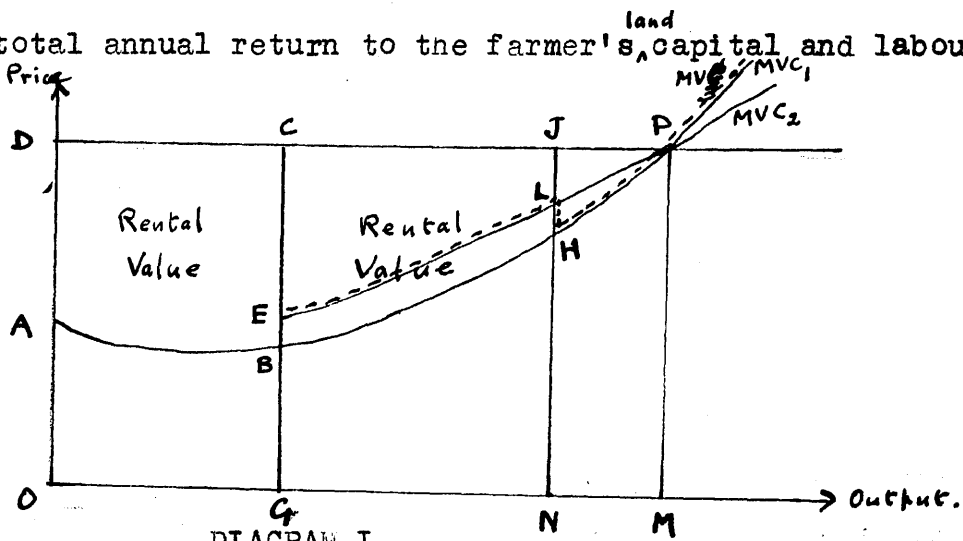

DIAGRAM I

Area ABCD = area BHJC

= value of annual rental

MVC_3 is shown as a dotted line.

Area CBHP = return to farmers capital and labour if there is no income tax.

Area CELP = his return if income tax is paid on assessment equal to income earned.

Area CELHP = his return if income tax is paid on assessment equal to rental value.

will be equal to the area ABPD. Out of this however, a rent payment equal to area ABCD falls to be paid, leaving a net remuneration to the fixed factors, capital and labour, supplied by the farmer, equal to area CBHP.

Let us to begin with suppose that this farmer is required to pay income tax on an amount of income assessed as being equal to his total earnings. And let us suppose that the prices he pays to the factors of production remain constant and independent of the income tax, so that MVC_1 continues to be the curve of

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costs other than income **tax**.   His income tax payment is now
an expense necessary to production, just like any of his other
variable expenses: and the curve of marginal variable costs
including tax to the farmer is MVC_2, ABELP in the diagram.   Before
he will be required to pay income tax his income will have to
exceed an amount equal to his rent payment.   In the diagram OG
is the quantity of crop that the farmer must sell at the existing
price level, before his total income becomes equal to his rent
payment.   Since the income tax absorbs a portion of each increment
of income once the output OG has been passed, the shape of the
new curve of cost including tax will be as shown.   The OMtn unit
yields no return above variable costs of production: it therefore
pays no income tax and the curve MVC_2 will pass through the point
P.   After the tax, output will be OM units, as it had been before it.

Next if the farmer may choose to pay income tax either on
the amount of income that he earns, or else on an amount of income
equal to the annual value of his rental, then following the law
of minimum cost he will choose to pay income tax to begin with on
the amount of income that he actually earns, and will do so until
the amount of his earned income additional to his rent payment
becomes equal to the value of his annual rental.   After this point
has been reached, when his earnings are greater than his rental
value, he will choose to pay income tax on an assessment equal
only to the value of his rental.   Thus he will always pay tax on
whichever of the two assessments is the lower.

In the diagram the rental value of the farmer's land is taken
to be equal to area CBHJ.   Until the crop production corresponding
to an income of this amount is reached, viz., a crop production
ON, the farmer chooses to be assessed on his actual income: over
the range O to N, therefore, the curve of marginal costs including
tax to the farmer, MVC_3, (when he pays income tax but is permitted

to do so on the alternative basis), is still ABEL, coinciding
over this range with the curve MVC$_2$. After output passes an
amount ON, the farmer will choose to pay income tax on an assessment
equal to the value of his annual rental. On units of output
between N and M, therefore, he will pay no additional income tax,
and his ~~sum~~ curve of marginal costs including tax will coincide, over
this range, with the curve MVC$_1$, (HP). At the point L there will
be a discontinuity in the curve of marginal costs. including tax,
MVC$_3$. MVC$_3$ is shown in the diagram as a dotted curve. Output
as in each of the two previous cases, will be OM, given by the
point of intersection of the curve of marginal costs with the price
line.

3. The net profits of the farmer after payment of rent
and of income tax, if he is assessed on his actual profits, will be
equal to area CELP. When he is offered the alternative basis of
assessment his net profits become equal to area CELHP; that is,
equal to his previous profits plus an additional profit LHP. The
farmer's capital and labour, therefore, is more highly remunerated
in this line of production as a result of the alternative basis of
assessment than it would have been otherwise. But if we assume
meantime that labour and capital are in perfectly elastic supply
to the industry this will not represent a possible equilibrium
state of affairs.

Instead, if it were to be the case that the technical coeffi-
cients of production on this farm and every other farm were fixed
and definite, and if the price of the commodity being produced on
the one hand and of the factors labour and capital being hired on
the other, were also fixed, then the only factor that would be able

to alter in price would be land; and the price of land would be
bid up so that each farmer just got the normal rate of remuneration
on the capital and labour involved. When rent had reached its
new equilibrium level, the farmer would be indifferent whether he
paid income tax to the government on the basis of rental value
or on the basis of income actually earned.

Since in these circumstances rents of land have risen, there-
fore land that was formerly below the margin of cultivation will
now come into production: the area of land cultivated will have
increased.

The long period curve of supply of labour to British
agriculture will not, in fact, be perfectly elastic: it will be
upward sloping. Since more land is in use as a result of the
double basis of tax assessment, and since the price of land has
risen, therefore labour and capital will be substituted for land
in the productive process. Hence the demand for labour must have
risen: more of it will be employed at a higher wage rate.

Our assumption hitherto has been that capital is in perfectly
elastic supply to the industry. Now the amount of tax remission
enjoyed by any farmer as a result of the alternative basis of
assessment will be greater, the greater the rate at which he is
liable to payment of income tax: that is, the tax remission is
greater the richer he is. If the farmer's income is sufficiently
low for him to pay no income tax then he gains no direct benefit
from the provision. It will be the rich people who will benefit
most, and these rich people will tend to be induced to enter the
farming industry in greater numbers than they otherwise would have
been.

A person tends to invest capital in each line of production
until he receives from it the same net return in each line. The

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tax remission that he in fact gets on interest accruing from agriculture, will induce a rich person to invest money in agriculture beyond the margin at which it fetches the normal gross rate of return, and up to a further margin at which the gross rate of return is less than normal.

Clearly also the demand curves for most products of British farming are down-sloping. (Wheat is the case that approaches most closely to an exception to this rule). As a result of the double basis of assessment for farming profits, the quantities of these products produced will be greater and therefore their prices lower. The rise in the rents of farm lands, owing to this fall in the prices of the commodities that they produce, will be less great than if, as we had supposed initially, the prices of these products had been perfectly rigid. The area of sub-marginal land actually coming into production will be lowered, through the fall that takes place in the price of farm produce.

The richer farmers will have bid up the price of land: herein the small entrepreneur-farmer suffers. As well these small farmers sell their output in competition with that raised by the richer farmers, who as a result of the alternative basis in tax assessment have increased their output. This again will react to the disadvantage of the small farmers. The more rigid is the demand for the crops raised by the particular small farmer concerned, and the greater the increase in output of these crops by his rich competitors, the more disadvantageous to him will the alternative basis of assessment turn out to have been. Hence on balance the position of the smaller farmers will have been worsened through the existence of the alternative basis of assessment.

Consider the case of the small farmers who own the land that they till. Their capital good, land, will have increased in rental value. Through the increased output of produce by the

richer farmers, these small owner-farmers may find the income that they derive from the husbandry of their lands, reduced. As well, the wages paid to farming labour will have increased. A not unlikely outcome will be for a number of the small owner-farmers to find it more profitable to sell or let their land to others and hire out their labour services to other farmers.

Thus the effects of the existence of the alternative basis of tax assessment in British farming can be summarized as follows:-

Rich farmers get an increased return on their capital. This acts as a subsidy. There is a consequent tendency for richer persons liable to income tax at the higher rates to be induced to enter the farming industry.

There is an increased production of farm products in the country.

A higher price is paid for land.

There is a worsening of the position of poorer farmers through the increased competition that they meet both in renting their land and in selling their crops. Those farmers suffer most, for whose commodities demand is most rigid.

A higher price is paid for farming labour.

There is a tendency to a fall in the numbers of small owner-farmers.