THE SHIFTING OF THE CORPORATION INCOME TAX: THEORY AND EVIDENCE

by

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We accept this thesis as conforming
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Date August 29, 1969.
ABSTRACT

Over the last ten years a series of empirical studies have been published that claim to test by statistical methods whether corporations, faced with the imposition of a tax on their business income, can in the short-term increase the gross profits so as to maintain their net of tax rate of return on capital. These studies have used various methods but the results yield contradictory evidence as to whether the proposition could or could not be accepted as having validity. The results suggested that a fresh look at the theoretical analysis on the corporate tax be undertaken.

The methodology followed was to make a series of simplifying assumptions such that focus could be directed towards an examination of decision-making within the firm and within the industry on which the tax was imposed. For the firm the effective rate of tax is dependent not only upon the statutory rate of tax but also upon the depreciation provisions in force; with an effective tax rate greater than zero, the tax ceteris paribus reduces the rate of return on investment projects. However, it was found that to gain fuller results as to the effect of the tax, more detailed specification of the environment within which the firm operates is needed.

The classical models of pure competition and pure monopoly were studied; short-run profit maximisation is assumed in such models. The tax imposition led to the prediction that the after-tax rate of return fell in the short-run; in the long-run if the tax imposed on normal profits, capital moved out of the industry.
Consideration was then given to oligopolistic industries. Profit maximisation was still assumed, but with the realisation that over the planning horizon the firm, departures from full short-run profit maximisation were probable. The reasons for such behaviour were examined. The tax was then imposed. In particular cases the tax affected the constraints to allow price increases and an increase in the gross rate of return. In others the constraints remained unchanged and no short-run alleviating action was possible. Relaxation of the assumptions of the theoretical analysis was then allowed, so that testable predictions could be put forward. Several of the recent studies were then examined to see whether their framework, data and estimating equations were adequate to test the hypotheses put forward. The conclusion drawn was that the use of annual time series over forty years was inadequate for such a purpose.
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INTRODUCTION

In 1963, M. Krzyzaniak and R. Musgrave (traditionally abbreviated to K-M in the literature) produced the first post-war book-length attempt to assess econometrically the effects of the corporate income taxes on the rate of return in manufacturing industries over the period 1935-42 and 1948-59. Their analysis attempted to focus on short-term shifting of the tax, and their startling conclusion in view of the traditional view concerning the effects of the tax in the short-run, was that corporations were able by some means (implicitly reserve market power) in the face of rising tax rates, to maintain their net rate of return, and in fact even increase this net rate. The reception given these findings was decidedly mixed. Several economists found enough confidence in the K-M model and the econometric techniques to perform almost identical tests for corporations in Canada, West Germany, and India. The results from these tests conformed with the K-M findings of over-shifting of the tax. Other economists did not share this optimism in the models used and the findings; R. Goode, R. Slitor, and collectively J. Cragg, A. Harberger, and P. Miezowski, demonstrated the susceptibility of the shifting measure to changes in the specification of the estimating equations. R. Gordon, specifying his own model and equations, found a result for short-run shifting entirely contrary to the K-M findings. A summary of the studies, techniques used, and results for short-run shifting is given in Table I.
CHAPTER II

RETURNS TO INVESTMENT, THE NATURE OF PROFITS, AND THE TAX
As can be seen the findings hardly display unanimity, and although the K-M study has been subject to damaging criticism, the conclusion must be that no clear consensus emerges from the literature. Discussion of the various econometric techniques used should, and undoubtedly will continue, but it appears that a more substantial review is called for. Therefore, in this paper a re-examination is made of the theory of tax incidence and of the predictions that can be derived from the same. Following this part of the paper, consideration is given to the operational problems in testing the body of predictions; then, having set out a methodological framework, the various studies designed to measure shifting are evaluated in the light of this framework.

4 Lammas, Gurchuran, S. The Shifting of the Corporate Income Tax - A Study with Reference to Indian Corporations" Public Finance Vol.21, No. 4.
<table>
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<tr>
<th>Author(s)</th>
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<tr>
<td>Krzyzaniak, M. and</td>
<td>150%</td>
<td>T.S.R.E. for 1935-1942 and 1948-1959.</td>
<td>Gross rate of return on capital for manufacturing (( \gamma_q ))</td>
<td>( \Delta C_{t-1}, \Delta t_{t-1}, \Delta E_{t}, \Delta L_{t} )</td>
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<td>Musgrave, R.A.</td>
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<td>Instrumental variables.</td>
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<tr>
<td>Hall, C.A. Jr.</td>
<td>0%</td>
<td>T.S.R.E. 1919-1950 O.L.S.</td>
<td>Profits share in National Income</td>
<td>Various, but including a measure of concentration</td>
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<td>Kilpatrick, R.W.</td>
<td>50-80%</td>
<td>Cross Section Regression Equations O.L.S.</td>
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<td></td>
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<tr>
<td>Roskamp, K.</td>
<td>108%</td>
<td>T.S.R.E. for post-war German Corporations. Instrumental variables.</td>
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<td>Slitor, R.</td>
<td>80%</td>
<td>T.S.R.E. for 1935-1942 and 1948-1959 O.L.S.</td>
<td>( \gamma_q )</td>
<td>( \Delta C_{t-1}, \Delta t_{t-1}, \Delta E_{t}, \Delta L_{t} )</td>
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<td>Cragg, Harberger</td>
<td>0%</td>
<td>T.S.R.E. for 1935-1942 and 1948-1959 O.L.S.</td>
<td>( \gamma_q )</td>
<td>( \Delta C_{t-1}, \Delta t_{t-1}, \Delta E_{t}, \Delta L_{t} )</td>
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<td>Miezowski</td>
<td></td>
<td>Instrumental variables.</td>
<td></td>
<td>and war dummy ( W_{t} ) and ( E_{t} ) and the employment rate</td>
</tr>
<tr>
<td>Gordon, R. J.</td>
<td>0%</td>
<td>T.S.R.E. for 1926-1962. War years not included. Iterative technique.</td>
<td>Current price, output, changes in same, productivity change term, capacity utilisation variable, and tax variable</td>
<td></td>
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<tr>
<td>Author(s)</td>
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<td>Econometric Technique</td>
<td>Dependent Variables</td>
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<tr>
<td>Spencer, B.G.</td>
<td>130%</td>
<td>T.S.R.E. post-war for Canada. Instrumental variables.</td>
<td>$\gamma_q$</td>
<td>$\Delta C_{t-1}, J_t, Q_t, L_t, V_{t-1}$.</td>
</tr>
<tr>
<td>Lammas, G.S.</td>
<td>113.5%</td>
<td>T.S.R.E. 1950-62 for India. Instrumental variables.</td>
<td>$\gamma_q$</td>
<td>$V_{t-1}, J_t, Q_t, L_t$.</td>
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KEY: T.S.R.E.: Time Series Regression Equations 
O.L.S.: Ordinary Least Squares

SOURCES:
8. Spencer, B.G. op. cit.
One of the principal difficulties that arise in discussions of the tax incidence is that partial equilibrium analysis imposes limitations. Other things cannot be expected to remain equal in response to a major shift in the tax structure; an analysis of such a shift would require examination of a complex dynamic system, for any major change in the tax provisions will have repercussions on the capital markets, the final demand for goods and services, the patterns thereof, the industrial structure, and the international payments position. Similarly, adjustments may be made simultaneously to other tax rates, patterns, and amounts of government spending which would have to be taken into account when assessing the overall and detailed effects of a major tax shift. Therefore, in the following analysis, certain assumptions will be made:

(i) the change in the tax provisions envisaged is confined to the rate of business income tax, and is sufficiently small that partial equilibrium analysis can be used in theoretical models; the repercussions suggested

1 See for example the assessment of the Carter Commission Report by various authors in the Canadian Journal of Economics. Supplement No. 1, Feb. 1968.
above are assumed to be such as to not seriously effect the validity of the predictions. In a later section the importance of relaxing these assumptions is considered.

(ii) in order to isolate theoretically the effects of the tax imposition, it is assumed that government expenditures are fixed in amount independent of the business income tax rates. In specific terms we assume all demand and supply curves in the economy fixed, except in so far as derived demands and supply prices of inputs are altered by the effects of specified changes in business income tax rates at other levels of production and distribution.

(iii) the business income tax is assumed to be general and applicable to returns yielded from all forms of assets.

Given these assumptions, we turn to an examination of the effects of the tax on the returns streams of individual firms both with regard to existing and future investment projects. The examination
is useful both for analysing the long and short-run effects of the
tax. Gross returns in any period before depreciation and tax
payments may be expressed as follows for the ith firm:

\[ G_i^t = p_i^t X_i^t - W_i^t - M_i^t - T_b_i^t \]

where

- \( G_i^t \) = gross returns in the period of the ith firm
- \( p_i^t \) = price per unit of output
- \( X_i^t \) = output sold (assumed equal to production) of the ith firm
- \( W_i^t \) = wage bill of the ith firm
- \( M_i^t \) = materials bill of the ith firm
- \( T_b_i^t \) = indirect business tax payments of the ith firm

Under the income tax provisions in operation, interest on bond
capital, and rental payments are legitimate deductions; these
elements of discrimination against some forms of capital sources
will encourage, ceteris paribus, substitution towards investment
financing by debt capital. For the purposes here, however, it
is assumed that no discrimination exists, hence assumption (iii)
above. The definition therefore stands as stated. However,
the returns evaluated in an investment programme or project
whichever evaluation criterion used by the firm, are not held
with certainty; the variables in the future income stream have
outcomes that cannot be predicted with complete certainty. The
entrepreneur or management group may be viewed as making decisions
in the face of uncertainty on the basis of probabilistic expec-
tations about future outcomes. The probability density functions
of the returns will have certain properties which will be valued by the decision-maker, who may be viewed as balancing the various moments of the probability function on the basis of his utility function. For example, for a given mean value, increasing variance will yield decreasing expected utility to risk averse firms; however skewness may have a compensating influence if positive, i.e. the probability of low earnings is small. It is not the purpose here to incorporate these vital elements caused by uncertainty on the investment process rigorously into the analysis, but only to stress their importance; one of the ways that business income taxation may effect the investment process is its effect on the certainty with which future values of variables in the gross returns stream are held.

There are several decision criteria used in investment evaluation, namely the present value rule, the pay-off rule, the gross returns rule and net returns rule, the accounting rate of profit rule, the internal rate of return rule, etc. Consideration to all these rules can not be given; we restrict our attention here to the last mentioned, the internal rate of return rule, which has certain advantages for the purposes of discussion. In a taxless world, firms according to this rule choose capital expenditures $K_j$ such that $\rho$ in the expression

$$\sum_{t=1}^{n} \frac{G_t^e}{(1 + \rho)} - K_j = 0$$

is a maximum, where $\rho$ is the internal rate of return. When the

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tax is introduced it is also necessary to consider the statutory provisions for depreciation, which determine the effective rate of tax, the extent of the tax burden, and bias in the tax system. If, for example, allowable depreciation is instantaneous at time of the asset purchase and before income yield, and immediate full loss offset provisions are in force, then the loss is refunded by the tax authorities which then can be reinvested, registered as a loss, refunded, etc. If we assumed constant returns to investment and all further income were subject to the rate of tax, the internal rate of return on capital invested will remain at the level attained in the taxless world, and the situation is equivalent to a zero profits tax. Now the case where instantaneous depreciation is not permitted will be considered. Under current depreciation provisions, three main methods can be used; these are the straight line basis, and the two accelerated schemes, the sum of the year's digits, and the double declining balance method. The present value of deductions under the latter schemes are higher than the straight line scheme; in fact it has been shown elsewhere that for many plausible values of machine life and interest rates, that the sum of the year's digits method predominates. The timing of introduction and extent of application of changes in the provisions can be


calculated to change the effective tax rate by significant amounts while the statutory rates are constant. With set depreciation provisions, the internal rate of return rule is now stated as: choose capital expenditures \( K_j \) such that

\[
\sum_{t=1}^{n} \frac{Q_t(1-c) + c D_t}{(1+r)} - K_j = 0
\]

is a maximum where \( r \) is the internal rate of return, and \( c \) is the tax rate. Two cases present themselves for consideration; firstly, the effect of the tax on existing projects, capital expenditures already having been made; secondly, the effect on investment projects under consideration for future capital expenditures.

(A) Existing projects and the Tax

For existing projects, the tax has the effect of reducing the attainable maxima under various decision rules; in our illustrative rule \( r \) is reduced. The net rate of return on capital is reduced, but will not effect the price and output since \( Q_t \) was already being maximised; this will be so for all firms whatever industrial structure they are operating in unless the tax changes the constraints within which maximisation takes place. In pure competition, firms have no discretionary power over price, but are price takers, and are assumed to pursue short-run profit maximisation as a prerequisite to long-run profit optimisation. In imperfectly competitive industries, firms are
assumed to maximise profits within constraints; therefore, if the tax makes a constraint inoperative, \( q_t \) may be a variable that can be affected by the firm, either as a sole member of the industry or as part of a collusive or mutually interdependent group of firms. In terms of the internal return rule, \( q \) which was depressed ceteris paribus by the tax may be pushed towards the original \( q \) value before the tax. If this cannot be done, the rate of returns will fall; the only remedying action that can be taken if the tax rate change is expected to be temporary is to maximise current tax deductions. At this stage in the discussion nothing more can be said without considering in fuller detail the various models of industrial structure; this is undertaken in the two following chapters.

(B) Investment Expenditures under consideration for the future

With the knowledge of the tax change and expectations as to the length of time for which the rate(s) is expected to apply, firms can incorporate the rates and depreciation provisions ex ante into the evaluation criteria. Here again the attainable maxima will be reduced for the various criteria; therefore \( q \) is again reduced. The expected rate of return on capital falls from future investment expenditures, unless similarly to the above, \( q \) can be pushed up again because constraints on profit maximisation are changed by the tax; even so since this necessitates an increase in price and a reduction in output, therefore the prospective need for additional capacity is reduced with consequent effects on investment.  

In long-run equilibrium, the rate of return on capital in each firm has components which vary among industries; above interest rate cost, returns are included for uncertainty bearing, entrepreneurial ability, and other economic rents in order to induce investment of capital into the industry. These elements combined with the interest rate cost determine the concept of a 'normal' rate for an industry; additional returns due to monopoly power may be included in some industries. Thus for purely competitive industries, the rate of return \( \rho = (\tau + \sigma + \theta) \), where \( \tau \) is the interest rate cost approximated to the yield on government bonds, \( \sigma \) is the reward for bearing uncertainty, and \( \theta \) are rents. Similarly, for monopoly power exercise \( \rho = (\tau + \sigma + \theta + \Pi^M) \) where \( \Pi^M \) are these monopoly returns. With the tax, the rate of return is reduced from \( \rho \) to \( \rho (1 - \bar{c}) \), where \( \bar{c} \) is the effective tax rate; meanwhile the yield on government bonds falls from \( \tau \) to \((1 - \bar{c}) \tau \). Under the assumption that government pursues a monetary policy keeping the bond rate constant, the effect on real investment and the rate of return can be isolated. In the competitive case, the depressed rate of return with the tax will not cover the new 'normal' profit rate, i.e. \( \rho = [i - \bar{c} (\tau + \theta + \sigma)] \); real resources will therefore leave the industry. In the monopoly case, real resources will leave this industry only on the following condition: that the tax rate is such that \( (\tau + \sigma + \theta + \Pi^M) (1 - \bar{c}) \leq [i - \bar{c} (\tau + \theta + \sigma)] \). If this condition is fulfilled, the tax rate fully eliminates monopoly
profits and impinges on normal profits. If the condition is not fulfilled, the tax depresses the rate of return without causing resources to move out of the industry. The re-established level of 'normal' profits will naturally reflect the adjustments of the supply of funds, the bond rate, and those sectors in the economy which are in fact not subject to the business income tax. We now turn to a more detailed examination of models of industrial behaviour.
CHAPTER III

INDUSTRIAL STRUCTURE AND TAX EFFECTS
We here give brief consideration again to the polar models of pure competition and pure monopoly; a considerable part of the analysis for these models was carried out in the previous chapter. The consideration is brief also since, unlike oligopoly models, they draw upon a large measure of acceptance from economists, and are included in most economists' box of analytical tools; in addition it is apparent in the literature that it is the consideration of oligopoly and its extent within any given economy that has been one of the causes of the gravest theoretical difficulties and the attendant problems of specifying an empirical framework.

(1) Pure Competition
Firms are assumed to maximise short-run profits, and the profit maximising output is attained where price equals marginal cost. We here recall the identity for business income of the $i$th firm in the $t$th period, before tax payments and depreciation, and abstracting from indirect business taxes:

$$ G_t^i = p_t^i X_t^i - W_t^i - M_t^i $$

If we assume constant marginal and average variable costs up to some capacity limit then the profit maximising condition can be
expressed in the form of prices being marked-up by some factor \( \alpha \) over unit variable costs\(^1\):

\[
\bar{p} = (1 + \alpha) \left[ \left( \frac{W_t^i + M_t^i}{X_t^i} \right) \right]
\]

Price will be the same between firms but \( \alpha \) may vary at any given time due to inter-firm differences in unit variable costs.\(^2\)\( \alpha \) the mark-up factor is left in the short-run to cover unit fixed costs: it, in fact, may or may not do so, but as long as \( \alpha \geq 0 \) the firm will continue operating in the short-run. The firm's position is illustrated below:-

In the short-run, equilibrium is attained at output \( \bar{X}_t \) where the industry price is \( \bar{p} \).

The imposition of the tax does not affect short-run marginal cost leaving the firm's output unchanged and the industry price remains at \( \bar{p} \). \( \alpha \) is unchanged so that business income received by the firm is unchanged, i.e. the gross rate of return on capital is unchanged; with the tax on business income the net rate of return on capital falls. In long-run equilibrium 'normal' profits will

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1 The theory is therefore quite compatible with mark-up behaviour professed by business men.

2 New plants or machines reflect current knowledge, technology, and factor prices; however, the cost structure of any industry in any given time period depends upon the past evolution of its gross investment, its technology, and factor prices.
be earned by all firms in the industry; economic losses and pure profits which may exist in the short-run will be eliminated. The tax which is imposed on business income imposes on 'normal' rates of profit in competitive industries, leading to exit of capital resources; as exit continues the supply curve of the industry shifts leftward raising price, and will continue until 'normal' rates of profit are re-established in the industry.

(ii) Pure Monopoly

In this case also profit maximisation remains the assumed goal, and the monopolist equates marginal revenue to marginal cost to determine price and output of the industry; this, too, can be expressed as prices being marked-up by a factor $\alpha$ over unit variable costs. In the short-run the rate of return is depressed, price and output remaining unchanged. In the long-run, as long as the tax does not impinge on the elements in the profit rate other than monopoly returns, the rate of return is depressed in the long-run without output or price change. In this pure case, the monopoly power is given by long-run control over industry supply through the ability to bar entry; the key feature of this model that differentiates it from the oligopoly models to be considered is that the monopolist's actions are not constrained by the recognition of interdependence between producers to any substantial degree affecting behaviour. To some extent all producers are competing for the consumer dollar, and the distinction noted
lacks precision, but once interdependence becomes an important feature affecting behaviour the constraints on the exercise of monopoly power must be precisely stated, and is best done in the consideration of oligopoly models.

In contrast to the classical theories of pure competition and pure monopoly, theories of oligopolistic behaviour find no such general acceptance by economists. The pure monopoly model is of limited applicability since such situations are found but rarely, primarily because single firms rarely have the ability to prevent entry and extract monopoly returns over a long period of time without attracting capital resources into the industry; more generally producer interdependence is the vital factor influencing behaviour. Even if there is a sole producer of a product facing a negatively sloped demand curve for this product and there exist substitutes, then the producer will have to take into account the effect of his actions on the behaviour of producers marketing substitutes. In formal terms, among the ceteris paribus determining the position of the demand curve will be the prices of the substitutes, and if the monopolist changes his price it is unlikely that the ceteris paribus will hold. An example of this is the soft-drink industry where several of the main producers have patented drinks with distinctive properties; the monopoly will therefore be limited, and constrained by the nature of interdependence of major decision variables. As has
been stated it is unusual for pure monopoly to continue over time; even if there are no close substitutes at any given time, the possibility of such development and entry may well influence the behaviour of the monopolist. Therefore, interdependence of producers, i.e. an oligopoly situation, is likely to be more common than pure monopoly, and in most modern capitalist economies oligopoly is a widespread form of market structure, and thus necessitates consideration in the analysis of tax effects. However, there is no simple set of rules for the equilibrium either of the firm or the group of firms that constitute the industry; neither is there a set of simple predictions as to how firms will react, either individually or collectively, to various changes in taxes, costs, and demand. All depends on the policy that the firm pursues, on the policies its competitors pursue, on how each reacts to the other's changes, and on how each firm thinks the other will react. Since firms can be assumed to act, react, and interact in many ways, the choice must be restricted to a selected few models.

One method of attacking the oligopoly problem is to develop a series of theoretical models assuming that individual firms react in particular ways, and then to see what follows from the assumptions. This approach is unsatisfactory on two main grounds. Firstly, the number of assumptions that could be made about behaviour is very large, and the number of possible cases that could be examined
is large and unwieldy. The second objection is more fundamental and it is that a satisfactory theory (or more likely group of theories) of oligopoly cannot begin with assumptions concerning the way in which interdependence with its rivals is considered by the firm; if we retain the profit maximising postulate of traditional price theory, then behaviour is no longer something to be assumed, but rather something to be deduced. The approach adopted here, therefore, is to retain this postulate of profit maximising and to specify the nature of the constraints operating in various oligopolistic environments, thus deducing behaviour and how this behaviour may be affected by the imposition of the tax.

All firms in an oligopoly are by definition mutually dependent; however, the ability to secure for the oligopoly, elements of monopoly returns on the basis of recognition of mutual dependence will depend, as in the pure monopoly case, on the ability to prevent or discourage new firms entering the industry. Thus if entry is relatively easy into an industry, then recognition of mutual dependence to collude to maximise industry profits by acting as a monopoly will not secure for the oligopolists high rates of return in the long-run. However, oligopolists, whose joint-monopoly position is protected by entry barriers, will be able to recognise their dependence and also adopt behaviour and measures that will protect their monopoly position.
We now turn to a more detailed examination of these models, the oligopolists' optimal behaviour, and an examination of whether the tax will change such behaviour. The taxonomic approach is continued here.

(iii) Oligopoly with Barriers to Entry and Homogeneous Product
The industries considered in this classification consist of those in which the minimum economic plant size is absolutely large, and requires large amounts of capital. Each market for the product is served by a few firms, and the product is homogeneous; this latter feature has important effects on behaviour. With the homogeneous product, buyers cannot be induced to prefer one maker's product over another's of similar quality if a positive price differential exists; we may go further and say that attempts to differentiate the product would be irrelevant in the market concerned since buyers are so well informed as to the available prices and quantities, that monetary expenditures to provide information to induce larger sales to any particular company are pointless. Oligopolists in such positions are not generally selling to the general public. This may be contrasted with some industries where products are often physically identical and in which prices of the various companies products are common yet brand allegiances can be formed and changed by informational expenditures, and thus increase sales to particular companies. An example of this is gasoline marketing by the major oil companies.
Now the combined profits of the firms in an industry are maximised when they act together as a monopolist; the optimal policy for the firms in an oligopoly is to recognise their mutual dependence and achieve joint-profit maximisation. Departures from trying to attain this maximum in an oligopoly protected by barriers to entry have a low probability, since attempts at price chiseling by any one firm are unlikely to go unnoticed by the others. If noticed they will be matched by price cuts from the rivals; the situation becomes unstable and if the price cut is not withdrawn price wars break out which are disastrous for individual firms and industry profits. In an optimal policy the firms realise their mutual dependence and act on this recognition; in such industries price competition, in the sense of deliberately lowering price to attract additional sales, will be suspended and price leadership will prevail.¹

For these industries, the capital requirements necessitated by the absolutely large size of minimum efficient scale of plant present formidable barriers to the potential entrant attracted by the monopoly returns being made; the position of oligopolists confers on them the exercise of considerable

¹ The classic case of this is the American Steel Industry where price leadership is generally provided by the U.S. Steel Company.
monopoly power. The oligopolists, therefore, having sus-
pended price competition in order to joint-profit maximise,
in further pursuing the optimal policy must adopt tactics to
preserve their market power and prevent decay in their shares
of monopoly profits and output.

The dangers have two major sources; namely those arising be-
cause of actions or potential actions within the group which
may endanger the maturity of the mutual dependence recognition,
and those arising externally from the group through movements
from potential domestic and international entrants. As such
the optimal policy of the oligopolists in face of these con-
straints may give rise to departures from those prices which will
maximise profits over a short period of time. This may be con-
trasted with the pure competition model where short-run profit
maximisation is a prerequisite of long-run profit optimisation.

We proceed to specify these constraints leading to such departures;
we then consider whether the constraints are changed by the tax.

(a) The constraint imposed by potential domestic entry:
The monopoly returns in the profit rate are attractive to potential
entrants within the economy, and if entry occurs each firm's share
of monopoly profits will decline, and may even give rise to
maturity breaking down although this seems an unlikely possibility
in the high concentration industries envisaged. Optimal policy
will be therefore to seek to discourage entry. It has been suggested that oligopolists can block entry by pursuing an overall less than monopoly price policy in all markets. At this price, entry at efficient scale will depress price (if the oligopolists do not cut output) so that the entrant will not achieve a competitive rate of return; in this way entry is discouraged and the oligopolists receive a rate of return above the competitive rate. However, the potential entrant will assess the investment at the post entry price and after the initial period of losses, and a strong objection to the limit price analysis is the assumption that the oligopolists do not accommodate the entrant. An entrant determined enough could still enter on the expectation that the oligopolists accommodate the move to avoid imposing losses on all, and share the monopoly profits. An exception to this however may occur, but the circumstances and casual inspection of the empirical data suggest this is likely to be unusual. This is where the existing firms in the industry are all at the minimum efficient scale of plant but do not have capacity above this; production at this capacity does not meet demand at the competitive price, but does not allow sufficient output for an additional plant of efficient scale, and yields elements of monopoly returns to the existing producers. Entry of another plant at optimal scale will

depress price; but even if accommodating move was made to try and maintain prices above the original competitive level this will reduce each firm's share of output such that none can operate at minimum efficient scale. The data suggest that in most industries with economies of scale, plant capacity is above the minimum, and thus under the original hypothesis accommodating moves could be made without impinging upon minimum efficient plant capacity.

More generally therefore it seems unlikely that oligopolists can prevent entry by an overall low price policy, or by short-run harassing tactics. Pashigian has stated the problem in the following way: "In practice, the rate of decay of market share will depend on a number of variables, only a few of which are under the firm's control. To a considerable extent, this is an area of ignorance. Very little is known about the causes of differences between industries in the rate at which the market share of the monopolist will decline rapidly if the monopoly price is charged." 3 In the oligopolies with homogeneous product, circumstances may exist however whereby price policy can be used to prevent entry. These circumstances are present where entry occurs in sub-markets or in specific classes of products, thereby fulfilling a necessary condition for price

discrimination to be feasible; here prices can be applied such that the entrant is forced out of business by substantial and consuming losses. This will discourage others from attempting entry, and the policy also minimises the effect on total profits.

(b) The constraint imposed by potential entrants from abroad: The oligopolists monopoly power in the domestic market is gained by the fact that prices are below foreign prices, or if the industry is protected, the foreign price plus the tariff. The industry must operate within this constraint. Short-run profit maximising implies that temporary upward fluctuations in demand, or shortages created before additional capacity can be added, will be met by price changes to extract full short-run monopoly returns. Therefore, if rationing by price was implemented in such situations the domestic price could approach the external price limit; however oligopolists have been observed to use physical rationing devices such as waiting lists in times of shortages. Extraction of short-run monopoly profits is not completed since optimisation of profits over a longer time span may adversely be effected by such action. The buyers of the industry's product if the price goes up in the short-run will face higher costs and thus face relatively lowered profit-margins; as such, then, when the shortages disappear, they will be encouraged to try and ensure such situations do not occur again by
encouraging supplies from abroad and re-specification or re-allocation of long-run supply contracts either abroad or by integrating stages of production domestically. Within such a framework, optimisation of profits over a longer period may require the oligopolists depart from short-run maximisation.

(c) Constraints imposed by internal disciplinary problems: Disagreement may arise within the oligopoly as to the nature of demand changes; thus some firms may regard some demand changes as permanent whereas others may consider the change temporary or regard the change to be of lesser extent. Since all price increases must be agreed on and validated by the price leader, signalling by other members of the oligopoly for price increases may not be validated by the less optimistic or more clearly sighted price leader, even though such increases would extract short-run monopoly returns. If the price leader validated such a change, the more optimistic may add plant capacity which would fail to be used sufficiently to generate the necessary returns; price chiseling might occur in such situations endangering the joint-monopoly position. Another problem arising internally is the danger of smaller firms in expanding under the price umbrella making inroads into the market shares of the larger companies. Here again if the company can be isolated in a market, the oligopolists will attempt to discourage future attempts of
similar companies by forcing losses on the small company.

Now we consider the imposition of a tax on profits for this classification of oligopolists; the key question is to ask whether the tax changes the behaviour of the group. At any given time the oligopolists may extract less than full short-run industry monopoly profits for the reasons given above.

The situation for the industry at any given time is illustrated below where $0\pi_c$ are industry competitive profits, whereas $0\pi_M$ are maximum short-run industry profits. The oligopolists may at this time be making less than $0\pi_M$ in the interest of long-run profit optimisation, e.g. $\pi_0$.

The tax reduces $0\pi_c$ and $0\pi_M$ to $0\pi_c'$ and $0\pi_M'$ respectively; in the short-run therefore a move towards extracting full monopoly returns could be made by the oligopolists so that part or all of the tax might be shifted. However, this short-run less than full extraction of monopoly profits is that policy which ex ante maximises expected profits over a longer period of time, so that unless the constraints are changed by the tax the optimal policy is not changed and the rate of return on capital in the industry is depressed by the tax, output and price remaining unchanged. Ceteris paribus,
tax does not change the constraints enumerated above. In the long-run as long as the tax does not impinge on 'normal' profits, the tax falls on the monopoly returns without changing output and price.

(iv) Oligopoly with Barriers to Entry producing Heterogeneous Products

This model displays similarities to that above in that considerable capital is required to build plant of optimal scale; similarly, outbreaks of open price competition will be avoided due to recognition of mutual dependence. However, the products, although close substitutes, can be differentiated and brand allegiances can be induced and changed by various methods; these methods of competing are accepted by convention in such industries as legitimate forms of competition since they avoid the dangers of open price competition. These conditions often arise in consumer rather than trade markets where information is less than perfect, but in such industries sales resistance is often quite substantial due to past sales promotion activities. The firms, with the establishment of a system of prices on the recognition of mutual dependence, maximise profits with recourse to the non-price competition of advertising, sales promotion gimmicks, temporary small value discounts, voucher schemes, etc. The fact that the product differentiation can be pursued creates wider scope to discourage entry. In the homogeneous product case, the invariant barrier of capital is principally caused by technological factors; with heterogeneous
products, the proliferation of advertising expenditures create necessary additional costs for entrants. These industries may often resort to legal means to make entry more difficult by patenting and trade-marking products. Another tactic employed in some industries is the differentiation and proliferation of brands that are physically identical in most respects, making the sales of an entrant launching a new brand smaller, and increasing advertising costs. This has been observed in industries where brand switching is important, such as the soap and tobacco industries. While if entry does occur, non-price competition can also be used to try and force losses on entrants, as well as price discrimination if this is feasible. With these industries, control over supply is often extended from production to wholesaling functions to control potential price cutting, or into the retail level by fully integrating all marketing processes, using franchises, agencies, and retail price maintenance. This type of industry is largely oriented towards the public; in Canada this type of industrial structure often predominates due to the tariff protected small sized market for consumer goods. Joint-profit maximisation must take place within similar constraints to the homogeneous product case; prices in such industries must be under the foreign price plus the tariff, the extent to which depending on cost and demand

4 Advertising is a fixed cost per unit of output, thus as a rectangular hyperbola in the traditional cost-output plane this has the effect of shifting the minimum point on the long-run cost curve upward and to the right.
conditions in the domestic market. As such with the tariffs unchanged and external producers' costs unchanged, the imposition of the tax does not effect the other constraints determining the departures from pricing policies that will extract full short-run monopoly profits; consequently the rate of return declines, with no price and output changes in the short-run, or the long-run, ceteris paribus holding.

(v) **International Oligopolies**

Rather than being import-competing in the domestic market, some oligopolies, generally those producing homogeneous goods for further processing, are export industries, and as such the policies of foreign companies must be taken into consideration in determining optimal price policy. Often in fact the oligopoly is a price taker in the export market due to the fact that their supply in the international market is not dominant; in which case the imposition of the tax cannot be shifted in the short-run without similar moves by companies in other countries. Even if the share of the market of the oligopolists is significant, unless other firms from other countries can be recognized as followers of price increases, then tax shifting will not occur; so unless tax rates change similarly in other countries such that all favour a price rise, the oligopoly must accept a lower rate of return.

Since, however, Canadian and U.S. rates have usually moved together

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5 Profit maximisation does not require such prices be just below the port of entry price since the demand and cost conditions may determine the profit maximising price to be substantially below the port of entry price.
firms in both countries will favour a raise in the price in a joint-market to avoid a depression in the rate of return, and short-run shifting will occur.

(vi) Oligopoly with Ease of Entry

Next in the classification are industries in which firms are interdependent, but cannot exercise long-run control over supply because entry is easy into the industry. This type of structure is often found in retailing and service industries where sub-markets are maintained by spatial factors; it is also found in manufacturing where the market is absolutely small and few firms achieving minimum efficient scale of plant populate the industry.

Recognition of mutual dependence and achieving monopoly industry profits will not protect the returns of the oligopolists because of easy entry; entrants may accept the monopoly price, but in this case each firm's share of monopoly profits declines. The convention of no price competition is accepted in this case, but the population of the industry has grown leading to excess capacity; since price competition is barred, competition among the firms in the industry for the limited numbers of customers takes the form of competing on cost increasing and profit decreasing non-price competition, such as service packages. 'Normal' profits will be earned in the industry. The imposition of the tax depresses

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6 This is likely to be very important in the Canadian case where the major oligopolies produce homogeneous products for sale in the international and U.S. markets, e.g. newsprint.
returns below 'normal', but monopoly price and output are unchanged; exit from the industry occurs until the share of monopoly profits to each firm is sufficient to cover 'normal' profits again.

Entrants may not accept the prices however, and active price competition may break out despite the interdependence of producers since new entrants must attract business to their enterprises; in this case, prices and profits are driven down to competitive levels. The situation tends to be unstable due to the periodic price breaks. With the tax and without price leadership no firm can raise its prices unless it can be sure of being followed; in which case the profits are depressed and exit will occur from the industry in the long-run.

In the models presented above on imperfect markets, it is predicted that for firms exercising joint-control over price then if short-run shifting does not occur then neither will long-run shifting, as long as monopoly elements make up the rate of return on capital. On aggregate, the tax can only be short-run shifted on this analysis if the economy is composed entirely of industries in which the tax removes a constraint which had previously made full extraction of monopoly returns at any given time non-optimal and non-operational. The point can be illustrated in the following diagram which shows the aggregate rate of return and the capital stock at a given instant of time:
Just prior to the tax imposition with capital stock $OK^*$, the rate of return given by the marginal efficiency of capital schedule $\text{MEC}_1$, gives $\rho_i$, as the aggregate rate of return. The immediate effect of the tax is to shift inwards the $\text{MEC}$ to $\text{MEC}_2$ reducing the net rate of return on capital to $\rho_i(1-c)$; thus unless all firms act similarly and manage to short-run shift the tax, thus pushing the $\text{MEC}$ back to $\text{MEC}_1$, the net rate of return after the tax must be reduced below $\rho_i$. 

![Diagram](image-url)
CHAPTER IV

TESTING HYPOTHESES AND THE EMPIRICAL EVIDENCE
Selected theoretical models of industrial behaviour have been specified including a more extensive theoretical treatment of imperfect competition than is usual in the literature on tax incidence. With the imposition of the business income tax under ceteris paribus assumptions, the models yielded a series of propositions as to the effect of the tax in the long and short-run on the rate of return on capital, price and output. In the non-stationary state and in an operational framework the predictions of the model are relative; thus for a zero short-run shifting proposition yielded by a specific model, the prediction becomes that price and output are unchanged while the net rate of return falls relative to what would have been reached in the absence of the tax. Similarly, for models yielding short-run shifting propositions, the predictions are that output falls, price rises, and the rate of return is maintained or falls by less than the amount of tax, relative to values that would have been reached without the tax. The predictions of the models specified have been expressed with respect to the rate of return on capital, and in specifying an
operational framework for the hypotheses and in considering the empirical evidence, this approach only will be accepted. Some empiricists have attempted to measure shifting of the tax by considering changes in the share of national income going to corporate enterprise as profits. However, there is no really satisfactory theory concerning these shares, and little can be done towards explaining past behaviour of these shares, nor is there a body of predictions about the effect on these shares of occurrences such as the rise of unions, price and wage controls, wage freezes, profits taxes, etc. Research is needed in this subject but until there emerges a more substantive body of theory, empirical studies purporting to test for shifting through an examination of changes in factor shares cannot be accepted.

Since the 1920's there has been a substantial shift in the tax structure in both the United States and Canada; those early years were characterised by low tax rates, whereas in the last twenty-five years the rate of tax has been about fifty per cent. There have been substantial changes in the general economic environment over the period; severe depression followed the generally prosperous 1920's to be followed by wartime, demobilisation, the inflationary situation of Korea, and then the return to normality and prosperity of the middle and late 1950's. If we assume that the economy had adjusted to low rates of taxation during the latter
half of the 1920's, and that also by the 1950's the economy had adjusted to the fact of high corporation tax rates, then the rates of return can be compared. Two periods when general conditions were similar can be singled out, one characterised by the low rates, the other by high rates of tax. The periods 1926-29 and 1954-58 both followed a cyclical upswing, and both had aggregate capacity utilisation and unemployment figures approximately comparable. The data is as follows:–

<table>
<thead>
<tr>
<th></th>
<th>Before Tax</th>
<th>After Tax</th>
<th>Statutory Tax Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average 1926-29</td>
<td>7.58%</td>
<td>6.68%</td>
<td>12%</td>
</tr>
<tr>
<td>Average 1954-58</td>
<td>12.06%</td>
<td>6.24%</td>
<td>52%</td>
</tr>
</tbody>
</table>


The conclusion to be inferred is that despite the quadrupling of the statutory tax rate, the net rate of return for corporate manufacturing as a whole has not been impaired. During the last twenty-five years since recovery from the depression years, corporations have managed to shift the tax in the sense of maintaining their net return on capital. The objective therefore is to explain how this came about; whether by short-run shifting or by long-run adjustments in the capital stock. This is what the recent studies have attempted to do by testing for short-run shifting.

The hypotheses put forward in this paper on short-run shifting can be
tested by econometricians by using data on profits, prices and output before and after the tax change, isolating the effect of the tax change from other factors operating to change the rate of return both cyclically and secularly. Thus following a tax change, evidence consistent with zero short-run shifting associates a positive change in the tax rate with a negative change in the net of tax rate of return (zero change in the gross rate) and zero change in price and output, after allowance for responses to other short-term demand and cost changes.\(^1\) However, if partial shifting occurs, i.e. some industries are able to shift the tax in the short-run, then on aggregate the prediction to be tested is that relatively the net rate of return falls, but aggregate output falls and prices rise.

Typically the empirical investigators have used time series regression analysis to predict the gross return on capital on aggregate by a number of explanatory variables including the tax rate. For such tests to be accepted, the empirical studies must satisfy the following:

i. Regression equations designed to isolate the tax effect must be derived from an articulated and specified economic model.

ii. In the specification of such models, authors are required to give qualitative predictions as to the expected partial regression coefficients of the other explanatory variables.

\(^1\) These changes, if they do occur, will be likely to be effected by an oligopoly in a short period of time.
iii. In the regression analysis we must be satisfied that multi-collinearity between independent variables is not present, and that spurious correlation between independent and dependent variables has been avoided.

iv. If the derived model is macro-economic in approach then confidence must be held that such a model is applicable over the whole data period used.

v. If the estimating equations are derived from a model of the firm it must be stated whether the predictions can be expected to hold for all market structures and various economic conditions or whether considerable differences in magnitude or sign can be expected depending on whether the market structure is competitive, oligopolistic, or monopolistic, and whether the economy is in a depressed or inflationary situation.

vi. Such estimating equations must explain short-term changes in the rate of return in response to demand, cost and tax changes rather than including adjustments to that rate due to long-run forces.

This last requirement appears to place considerable difficulties in
the face of time series analysts who have used data from over the last forty years, where sufficient time has elapsed for considerable changes in the capital stock. In effect what these time series analyses have done is to compare levels of the variables at each observation with those of every other observation in the sample. Referring again to the figures on the rate of return for the 1920's and toward the end of the time series in the 1950's and the accompanying tax rates, it can be seen that both levels of the variables have increased over the period. Consider again the movement of the tax rate during the period of the time series; the movement itself has come in stages, moving from low rates during the 1920's and early and mid 1930's, then drifting upwards during the recovery to a peak during wartime, falling off in the late forties, peaking again in the Korean War years, and then stabilising in the 1950's. Cragg, Harberger, and Miezowski have stated the problem thus: "Given this type of movement, the different phases [of the tax] being associated with radically different types of economic environment, one runs the risk of mistaking association for causation in any empirical attempt to assess the impact of changes in the tax". Now consider what the empirical studies are attempting to do to test for short-term shifting; they are trying to estimate the short-term difference caused by the tax rate on the rate of return from what would have occurred in the absence of the profits.

tax. Thus if by the late 1920's the economy had adjusted to low rates of tax, and by the 1950's had adjusted similarly for the high rates, then such time series regressions over the span of forty years run the extreme danger of not succeeding in isolating short-term changes from long-run adjustments in the capital stock, apart from the problems of accounting for cyclical variability. Furthermore, in a growing economy independent variables apart from the tax rate which are included in regressions to isolate and explain oscillations in the rate of return, are likely to be collinear over the whole period even if following different short-run cyclical patterns. Time series empirical studies face extreme difficulties, therefore, which will not easily be overcome.

A further point closely connected with the last is the relevance of the data used in the time series over the whole of the last forty years for empirical testing of the hypotheses stated here. These hypotheses were put forward about the behaviour of firms in a 'normal' environment in various market situations; they thus abstract from abnormal conditions such as severe depression and wartime. Severe depression came to the North American Economy in 1930 and continued throughout the 1930's with severe under-utilisation of capital and manpower; investment expenditures collapsed to a level close to zero in 1932-33. International trade sharply declined and tariff protection increased. GNP in the United States did not recover its 1929 value until 1938, and full employment was

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3 We assume the capital markets to be allocating the flow of funds such that net of tax returns to capital are tending to equality; investment will leave those corporate industries whose rate of return is reduced by the tax below the competitive level, and move into alternative assets. The tax system has been applying a differential over the time period considered, and thus the evidence is quite consistent with the discussion of long-run adjustment in this analysis which was conducted within a partial equilibrium setting.
attained again only under heavy government expenditures and the stimulus of mobilisation. The models specifically abstracted from such abnormal situations. Thus the time series analysts equations have to explain adequately the pressures on the gross rate of return in the depressed 1930's and the more prosperous 1950's; yet the main increases in the rate of tax occurred outside of the 1930's in the period 1940 onwards, i.e. that period aside from the war years for which the models presented here are designed to analyse. Therefore, these factors point to testing the predictions by industry, and with data drawn from a sample which does not include the depression or war years, i.e. with data drawn from the post-war period. This procedure avoids the data period in which substantial environmental change was occurring and in which it appears factors affecting the equilibrium composition and size of the capital stock were changing most rapidly. Present knowledge of the causes of changes in these factors, such as the relative prices of capital goods, the rate and bias of technological change, etc. have not been fully investigated.

Despite these arguments, Krzyzaniak and Musgrave (K-M) performed regression analysis for the United States using data from 1935-42 and 1948-59 and concluded that the corporate income tax was fully shifted in the short-run and indeed more so since capital owners actually gained in after-tax income as a consequence of the tax change.  

Studies for Canada, West Germany, and India using an almost identical regression formulation found similar evidence that the tax had been overshifted on aggregate for manufacturing. The basis of the regression equations used by K-M were derived in an ad hoc fashion from an eight equation macro-model; they state "...it cannot be our purpose here to develop a general macro-model, but the type of system may be sketched" [my italics]. No further explanation is offered. They continue: "The model has been written in a sufficiently general form to avoid any dogmatism between Keynesian versus Classical systems or competitive versus imperfectly competitive systems." While dogma is to be avoided naturally, the methodological concept fails to qualify under the listed requirements of an empirical study.

Several authors have criticised the K-M study, and by association the other three studies done in a similar vein. The main criticism is directed towards the specification of the estimating equation used by K-M. The Cragg, Harberger and Miezowski study takes as its starting point that the K-M equation has inadequately corrected for the "spurious correlation between the corporate tax rate and gross-of-tax rate of return on corporate capital in manufacturing in the time series for 1935-42 and 1948-59." Operating within the K-M framework they add two additional variables namely the employment rate and a dummy for the Korean

5 Krzyzaniak and Musgrave, op.cit. pp. 33
War episode; these variables reduce the previously positive significant sign on the tax variable to insignificance.

Experimentation by Slitor also led to similar conclusions about the susceptibility of the K-M result to re-specification within the original framework. This result, however, does not change the fact that the original framework and 'model' is woefully inadequate.

Consider the variables used to explain the gross rate of return; the equation is:

\[ Y_{gt} = \alpha_0 + \alpha_1 \Delta C_{t-1} + \alpha_2 V_{t-1} + \alpha_3 J_t + \alpha_4 Q_t + \alpha_5 Z_t + u_t \]

where
- \( Y_{gt} \) = the gross rate of return on corporate capital in manufacturing
- \( \Delta C_{t-1} \) = the change from year \( t-2 \) to year \( t-1 \) in the ratio of consumption to GNP
- \( V_{t-1} \) = the ratio of inventories to sales in manufacturing in year \( t-1 \)
- \( J_t \) = the ratio of tax accruals (other than corporate income taxes) minus government transfers to GNP in year \( t \)
- \( Q_t \) = ratio of government purchases of goods and services to GNP in year \( t \)

A requirement that has been specified is that the authors provided us with qualitative predictions as to \( \alpha_1, \alpha_2, \alpha_3, \alpha_4 \): this K-M fails to do or give an adequate rationale for the variables included. In the results \( \alpha_1 > 0 \); this may be the result of diverse causes such as reduction in personal taxes or a decrease in private investment. It might be suggested that the variable incorporate the notion of a

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form of accelerator factor; if this was so other variables might be expected to represent this factor better. Gordon has argued that the positive coefficient arises from historical coincidence; on modern theories of the consumption function.

$\Delta C_{t}$ tends to be positive in recessions, and since profits tend to be high in the first post-recession year, the coefficient on $\Delta C_{t-1}$ tends to be positive. But the positive correlation is just a coincidence owing to the fact that post-war recessions have lasted only one year. $\alpha_2$ is found negative; a positive change in unlagged inventories can be expected to lower the rate of return, but lagging has no apparent rationale. $\alpha_3$ is negative; $\alpha_4$ is negative and insignificant and is dropped from the K-M preferred equations, although ceteris paribus the expected sign would be opposite to $\alpha_3$. No prior information is presented in the K-M study, nor is the equation derived from a stated set of hypotheses about profit behaviour. This is not an acceptable approach for an empirical study.

Kilpatrick recognising some of the problems associated with the use of time series over a long period to predict short-term changes in the rate of return adopted a less direct method of testing through the use of a cross-section analysis. He hypothesised that market power is a necessary condition for

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short-run shifting of the tax. Therefore, if between two periods with different tax rates there is a significant cross-section correlation between an industry's concentration ratio $C_i$ and the change in its profit rate $(\frac{y_{gi}}{y_{gk}})_i$ over the interval from $k$ to $j$ then this was de facto evidence of tax shifting. The model tested was:

$$\left( \frac{y_{gi}}{y_{gk}} \right)_i = \alpha + b \cdot C_i + \epsilon_i$$

Other explanatory variables were included in the regression to assist explanation of the change of profit rate. The hypothesis assumed that when $C_i^2 = 0$, i.e. monopoly power was zero, $\alpha = 1$ and zero short-run shifting took place. A significant regression coefficient was found on the $C_i$ term, and thus on the basis of the assumption, Kilpatrick accepted the hypothesis of 50-80% short-run shifting in manufacturing.

However, this relationship may well be found even if tax rates did not change over the interval; in effect it may be expected that concentrated industries exercising monopoly power over price and protected by barriers to entry are better able to protect or improve their rates of return over an interval of time, whereas in competitive industries the rates of return are subject to the depressing effects of easy entry. The significant coefficient on the concentration ratio cannot therefore be accepted as sufficient evidence of short-run forward shifting.

Gordon's analysis uses similar tools to the K-M study in that
time-series regression equations are specified in which the corporate profit rate is the dependent variable. The data used, however, covers a longer period from 1925-1962; the analysis is open therefore to the same objections as to the use of this time series and the extreme difficulties of isolating the tax effect in the short-term as is the K-M study.

The model of profit behaviour is developed from a model of the firm practising a mark-up pricing policy over average cost at capacity output. As such this gives no objection, but the assumption is made that all manufacturing firms follow pricing practices similar to the representative firm and secondly it is assumed that the mark-up profits equation represents profit behaviour in every manufacturing industry. Estimation of the equation derived from these assumptions with aggregate data leads Gordon to conclude that the tax is not shifted in the short-run. On the basis of applying the same estimating equation to industry data, he also found however that the tax was shifted in the Paper, Chemicals and Petroleum, Rubber and Stone industries, and was negatively short-run shifted in the Printing industry. Although we considered the possibility of short-run positive shifting in our theoretical analysis, the latter result was not considered. This suggests that the estimating

10 Gordon, R.J. op. cit.
11 Gordon, R.J. op. cit. p. 743.
equations are not isolating other factors effecting short-term changes on the rate of return because the same specification is used for all industries, where in fact we might expect different variables to have differing effects on the rate of return in various industries. Consider how an increase in the average productivity of labour, which Gordon claims to include in his regression equation, might influence industry profits, holding constant, wages of labour for expository purposes.

In pure competition, firms fully pass on to purchasers the increase in labour productivity: consider if the demand for the industry product is inelastic, then profits of the industry will fall. However, in oligopolistic industries if labour productivity increases and firms do not change price, then firms will keep the extra savings, and industry profits will increase. Therefore, if the equations do not fully capture these influences then it is quite possible that the associations found and attributed by Gordon to the income tax are, in fact, due to other factors which his estimating equations derived for a representative firm cannot adequately capture due to inter-industry differences.

Therefore, in conclusion, it must be stated that the empirical studies have not adequately tested for short-run shifting. Price changes in response to the tax, if they occur, are likely to occur within a short-period of time after the tax change, and the effect
on gross profits in a similar short period of time given an oligopolistic situation.

Since, however, the largest changes in the tax rate have taken place during wartime, and subsequent changes in the effective tax rate have been small during normal economic conditions, it must be concluded that the methodology adopted by recent empirical studies has not led to an increase in the understanding of the effects of the tax.
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