A COST OF TAX PLANNING*

YORAM MARGALIOTH,[+] EYAL SULGANIK,[++] RAFAEL ELDOR,[++] YOSEPH EDREY[†]
[+]*Tel Aviv University;* [++]*Interdisciplinary Center, Herzliya;* [†]*Haifa University*

Tax planning is an area of growing interest and this paper is an attempt to contribute to the small formal literature on this topic. The paper analyzes the case of tax planning that manipulates the tax system to impose lower effective tax rates on gains than on losses, and proves that such tax planning may provide firms with an incentive to produce more than the social optimum. This inefficiency is different from the general inefficiency entailed by income taxation, captured by the conventional notion of excess burden. A low asymmetric tax may be more distortive than a high symmetric tax rate.

1. INTRODUCTION

Ten years ago it was unusual to find mainstream corporate tax departments who would buy tax-sheltering ideas. Today, with the tax department viewed as a profit center, it is rare to find a major corporation that does not use them (Avi-Yonah, 2004; Slemrod, 2004). Such understatement of income is an omission from the tax base (Weisbach, 2002) entailing efficiency and equity costs. The inefficiency is usually attributed to non-economic incentives to enter into various transactions to minimize taxes created by tax planning opportunities, leading to inefficient allocation of resources, and to the added complexity of greater compliance and administrative costs (see, e.g., Slemrod and Yitzhaki, 2002).[1]

* The authors would like to thank Michael Rabin for his invaluable help with the proof; David Weisbach for his excellent comments on an earlier version presented at a conference at the University of Michigan, and an anonymous referee for very helpful comments and suggestions that significantly improved the paper. Yoram Margalioth would also like to thank the Cegla Center for Interdisciplinary Research of Law for financial support.

[1] For recent contributions, see Symposium on the Future of Tax Shelters (*Virginia Tax Review,* 2007, 26:769). See in particular Curry, Hill and Parisi (2007) and Weisbach (2007) raising (and commenting on) the possibility that the government would exploit failures in the market for tax shelters, but accounting for the trade-off between government revenue and taxpayers' costs, concluding that due to taxpayers' additional search costs it would not be optimal to eliminate all tax planning.

We would like to focus on another source of inefficiency created by tax planning; one that does not depend on the tax rate. We argue that a certain type of tax planning schemes may distort production. Such tax planning reduces the effective tax rate by manipulating the tax system to impose lower effective tax rates on gains than on losses. "Properly structured, these transactions ensure the deduction of losses at high rates and the recognition of gains at low rates, or, what amounts to the same thing, the acceleration of loss recognition and deferral of gain recognition" (Bankman, 1995:787). This tax asymmetry was also termed "imbalance" in the literature, and described as a case in which the government's gain-loss ratio was lower than one, namely, that due to tax planning the government's share in gains would be greater than its share in losses (Schizer, 2004).[2]

As we prove in the paper, this type of tax planning provides firms with incentives to produce more than the social optimum. According to standard textbook analysis, income tax rates are not supposed to affect the level of production. The firm maximizes profit by setting its output so that the marginal cost of production equals price. Lowering the tax rate on a firm's profit does not change its marginal cost and therefore does not change its output level (Mankiw, 2001:297). The standard analysis is based on two assumptions: certainty and tax symmetry.

Unlike firms that operate in a deterministic environment where profit is secured (always positive or zero), in reality, a firm may find itself in states of nature of gains or losses. There is a large body of literature analyzing the effects of uncertainty and taxation (see, e.g., Domar and Musgrave, 1944; Stiglitz, 1969; Sandmo, 1971; Smith and Stulz, 1985; Green and Talmor, 1985; De Marzo and Duffie, 1995; Faig and Shum, 1999).

This literature, however, assumes symmetric taxation. Tax asymmetry was introduced only in the context of restrictions on the deduction of losses (see Campisano and Romano, 1981; Altshuler and Auerbach, 1990; Eldor and Zilcha, 2002). These limitations work in the opposite direction to tax planning, that is, create a government gain/loss ratio greater than one.

We argue that tax asymmetry in a world of uncertainty (that is, in the real world) distorts production level. Only in knife-edge cases would the two effects -- tax planning and limitations on losses -- exactly offset each other and the government gain/loss ratio equal one. The direction of the imbalance may differ across industries and across taxpayers, raising additional inefficiency and distributive concerns.

---

[2] Schizer (2004) showed how this could be done using financial derivatives. However, as stated by Shaviro (1995), similar tax planning can be done using non-financial assets, albeit at higher transaction costs. See an example of such tax planning in the Conclusion.

In this paper we focus on the case in which tax planning is the dominant factor, that is, we assume that the gain/loss ratio is below one. This may be the more realistic assumption, taking into account the increased tax planning activity over the past decade. An interesting aspect of this type of distortion is that it does not depend on the tax rate. It depends on the difference between the effective tax rates on gains and losses. Hence, in addition to the well-known approximation of the excess burden entailed by the (symmetric) tax system, measured with demand curves (see Hines, 1999), tax planning in a world of price uncertainty creates another form of distortion.[3] A low asymmetric tax may be more distortive than a high symmetric tax rate.

2. THE MODEL

Consider a price-taking risk-neutral firm, which produces a commodity whose price is a continuous random variable $\tilde{P}$. We assume $\tilde{P}$ to accept values in the interval $[\underline{P}, \overline{P}]$, and $\tilde{P}$ to have a density function $f(p)$. The firm's technology of production gives rise to a cost function $C(Q)$ which satisfies: $0 < C(Q), 0 < C^{'}(Q), 0 < C^{''}(Q)$.

The firm determines its output Q at time 0, production is completed at time 1, when the price $\tilde{P}$ is realized and transactions take place.

We denote by $\tilde{\pi}(p,Q)$ the random variable of the profit before tax:

[1] $$\tilde{\pi}(p,Q) = \tilde{P}Q - C(Q)$$

The expected profit *before tax* is then given by:

[2] $$E(\tilde{\pi}(p,Q)) = E(\tilde{P})Q - C(Q) \quad \text{where } E(\tilde{P}) = \int_{\underline{P}}^{\overline{P}} pf(p)\,dp \;.$$

$E(\tilde{\pi}(p,Q))$ is assumed to be positive for all production levels. Please note that this is a sufficient, but not a necessary, condition.

[3] Unless we assume that we are originally in a second-best setting where the average (symmetric) tax rate influences a firm's entry decision. In that case tax planning may in fact reduce distortions.

http://www.bepress.com/rle/vol5/iss1/art7
DOI: 10.2202/1555-5879.1298

2.1. THE BENCHMARK: THE SYMMETRIC TAX CASE

Our benchmark is the production level under symmetric taxation. We compare it with the production level under tax asymmetry that is induced by tax planning. Let $\hat{Q}$ be the unique solution of the symmetric taxation case:

$$[3] \qquad \max_{Q}([E(\tilde{P})Q - C(Q)](1-t))$$

It is straightforward to see that it is determined by:

$$[4] \qquad E(\tilde{P}) = C'(\hat{Q})$$

It would be worth talking about subsidies only if $\underline{P}\hat{Q} - C(\hat{Q}) < 0$

2.2. PRODUCTION INEFFICIENCY: THE CASE OF ASYMMETRIC TAXATION DRIVEN BY TAX PLANNING

Let the effective tax rate on gains t_1 be lower than the effective tax rate on losses t_2, $0 \leq t_1 < t_2 = t$.

Note that for ease of exposition we assume that $t_2 = t > 0$, namely a positive effective tax rate on losses, while $t_1 = 0$, since, the general case of asymmetry (in favor of the taxpayer) is *transformable*, without loss of generality, into that simple case. Please see this proposition (Proposition 1) and its proof in the Appendix.

The *expected after-tax* profit for a production level *Q*, denoted as $EN(Q)$, taking into account taxes (on profits) and subsidies (on losses), is the following:

$$[5] \qquad EN(Q) = E(\tilde{P}Q - C(Q)) - t \cdot E(\min(0, \tilde{P}Q - C(Q))),$$

where the second term is the subsidy on the expected loss.[4]

For a given *Q*, the price range where there is a (pre-tax) *loss* is:

$$[6] \qquad \underline{P} < P \leq \frac{C(Q)}{Q} = P(Q)$$

[4] Note that $\min(0, \tilde{P}Q - C(Q))$ is negative, therefore, $-t \cdot E(\min(0, \tilde{P}Q - C(Q)))$ is positive, namely, a subsidy.

The expected after-tax profit is given by

[7] $$EN(Q) = E(\tilde{P})Q - C(Q) - t\int_{\underline{P}}^{P(Q)} (pQ - C(Q))f(p)dp$$

Denote by Q^* the production level maximizing $EN(Q)$ given by [7].

We are now in a position to state the main result:

2.3. THEOREM 1

The optimal output under symmetric taxation, $\hat{Q}$, is lower than the output, Q^*, which is the output level in the presence of tax planning that results in tax asymmetry. i.e., $\hat{Q} < Q^*$

Proof: Differentiating [7] to find the maximizing Q^* using Leibniz's rule for differentiation under the integral sign. For all Q, $P(Q) = \frac{C(Q)}{Q}$. Hence, $(P(Q)Q - C(Q))f(p) = 0$.

Thus,

[8] $$EN'(Q^*) = E(\tilde{P}) - C'(Q^*) - t\int_{\underline{P}}^{P(Q^*)} (p - C'(Q^*))f(p)dp = 0$$

So

[9] $$E(\tilde{P}) - t\int_{\underline{P}}^{P(Q^*)} pf(p)dp = C'(Q^*) - C'(Q^*)t\int_{\underline{P}}^{P(Q^*)} f(p)dp$$

Denote $\int_{\underline{P}}^{P(Q^*)} f(p)dp = \Delta.$

Now $E(\tilde{P})Q^* - C(Q^*) > 0$, by assumption, hence $E(\tilde{P}) > P(Q^*)$. Hence,

[10] $$t\int_{\underline{P}}^{P(Q^*)} pf(p)dp < t\int_{\underline{P}}^{P(Q^*)} E(\tilde{P})f(p)dp = tE(\tilde{P})\Delta$$

So from (9) and (10)

$$E(\tilde{P})(1 - t\Delta) < C'(Q^*)(1 - t\Delta).$$

http://www.bepress.com/rle/vol5/iss1/art7
DOI: 10.2202/1555-5879.1298

Note that $t\Delta < 1$. Thus

$$C'(\hat{Q}) = E(\tilde{P}) < C'(Q^*).$$

But $C'(Q)$ is strictly monotone increasing. Hence $\hat{Q} < Q^*$. □

3. CONCLUSION

Inefficiency entailed by asymmetric taxation, in a world of uncertainty, is different from the inefficiency caused by the (symmetric) income tax system, captured by the conventional concept of excess burden. We show that the size of the distortion does not exclusively depend on absolute tax rates. Indeed, as in the case of symmetric taxation, the higher the tax rate, the greater the distortion. However, for this type of distortion, what matters most is the difference between the tax rate on losses and the tax rate on gains. In fact, there could be more than one set of asymmetric tax rates that create the same *t*, that is, the same output distortion, and a low asymmetric tax may be more distortive than a high symmetric tax rate.

To make our argument concrete, we will provide one example of tax planning. We choose to illustrate a type of tax planning known as 'transfer pricing' because of its huge and further growing significance, especially in the area of international taxation where it is considered to be the greatest problem in taxing multinational corporations.

The term 'transfer pricing' refers to the prices that related parties charge one another for goods and services passing between them. If one party is subject to relatively high tax rates whereas the other party is subject to low (or zero) tax rates due to its location in a low-tax jurisdiction, or because it has net operating losses or is a tax-exempt organization, it would be in the best interests of their economic group to allocate losses to the former and income to the latter.

Assume that a taxpayer owns a producing company ("PCO") as well as a marketing company ("MCO"). Further assume that PCO is subject to a lower tax rate than MCO, either because it operates in a low-tax jurisdiction, or because of tax benefits it is entitled to, or due to net operating losses.

PCO has to take a decision regarding the level of production before the market price is known, and we assume that storage is costly. Under these conditions, PCO takes its decision and then acts as follows:

(a) If the market price turns out to yield profit from the production, PCO will sell the products by itself.

(b) If the market price leads to losses, PCO will sell the products at full price to MCO, which will sell the goods to consumers and bear the losses.

The amount of losses that can be shifted to MCO is regulated by the tax authorities (see section 482 of the Internal Revenue Code and its regulations). The arm's length standard, described in regulation 1.482-1(b), requires that the price set between the related parties will be close to the price that would have been set between unrelated parties. Nevertheless, some loss shifting is possible (especially when more complicated structures are being used); hence, the economic result of this strategy is the application of different effective tax rates to profits and losses, yielding a gain/loss ratio lower than 1, when viewing the group as one economic agent.

4. APPENDIX

Proposition 1: For $0 < t_1 < t_2$, consider:

[11] $$\max_Q [E(\tilde{P}Q - C(Q))(1-t_1) - t_2 \cdot E(\min(0, \tilde{P}Q - C(Q)))]$$

Then, Q^* solves [11] if Q^* solves [5] for $t = \frac{t_2 - t_1}{1-t_1}$.

Proof: When $0 < t_1 < t_2$, the optimization problem is formulated as:

$$EN(Q, t_1, t_2) = E(\tilde{P}Q - C(Q))(1-t_1) - t_2 \cdot E(\min(0, \tilde{P}Q - C(Q)))$$

Because t_2 is larger than t_1, we write it as $t_2 = t_1(1+\alpha)$.

Denote, by E^+ that part of the expectations of $\tilde{\pi}(p, Q)$ which is positive, namely the part which represents expected gains, and by E^- the negative part, that is the part that represents expected losses. Then,

$$EN(Q, t_1, t_2) = E^+(1-t_1) + E^- - t_1(1+\alpha)E^-$$

Hence,

$$EN(Q, t_1, t_2) = (1-t_1)E(\tilde{P}Q - C(Q)) - t_1 \alpha E^-$$

Dividing by $1-t_1$[5] we conclude that maximizing $EN(Q, t_1, t_2)$ is the same as maximizing $EN(Q, 0, \frac{t_2 - t_1}{1-t_1})$.

[5] As long as $1 - t_1$ is positive, which seems like a plausible assumption.

DOI: 10.2202/1555-5879.1298

References

Altshuler, R., and A. Auerbach. 1990. "The Significance of Tax Law Asymmetries: An Empirical Investigation," 105 *Quarterly Journal of Economics* 61-86.

Avi-Yonah, R.S. 2004. "Corporations, Society and the State: A Defense of the Corporate Tax," 90 *Virginia Law Review* 1193-1255.

Bankman, J. 1995. "Colloquium on Financial Instruments: Commentary," 50 *Tax Law Review* 787–796.

Campisano, M., and R. Romano. 1981. "Recouping Losses: The Case for Full Loss Offsets," 76 *Northwestern University Law Review* 709.

Curry, P.A., C.A. Hill, and F. Parisi. 2007. "Creating Failures in the Market for Tax Planning," 26 *Virginia Tax Review* 971-979.

De Marzo, P., and D. Duffie. 1995. "Corporate Incentives for Hedging and Hedge Accounting," 8 *Review of Financial Studies* 743-771.

Domar, E.D., and R. Musgrave. 1944. "Proportional Income Taxation and Risk-Taking," 58 *Quarterly Journal of Economics* 388-422.

Eldor, R., and I. Zilcha. 2002. "Tax Asymmetry, Production and Hedging," 54 *Journal of Economics and Business* 345-356.

Faig, M., and P. Shum. 1999. "Irreversible Investment and Endogenous Financing: An Evaluation of Corporate Tax Effects," 43 *Journal of Monetary Economics* 143-171.

Graham, J.R., and C.W. Smith, Jr. 1999. "Tax Incentives to Hedge," 54 *Journal of Finance* 2241-2262.

Green, R.C., and E. Talmor. 1985. "The Structure and Incentive Effects of Corporate Tax Liabilities," 40(4) *Journal of Finance* 1095-1114.

Hines, J.R. 1999. "Three Sides of Harberger Triangles," 13 *Jrnl of Economic Perspectives* 167-188.

Mankiw, G.N. 2001. *Principles of Microeconomics*. Harcourt College Publishers.

Sandmo, A. 1971. "On the Theory of the Competitive Firm under Price Uncertainty," 61 *American Economic Review* 65-73.

Schizer, D.M. 2004. "Balance in the Taxation of Financial Instruments: An Agenda for Reform," 104 *Columbia Law Review* 1886-1946.

Shaviro, D.N. 1995. "Colloquium on Financial Instruments: Risk-Based Rules and the Taxation of Capital Income," 50 *Tax Law Review* 643-724.

Slemrod, J. 2004. "The Economics of Corporate Tax Selfishness," 57 *National Tax Journal* 877-99.

_______ and S. Yitzhaki. 2002. "Tax Avoidance, Evasion, and Administration," in Auerbach and Feldstein, eds. *Handbook of Public Economics*, Vol. 3. Amsterdam: Elsevier.

Smith, C.W.,Jr., and R. Stulz. 1985. "The Determinants of Firm's Hedging Policies," 20 *Journal of Financial and Quantitative Analysis* 391-405.

Stiglitz, J.E. 1969. "The Effects of Income, Wealth, and Capital Gains Taxation on Risk-Taking," 1969 *Quarterly Journal of Economics* 263-283.

Weisbach, D. 2002. "Ten Truths about Tax Shelters," 55 *Tax Law Review* 215-253.

________. 2007. "Disrupting the Market for Tax Planning," 26 *Virginia Tax Review* 971-979.