Refundability and the Incentive Effects of Flowthrough Shares

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PRÉCIS

Dans un article paru dernièrement dans cette revue, Glenn Jenkins avança l'idée que les actions accréditives ne sont pas un moyen efficace de procurer des remboursements aux sociétés d'exploitation des ressources en situation de pertes fiscales. Cet article examine les répercussions de cette inefficacité sur l'effet d'incitation des actions accréditives. Les taux effectifs marginaux d'imposition sur les explorations sont calculés selon diverses hypothèses de financement (actions accréditives, bénéfices non répartis et émissions de nouvelles actions ordinaires) et d'autres hypothèses considérant l'efficacité des actions accréditives comme mécanisme de remboursement. L'article démontre que lorsqu'on tient compte des inefficacités mesurées par Jenkins, le taux effectif marginal d'impôt sur les explorations financées par des actions accréditives est nettement inférieur à ce qui est suggéré dans des études précédentes. L'incitation à entreprendre des explorations ainsi offerte aux compagnies en situation de pertes fiscales est donc moindre. Cependant, en dépit de ce fait, les actions accréditives peuvent tout de même servir de mesure incitative dans le cas de compagnies en situation de pertes fiscales élevées. En effet, même après avoir tenu compte de leur inefficacité comme mécanisme de remboursement d'impôt, le taux effectif marginal d'impôt sur les explorations financées par des actions accréditives est, dans certains cas, inférieur aux taux de l'impôt applicables aux financements par des bénéfices non répartis ou des émissions d'actions ordinaires.

ABSTRACT

In a recent article in this journal, Glenn Jenkins argued that flowthrough shares are an inefficient way of providing refundability to resource corporations in a tax loss position. The article presented here explores the implications of this inefficiency for the incentive effects of flowthrough shares. Marginal effective tax rates on exploration are calculated under alternative financing assumptions (flowthrough shares, retained earnings, and ordinary new share issues) and alternative assumptions regarding the efficiency of flowthrough shares as a refundability mechanism. It is shown that, when the inefficiencies measured by Jenkins are accounted for, the marginal effective tax rate on exploration financed by flowthrough shares is much lower than suggested in previous studies. The incentive provided to tax loss firms to conduct exploration is lower. Yet despite this, flowthrough

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shares can still provide an incentive for companies deep in the "tax loss hole" to conduct exploration. This is because, even after their inefficiency as a tax refundability device is accounted for, the marginal effective tax rate on flowthrough share financed exploration is, in some cases, lower than the effective tax rates associated with retained earning or ordinary share issue finance.

INTRODUCTION

In a recent article in this journal, Glenn Jenkins examined the efficiency of flowthrough shares (FTSs) as a mechanism for providing refundability to resource corporations in a tax loss position.[1] The approach taken by Jenkins was to use data on FTS limited partnerships to determine the tax cost to the government per dollar of benefit received by the corporations issuing the shares. On the basis of his calculations, Jenkins concluded that FTSs are an expensive and inefficient way of passing tax benefits on to tax loss corporations.

Jenkins did not consider the implications of this inefficiency for the incentive effects of FTSs. Yet clearly this is an important issue, since one of the justifications for FTSs is to promote exploration by tax loss companies. The issue is particularly important in the light of the large number of resource firms in a tax loss position—Glenday and Mintz calculate that, on average, from 1975 to 1985, 60 percent of oil and gas and 70 percent of mining companies had no taxable income.[2] Moreover, FTSs have historically been an important source of finance for the resource sector.[3]

In this article I consider the implications of the inefficiency of FTSs as a refundability mechanism for their incentive effects. I modify an approach that Robin Boadway and I developed to account for the inefficiencies calculated by Jenkins.[4] We investigated the incentive effects of FTSs by comparing the marginal effective tax rate (METR) on exploration financed by FTSs with the METR under alternative sources of finance, such as

[1] Glenn P. Jenkins, "Tax Shelter Finance: How Efficient Is It?" (1990), vol. 38, no. 2 *Canadian Tax Journal* 270-85.

[2] Graham Glenday and Jack M. Mintz, "The Nature and Magnitude of Tax Losses of Canadian Corporations," in *Policy Options for the Treatment of Tax Losses in Canada* (Toronto: Clarkson Gordon Foundation, 1991), 2:1-64. This compares with from 54 to 62 percent for the entire corporate sector.

[3] Robert Raich, "Flow-Through Financing—Present and Future," in *Report of Proceedings of the Thirty-Ninth Tax Conference*, 1987 Conference Report (Toronto: Canadian Tax Foundation, 1988), 43:1-14, estimates that in 1987 approximately $1 billion was invested in FTSs.

[4] Robin Boadway and Ken McKenzie, "The Treatment of Resource Industries in the 1987 Federal Tax Reform," in Jack Mintz and John Whalley, eds., *The Economic Impacts of Tax Reform*, Canadian Tax Paper no. 84 (Toronto: Canadian Tax Foundation, 1989), 286-325. See also Robin W. Boadway, Kenneth J. McKenzie, and Jack M. Mintz, *Federal and Provincial Taxation of the Canadian Mining Industry: Impact and Implications for Reform* (Kingston, Ont.: Queen's University, Centre for Resource Studies, 1989).

retained earnings and ordinary new share issues. Implicit in the Boadway-McKenzie approach was the presumption that FTSs are fully efficient as a refundability mechanism. It showed that, when this is the case, FTSs significantly lower the METR on exploration conducted by tax loss companies, and provide a substantial incentive for those corporations to invest in exploration. In this article, I modify the Boadway-McKenzie approach to incorporate the inefficiencies measured by Jenkins, and show that the METR on FTS-financed exploration drops significantly, thereby lowering the incentive effects of the shares. Nonetheless, in some cases the METR on exploration financed by FTSs is still lower than that financed by retained earnings and ordinary share issues. Despite their inefficiency as a refundability mechanism, therefore, FTSs can, in some cases, still have a positive incentive effect.[5]

The remainder of the article is organized as follows. The next section contains a brief summary of the legislation governing FTSs. In the third section I derive an expression for the METR on FTS-financed exploration that allows for the inefficiencies measured by Jenkins. I then present some numerical calculations that show the importance of correctly accounting for the inefficiency of FTSs when evaluating their incentive effects. The final section contains a summary and a discussion of the results.

DESCRIPTION OF FLOWTHROUGH SHARES

Flowthrough shares allow the transfer to tax-paying investors of various tax deductions and credits associated with exploration and development that cannot be used currently by a company in a tax loss position. The company issues new equity, the proceeds of which must be used to conduct exploration and development. The company then renounces, or flows through, the deductions and credits associated with the exploration and development to the investors purchasing the new shares, who are able to use them to reduce taxes owing on income from other sources. The basic notion behind FTSs is thus the linking of the flowthrough of tax benefits to equity investment in the loss company.

Flowthrough shares are thus hybrid securities, consisting of ordinary common equity plus some tax deductions. Taxpayers investing in FTSs will presumably pay a premium over the price of ordinary common shares, the premium reflecting the value of the tax benefits to them. By collecting the FTS premium, non-tax-paying resource companies are able to realize immediately the value of the tax benefits associated with exploration and development—they receive the FTS premium now in exchange for giving up the tax benefits in the future.

Under current tax law, Canadian exploration expenses (CEE) are written off immediately at a 100 percent rate, while Canadian development expenses (CDE) are written off over time at a 30 percent declining balance

[5] The perspective taken in this article is very much a positive one, as I focus on measuring the extent of the incentives. I do not consider the normative issue of whether or not the government *should* provide an incentive for firms to conduct exploration.

rate. The vast bulk of FTSs are issued in respect of exploration expenditures; in that case investors are able to deduct the full cost of the shares immediately. The remainder of this discussion assumes that the FTSs are issued to finance exploration expenditures.

Although income from the sale of FTSs is considered in common law to be capital income, and therefore subject to capital gains taxes at a reduced rate (currently 75 percent of the rate on ordinary income), the adjusted cost base (ACB) of the shares must be reduced by the amount of the flowed-through expenses. Since exploration expenditures are written off immediately, this means that the ACB is zero—upon sale, the entire proceeds are subject to capital gains tax. Capital gains in respect of FTSs are also eligible for the $100,000 capital gains exemption, with some restrictions. Cumulative net investment loss (CNIL) rules reduce the amount of a capital gain in respect of FTSs eligible for the exemption by 50 percent of the flowed-through deductions. In the case of exploration, the CNIL rules essentially render half the capital gain in respect of FTSs ineligible for the capital gains exemption.

In the 1974 budget, earned depletion was introduced as a tax incentive for exploration in the resource sector. This enabled taxpayers to claim an additional $1 deduction for every $3 expended on CEE, resulting in an effective writeoff rate of 133 1/3 percent. Earned depletion in respect of mining exploration was fully eligible for flowthrough.[6] Although the earned depletion allowance was phased out in the 1987 tax reform—from 33 1/3 percent to 16 2/3 percent in 1988, and eliminated by the end of 1989—the FTSs analyzed by Jenkins were issued in 1986 to 1988, when earned depletion was still in effect.

ANALYSIS OF FLOWTHROUGH SHARES

As discussed in the introduction, Jenkins's approach to evaluating the efficiency of FTSs as a refundability device involved measuring the total cost to the government of delivering $1 in tax benefits to the corporation via the FTS premium. A fully efficient refundability mechanism, such as 100 percent direct refundability, where the government writes a refund cheque directly to the loss company, would have an efficiency measure of 1—it costs the government $1 to deliver $1 in tax benefits to the corporation, and the entire tax benefit accrues to the firm. To the extent that the efficiency measure exceeds 1, it costs the government more in forgone revenue than is received by the corporation to conduct exploration.

Jenkins collected data on seven FTS limited partnerships. Rather than investing in individual FTS issues, investors often buy units in a limited partnership that purchases a number of FTS issues. After the tax deductions are used, individuals end up with units in a resource mutual fund.

[6] Although depletion was earned at the rate of $1 for every $3 spent on exploration, it could be claimed only up to a maximum of 25 percent of income (unclaimed earned depletion could be carried forward indefinitely at no interest).

Jenkins calculated an efficiency measure for each limited partnership under two assumptions regarding the capital gains rate of investors—that they faced the full capital gains rate, and that they paid no capital gains taxes. On average, the efficiency measures ranged from 1.8 to 2.7, depending on the assumption regarding the capital gains rate.[7] This means that for every dollar in benefit received by the corporations issuing the shares, it cost the government between $1.80 and $2.70 to deliver that benefit. Put another way, on average between 37 and 55 percent of the tax benefits granted by the government were passed on to the corporations issuing the FTSs, the remainder accruing to financial intermediaries and the purchasers of the shares. On the basis of these calculations, Jenkins concluded that FTSs are an expensive and inefficient way of refunding tax benefits to tax loss companies.

As mentioned, Jenkins did not directly address the implications of this inefficiency for the incentive effects of FTSs. To address this issue, I follow the standard marginal effective tax rate (METR) approach, with some modifications.[8] The METR on exploration measures the amount of tax collected on the income generated by the last (marginal) unit of exploration undertaken. Economic theory tells us that the last unit invested in exploration "breaks even," in the sense that it is expected to generate just enough revenue to cover its economic costs—the marginal unit thus earns no "economic income." In a neutral tax system, one that neither encourages nor discourages exploration, no tax is collected from the marginal unit—the METR is zero.[9] A positive METR indicates that the marginal unit of exploration does pay tax, implying that exploration is discouraged by the tax system. A negative METR indicates that exploration is encouraged by the tax system. By comparing the METR on FTS-financed exploration with the METR on exploration financed by other means—retained earnings and ordinary new share issues—it can be determined whether the existence of FTSs has a positive incentive effect on exploration. An important contribution of this article is to extend the approach developed by Boadway and McKenzie for computing the METR on FTS-financed exploration to take account of the refundability inefficiencies uncovered by Jenkins.

An intuitive approach is used to develop an expression for the METR on FTS-financed exploration.[10] A firm issues $1 in new shares to finance exploration. Ignoring taxes, the value of existing shares will decline by $1 because of dilution. After the imposition of the capital gains tax at the

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[7] See Jenkins, supra footnote 1, at 284, table 2.

[8] For an analysis and survey of the METR methodology, see Robin W. Boadway, "The Theory and Measurement of Effective Tax Rates," in Jack M. Mintz and Douglas D. Purvis, eds., *The Impact of Taxation on Business Activity* (Kingston, Ont.: Queen's University, John Deutsch Institute for the Study of Economic Policy, 1987), 60-98.

[9] Tax is collected, however, on income generated by *inframarginal* units of exploration, so a neutral tax system, with an METR of zero, still generates tax revenue.

[10] For METR expressions for exploration financed by retained earnings and new share issues, see Boadway, McKenzie, and Mintz, supra footnote 4.

accrual equivalent rate of c, the wealth of existing shareholders will decline by \$$(1 - c)$.[11] To approve the share issue, existing shareholders must be compensated for this decline in their wealth by an increase in dividends of \$$(1 - c)$. Since these dividends are taxed at the rate θ, it is actually after-tax dividends that must rise by \$$(1 - c)$. Thus, a \$1 new share issue requires $(1 - \theta)\Delta D = (1 - c)$, where ΔD is the change in before-tax dividends required by existing shareholders. Solving this expression for ΔD gives

$$\Delta D = (1 - c) / (1 - \theta). \tag{1}$$

Since capital gains are taxed at a lower effective rate than dividends (that is, $c < \theta$), equation 1 indicates that $\Delta D > 1$. Thus, the required increase in dividends generated by an investment financed by a \$1 new share issue must exceed \$1. This illustrates the well-known result that the tax system discriminates against new equity as a source of finance because of the differential taxation of dividends and capital gains.

Now assume that the new shares are an FTS issue. Setting the price of an ordinary share to \$1, the price of an FTS that earns a premium of P (which is left unspecified for the moment) is \$$(1 + P)$. This is used to finance a unit of exploration, which is expected to give rise to revenues that will be paid out as dividends. We denote the expected revenue generated by an incremental expenditure on exploration by R. Of course, this revenue is taxed at the corporate level. Let u be the corporate tax rate and ξ a present-value parameter representing the "taxability" of the corporation—ξu is thus the expected present-value tax rate faced by the firm.[12] Firms in the resource sector may also claim an additional deduction called the *resource allowance*, which effectively reduces their tax rate by 25 percent.[13] For the sake of generality, we denote the resource allowance rate by σ. The total expected present-value tax rate faced by a firm in the resource sector is thus $\xi u(1 - \sigma)$. In after-tax terms, the expected present value of the revenue generated by a marginal unit of exploration is thus $R[1 - \xi u(1 - \sigma)]$.[14]

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[11] The accrual equivalent capital gains rate reflects the fact that capital gains are taxed on realization and not as they accrue. The resulting reduction in the present value of the capital gains taxes, as well as the lower statutory rate, are reflected in the accrual equivalent capital gains rate.

[12] The parameter ξ is a simple way of reflecting the fact that, for firms in a tax loss position, the taxes and deductions associated with an incremental unit of exploration are postponed. This lowers their expected present value. Thus, $0 \leq \xi \leq 1$, where $\xi = 0$ implies that the corporation will never pay taxes (meant to approximate a corporation that is very deep in the tax loss hole), while $\xi = 1$ indicates that the firm is currently fully tax paying. See Jack M. Mintz, "An Empirical Estimate of Corporate Tax Refundability and Effective Tax Rates" (February 1988), 103 *The Quarterly Journal of Economics* 225-31.

[13] The resource allowance is granted in lieu of royalty or mining tax deductibility.

[14] I ignore here, and in the subsequent calculations, the imposition of provincial mining taxes and royalties. Although the magnitude of the METRs would change, the qualitative conclusions would be the same. For more on provincial mining taxes and royalties, see Boadway, McKenzie, and Mintz, supra footnote 4.

Using the proceeds from the issue of FTSs to finance exploration thus gives rise to an expected change in dividends of

$$\Delta D = R[1 - \xi u(1 - \sigma)](1 + P). \quad (2)$$

Note that the deductions associated with exploration at the corporate level are not explicitly included in equation 2. This is because they have been flowed through from the corporation to individual investors and are presumably incorporated in the FTS premium *P*.

As long as the expected change in dividends resulting from an incremental investment in new exploration, given by equation 2, exceeds the change in dividends required by existing shareholders to compensate them for the issue of new equity, given by equation 1, the firm should continue to issue FTSs to finance exploration.[15] As more exploration is conducted, however, *R* eventually begins to decline because additional exploration is expected to generate less and less revenue.[16] This continues until the increase in dividends required by the firm's owners is exactly equal to the increase in dividends generated by spending an additional dollar on exploration—at the optimum, shareholders are just indifferent between undertaking an additional dollar of FTS-financed exploration or not. Using equations 1 and 2, the optimal amount of exploration financed by FTSs is thus determined (implicitly) by

$$R = [(1 - c) / (1 - \theta)] / [(1 - \xi u(1 - \sigma))(1 + P)] \quad (3)$$

or,

$$R = \left[\frac{1-c}{1-\theta}\right]\left[\frac{1}{(1-\xi u(1-\sigma))(1+P)}\right].$$

The right-hand side is the after-tax user cost of exploration financed by FTSs. Equation 3 simply requires that exploration be conducted up to the point where the expected revenue generated by the last unit undertaken is just equal to its after-tax user cost. The METR for exploration is defined as the difference between the after-tax user cost and the before-tax user cost, all divided by the before-tax user cost. The METR thus measures the percentage change in the user cost of exploration caused by the tax system. Since the before-tax user cost of exploration is normalized to 1, the marginal effective tax rate on FTS-financed exploration is simply,

$$\text{METR} = R - 1. \quad (4)$$

If the METR on FTS-financed exploration is less than the METR on exploration financed by retained earnings or by an ordinary new share issue, then the ability to issue FTSs will encourage exploration by lowering its user cost.

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[15] I implicitly assume risk neutrality here. The results do not change substantially when risk aversion is allowed for.

[16] The reasoning behind this is that the "easy" discoveries are made first. Thus, as more exploration is conducted, it becomes less and less likely that a new discovery will result, and therefore the expected revenues from the exploration decline.

The value of the FTS premium P was not specified in the above formulation. Two approaches are possible. The Boadway-McKenzie approach implicitly presumed that FTSs are fully efficient as a refundability device. This means that the full value of the tax deductions granted by the government are reflected in the FTS premium received by the firm issuing the shares. I call the METR calculated under this assumption the "theoretical" METR. An alternative approach is to incorporate into the METR calculation the fact that FTSs are not 100 percent efficient as a refundability mechanism by using directly the actual market premiums determined by Jenkins for P. I refer to this as the "empirical" METR. The empirical METR is very useful because it provides information on the implications of the imperfect nature of FTSs as a refundability mechanism for their incentive effects.

As mentioned, the Boadway-McKenzie calculations assumed that FTSs were fully efficient as a refundability mechanism. To see what is involved in this, consider that the maximum amount F an individual investor i will be willing to pay for an FTS is

$$F_i = S + F_i(1 + d)m_i - Sc_i, \tag{5}$$

where S is the market price of an ordinary common share, m_i is individual i's marginal tax rate, and c_i is the accrual equivalent effective capital gains tax rate.

Equation 5 reflects the fact that FTSs are a hybrid security consisting of an ordinary common share plus a tax deduction (net of the additional capital gains tax). Since the tax deduction is riskless and the risk associated with the common share is fully reflected in its price, in a well functioning capital market the price paid for the FTS should not reflect an additional risk premium.[17] In this environment, the maximum amount the investor will be willing to pay for the FTS over the ordinary common share is equal to the net value of the tax benefits, which is the last two terms of equation 5. Converting this into a percentage premium,

$$P_i = (F_i - S)/S = [m_i(1 + d) - c_i] \,/\, [1 - m_i(1 + d)]. \tag{6}$$

From equation 6 it is evident that, as the effective capital gains rate c_i decreases, or the personal tax rate m_i increases, the maximum premium an individual will be willing to pay increases. Thus, the group of taxpayers willing to pay the highest premium for FTSs are those with the lowest effective capital gains rate c_l and the highest personal tax rate m_h. I refer to this group of investors as the "high-premium clientele."

Capital market equilibrium requires that the expected after-tax rate of return on all securities with the same risk be identical. Therefore, if there are no restrictions on the ability of the high-premium clientele to take advantage of the tax deductions, then the premium that should be observed in equilibrium is

$$P_h = [m_h(1 + d) - c_l] \,/\, [1 - m_h(1 + d)]. \tag{7}$$

[17] Although see the discussion of liquidity risk in the final section of this article.

FTSs priced at the maximum premium reflect the full value of the tax benefits to the investors who value them the most—the high-premium clientele. In equilibrium, the high-premium clientele is indifferent between purchasing an FTS and an ordinary common share in the same company. If this were not the case, say the premium were less than P_h, then the high-premium clientele would demand more FTSs, which would bid the premium up.

It is easy to show that, if FTSs are priced at their maximum as given in equation 7, and therefore purchased only by the high-premium clientele, then in the absence of additional transactions costs associated with FTSs Jenkins's efficiency measure is equal to 1. When this is the case, FTSs are 100 percent efficient as an indirect refundability mechanism—the issuing company receives the full value of the flowed-through tax benefits. If the observed premium is less than the theoretical maximum (that is, $P < P_h$), then FTSs are less than fully efficient. In their "theoretical" METR calculations, Boadway and McKenzie set $P = P_h$, and therefore ignored the possibility that FTSs may not be fully efficient as a tax refundability mechanism.

Tables 1 and 2 present METR calculations for the FTS limited partnerships studied by Jenkins under different financing assumptions. RET, OSI, and FTS refer to exploration financed by retained earnings, ordinary share issues, and FTSs, respectively. Both theoretical and empirical METRs on exploration financed by FTSs are determined. CMP and NEF refer to the names of the managing partners; 1986, 1987, and 1988 to the year of issue, and I, II, and III to different issues in those years. Following Jenkins, table 1 assumes that capital gains are taxed at the full rate, while table 2 assumes a zero capital gains rate.[18] Moreover, for each financing assumption METRs are determined under three different assumptions regarding the taxability of the corporations as captured in the present value parameter ξ. In the first case, it is assumed that the deductions have no value at the corporate level, and therefore that $\xi = 0$. This is meant to represent corporations that are deep in the "tax loss hole." In the second case, deductions are presumed to have a present value of 0.24 of their full value. This figure is based upon some work by Mintz, who uses aggregate data to estimate taxability parameters for a number of sectors.[19] In the final case, it is presumed that corporations are fully tax paying, and therefore able to take immediate and full advantage of the tax deductions (that is, $\xi = 1$).

The tables also include the FTS premiums estimated by Jenkins for the seven limited partnerships, as well as the maximum premium that the high-premium clientele would be willing to pay given the capital gains rate assumptions (P_h). The first thing that is evident is that the premiums measured by Jenkins are in every case significantly less than the theoretical maximum.

[18] The use of the two "extreme" assumptions regarding the applicable capital gains tax rate reflects the difficulties involved in obtaining estimates of the accrual equivalent effective capital gains rate.

[19] Mintz, supra footnote 12.

Table 1 Marginal Effective Tax Rates (METR) on Exploration, Full Capital Gains Rate

	CMP 1986	CMP 1987	CMP 1988 I	CMP 1988 II	CMP 1988 III	NEF 1987	NEF 1988
				percent			
Premium	72	92	20	12	17	32	13
P_h[a]	144	144	38	38	38	144	38
RET[b]							
$\xi = 0$	0	0	0	0	0	0	0
$\xi = 0.24$	–7.7	–7.7	–4.6	–4.6	–4.6	–7.7	–4.6
$\xi = 1$	–46.7	–46.7	–28.0	–28.0	–28.0	–46.6	–28.0
OSI[b]							
$\xi = 0$	32.9	40.7	12.2	12.2	12.2	40.7	12.2
$\xi = 0.24$	28.5	37.0	8.8	8.8	8.8	37.0	8.8
$\xi = 1$	6.0	18.4	–8.4	–8.4	–8.4	18.4	–8.4
FTS[b]							
$\xi = 0$							
Theoretical	–45.5	–42.3	–18.8	–18.8	–18.8	–42.3	–18.8
Empirical	–22.7	–26.7	–6.5	0	–4.1	6.2	0
$\xi = 0.24$							
Theoretical	–40.1	–36.6	–10.8	–10.8	–10.8	–36.6	–10.8
Empirical	–15.0	–19.5	2.8	10.1	5.4	17.1	9.6
$\xi = 1$							
Theoretical	–12.8	–7.7	29.9	29.9	29.9	–7.7	29.9
Empirical	23.7	17.2	49.6	60.4	53.5	70.5	58.9

[a] P_h is the maximum theoretical premium as given by equation 7 in the text. [b] RET, OSI, and FTS refer to exploration financed by retained earnings, ordinary share issues, and flowthrough shares, respectively.

The implication is that the corporations are not receiving the full value of the tax benefits, and therefore that FTSs are inefficient as a refundability mechanism.[20]

The tables provide some interesting insights regarding the incentive effects of the tax system under different financing scenarios. Ignore for the moment the empirical METR on FTS-financed exploration. First, note the preponderance of negative numbers associated with retained earnings and (theoretical) FTS finance. This indicates that in these circumstances the tax system offers a substantial subsidy for exploration in the resource sector. Second, comparing retentions with ordinary share issues, note the significantly higher METRs on exploration financed by the latter. Indeed, the METR under retentions is always non-positive, while the METR under ordinary new share issues is almost always positive, often substantially so. This starkly emphasizes the tax penalty imposed on exploration financed by new equity due to the differential taxation of dividends and

[20] This, of course, is exactly what Jenkins concluded. It should be noted that Jenkins's premiums were measured net of transaction costs. Even if these costs are ignored, the empirical premiums are substantially less than the theoretical maximums.

Table 2 Marginal Effective Tax Rates (METR) on Exploration, Zero Capital Gains Tax

	CMP 1986	CMP 1987	CMP 1988 I	CMP 1988 II	CMP 1988 III	NEF 1987	NEF 1988
				percent			
Premium	72	92	20	12	17	32	13
P_h[a]	231	231	97	97	97	231	97
RET[b]							
$\xi = 0$	0	0	0	0	0	0	0
$\xi = 0.24$	–7.7	–7.7	–4.6	–4.6	–4.6	–7.7	–4.6
$\xi = 1$	–46.7	–46.7	–28.0	–28.0	–28.0	–46.7	–28.0
OSI[b]							
$\xi = 0$	80.0	90.5	60.0	60.0	60.0	90.5	60.0
$\xi = 0.24$	80.2	91.8	61.4	61.4	61.4	91.8	61.4
$\xi = 1$	81.3	98.1	68.1	68.1	68.1	98.1	68.1
FTS[b]							
$\xi = 0$							
Theoretical	–45.5	–42.3	–18.8	–18.8	–18.8	–42.3	–18.8
Empirical	4.7	0	33.4	42.9	36.8	44.3	41.6
$\xi = 0.24$							
Theoretical	–40.1	–36.6	–10.8	–10.8	–10.8	–36.6	–10.8
Empirical	15.0	9.0	46.6	57.0	50.3	58.6	55.7
$\xi = 1$							
Theoretical	–12.8	–7.7	29.9	29.9	29.9	–7.7	29.9
Empirical	67.5	58.7	113.4	128.6	118.9	130.9	126.6

[a] P_h is the maximum theoretical premium as given by equation 7 in the text. [b] RET, OSI, and FTS refer to exploration financed by retained earnings, ordinary share issues, and flowthrough shares, respectively.

capital gains. Third, for both retentions and ordinary share issues the METR increases as the "taxability" of the corporation erodes (that is, as the present value taxability parameter becomes smaller). This implies that in the absence of FTSs the tax system would discriminate against investment by tax loss companies. For FTSs, on the other hand, the theoretical METR becomes lower (more negative) as companies move deeper into the "tax loss hole," implying that, if fully efficient, FTSs are relatively more attractive to tax loss companies than to fully tax-paying firms. Finally, note the large difference between the METRs on exploration financed by ordinary share issues when capital gains are fully taxed and when capital gains face a zero effective rate. The METR is much higher in the latter case. This is because, as the spread between the effective capital gains tax rate and the dividend tax rate increases, the tax penalty on new equity increases.

Turning now to the empirical METRs, note that the empirical METRs on FTS-financed exploration, based upon the premiums calculated by Jenkins, are substantially less than the theoretical METRs, regardless of the taxability assumption. The clear conclusion is that the inefficiency of FTSs as a refundability mechanism has serious implications for their incentive effects. Specifically, FTSs offer a much lower incentive to undertake exploration than has been suggested in previous studies that do not account for this inefficiency, such as the Boadway-McKenzie study.

It bears noting, however, that under full capital gains taxation (table 1), for tax loss firms very deep in the "hole" (that is, with $\xi = 0$), the empirical FTS METR is still less than the METR under retained earnings and ordinary new share issue financing in every case. When deductions have some value at the corporate level (that is, $\xi = 0.24$) the empirical METR is less than the retentions METR in four of the seven cases, and still less than the ordinary share issue METR in every case. For fully tax-paying firms (that is, with $\xi = 1$) retentions dominate, followed by ordinary common shares, then by FTSs. The conclusion based upon these comparisons is that for companies in a tax loss position without access to retained earnings, which might perhaps be the typical case, the presence of FTSs still offers an incentive to undertake exploration despite their inefficiency as a refundability mechanism. If such firms do have access to retained earnings, the calculations indicate that in some cases FTSs offer an additional incentive, while in some cases they do not. Not surprisingly, for fully tax-paying firms, FTSs offer no added inducement to invest in exploration. To reiterate, even in cases where the empirical METR on FTS-financed exploration is lower than under other sources of finance, the incentive is still substantially lower than would be the case if the shares were fully efficient in passing tax benefits on to corporations.

The conclusions are similar in the case of zero capital gains taxation (table 2), except that retained earnings finance is relatively more attractive, and FTS and ordinary new share issues relatively less so.

SUMMARY AND DISCUSSION

This article brings together two previously unrelated studies of FTSs. Jenkins studied the efficiency of FTSs as a refundability device while ignoring the incentive effects. Boadway and McKenzie examined the incentive effects of the shares while ignoring the possibility that they could be less than fully efficient as a refundability mechanism. In this article, I have extended the Boadway-McKenzie approach to allow for the inefficiencies observed by Jenkins. I show that when this inefficiency is accounted for, FTSs offer a substantially lower incentive for tax loss companies to undertake exploration than previously thought. Yet despite the inefficiencies, in many cases the METR on FTS-financed exploration is still less than the METR under alternative sources of finance—such as retained earnings or new share issues. In those cases, the existence of FTSs still provides a tax incentive for tax loss firms to undertake exploration.

One question that has not been addressed in this article, nor in previous research, is *why* FTSs may be inefficient as a refundability mechanism. Jenkins shows that additional transaction and administration costs associated with FTSs may be one reason. Yet even ignoring these costs, FTSs are still inefficient using Jenkins's measure, because the market FTS premiums determined by Jenkins are significantly less than the maximum theoretical premium (see tables 1 and 2). Why might this be the case? I speculate on two possible sources for the apparent underpricing and the associated inefficiency. Clearly more research on FTSs is required to gain a more complete understanding of this issue.

One possibility is that individuals in the high-premium clientele may somehow be restricted in their ability to purchase FTSs to reduce their tax liability. The reluctance of individuals to overexpose themselves to one company (or sector) may limit their demand for FTSs despite the tax benefits. This implies that the aggregate demand of the high-premium clientele at the maximum theoretical premium may not be high enough to take up all FTS issues, and individuals who are willing to pay a lower premium determine the FTS premium in equilibrium. In terms of a simple supply-demand framework, the demand curve for FTSs may be eventually downward sloping, which implies an equilibrium price less than the theoretical maximum. This is illustrated in figure 1, where $D(P)$ is the aggregate demand curve for FTSs expressed as a function of the premium, and $S(P)$ is the aggregate supply curve. In this diagram the equilibrium FTS premium P is less than the theoretical maximum P_h, and the marginal investor is in a lower tax clientele. This creates a "tax-induced investor surplus," shown by the shaded area. The implication is that some investors, the higher premium clientele, would be willing to pay a larger premium but need not do so in equilibrium. They receive a "surplus," which is not passed on to the issuing corporations. This would manifest itself in the sort of inefficiencies measured by Jenkins.[21]

The existence of an investor surplus may be exacerbated by certain legislative provisions pertaining to FTSs. In particular, the so-called "prescribed share" and "at risk" rules prevent investors and firms from making arrangements that would remove much of the risk associated with FTSs. Without these provisions, FTSs could be turned into a pure sale of tax benefits without the risk associated with the equity investment. If this were allowed, the flat portion of the demand curve in figure 1 would be extended (as illustrated), because the demand of the high-premium clientele would be higher. This would lead to a premium closer to the theoretical maximum, and an associated increase in the efficiency of FTSs. Further to this point, the minimum tax also potentially restricts the demand of the high-premium clientele for FTSs because in some circumstances it prevents some investors from claiming the deductions altogether.[22] One reason for these restrictive provisions is presumably to control the absolute cost of FTSs to the government. But in attempting to control the absolute cost, the government may well be limiting the

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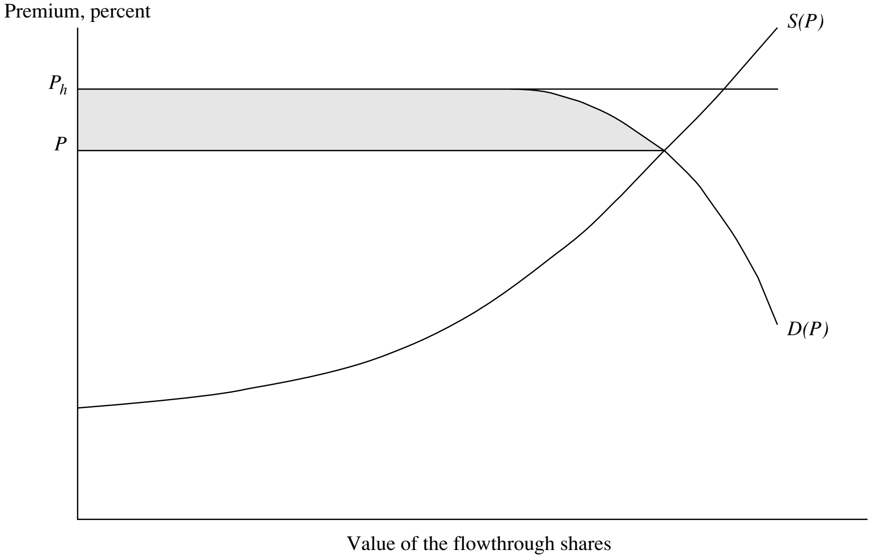
[21] As a referee reminded me, this sort of "tax-induced surplus" arises in other contexts—for example, with tax-exempt bonds in the United States.

[22] Even in the absence of these provisions, the demand curve will eventually slope down because of the progressive nature of the personal tax system. This is because at some point there will be no income left to tax at the highest rate! Of course, this would not likely happen at reasonable levels of FTS issues.

Figure 1 The Flowthrough Share Market



benefits received by the corporations and therefore increasing the cost per dollar of benefit received by the issuing corporation![23]

Another explanation for the apparently low FTS premiums measured by Jenkins, and the associated inefficiency, is the possible existence of something called "liquidity risk." Above, I argued that FTSs and their common share counterparts are in the same risk class, and therefore that FTSs can be thought of as a hybrid security composed of common shares plus some tax deductions. This might not in fact be the case. One reason may be that the common shares associated with an FTS issue cannot be traded until the exploration has been undertaken and the tax deductions renounced. As such, FTSs are often held in escrow, sometimes for as long as one year. Over this period the shares are non-marketable, or not liquid. This exposes investors to additional risk, over and above ordinary common share holders, because the FTS investors are not able to respond optimally to new information. They may demand a liquidity risk premium to compensate them for this. The result would be a reduction in the FTS premium, and an associated reduction in the benefits flowed to the issuing corporation. This too would manifest itself in Jenkins's measure of inefficiency.

Anything that lowers the FTS premium below its theoretical maximum will reduce the efficiency of the shares as a refundability mechanism.

[23] As a referee pointed out, governments often try to "have their cake and eat it too" by giving incentives with one hand and taking them away with the other. The special provisions regarding FTSs are a good example of this all-too-common phenomenon.

While I have speculated on two possible reasons why this discounting might occur—tax-induced investor surplus and liquidity risk—there may well be others. More research, both theoretical and empirical, is required to uncover some of the apparent mysteries of FTS pricing. Nonetheless, this article shows that, whatever its source, the "underpricing" of FTSs has serious implications for their incentive effects.