Flowthrough Shares: Premium-Sharing and Cost-Effectiveness

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PRÉCIS

Dans cet article nous examinons les aspects économiques des actions accréditives (AA) du point de vue des compagnies minières et pétrolières et des investisseurs. Nous calculons d'abord la mesure dans laquelle les compagnies qui émettent des AA récupèrent la valeur des déductions d'impôt sur le revenu pour leurs travaux d'exploration et de développement cédées aux investisseurs, via le prix d'actions ordinaires auquel s'ajoute une prime basée sur la valeur fiscale que les investisseurs retirent du transfert des dépenses. Nous examinons ensuite la capacité des AA de stimuler de nouveaux travaux d'exploration et de développement. Nous analysons également le taux de rendement des AA pour les investisseurs. Étant donné que ce mécanisme de financement basé sur des actions donne droit à un traitement spécial pour l'impôt sur le revenu, nous tenons compte d'influence de divers paramètres d'impôt.

Nous commençons notre analyse en définissant la notion de prime maximale (théorique) pour les actions accréditives. Nous présentons ensuite le concept du partage de la prime maximale entre les investisseurs et les compagnies émettrices et nous utilisons ce concept pour analyser l'«efficacité» du mécanisme des AA. Cette méthode innovatrice marque la différence entre notre étude et les études précédentes dans ce domaine, et elle ouvre de nouvelles perspectives sur l'efficacité de mécanismes similaires.

Nous utilisons également les notions de prime maximale et de partage afin de déduire les taux marginaux effectifs de l'impôt sur les AA. La relation entre le partage de la prime et les taux marginaux effectifs de l'impôt permet d'analyser d'une part le rapport coût/efficacité des AA à comparer à celui d'autres options de financement à base d'actions dont disposent les compagnies minières et pétrolières, et d'autres part les

divers niveaux d'avantages que le régime fiscal accorde aux activités d'exploration et de développement dépendant du mode de financement.

Pour terminer, notre article constitue la première évaluation systématique des expériences des investisseurs avec les AA. Notre analyse permet d'évaluer le rendement intrinsèque d'un investissement en AA.

ABSTRACT

This article considers the economics of flowthrough shares (FTS) from the perspectives of mining and petroleum companies and investors. We first measure the extent to which firms that issue FTS obtain the value of the income tax deductions for exploration and development renounced to investors through the premium, over and above the price of the firm's common shares, associated with the FTS. We then examine FTS in terms of their ability to encourage new exploration and development activities. We also examine the rates of return to investors from FTS. Since this equity-based financing mechanism receives special income tax treatment, we take the influence on it of various tax parameters explicitly into account.

Our analysis begins by developing the notion of the maximum (theoretical) flowthrough share premium. It then introduces the concept of a sharing of the maximum premium between investors and issuing firms and uses this concept to investigate the "effectiveness" of the FTS mechanism. This innovative approach differentiates our work from previous efforts in this area and provides new insights into the effectiveness of mechanisms of this type.

We also use the notions of the maximum premium and sharing to derive marginal effective tax rates for FTS. The relationship between the sharing of the premium and marginal effective tax rates permits investigation of the cost-effectiveness of flowthrough shares relative to that of other equity-based financing options available to mining and petroleum companies and of the varying degrees of encouragement provided by the tax system to exploration and development activity financed in different ways.

Finally, the article provides the first systematic assessment of investors' experiences with FTS. This analysis permits an evaluation of the performance of the underlying FTS investment.

INTRODUCTION

Flowthrough shares (FTS) are one of several ways in which mining and petroleum companies can finance their exploration and development activities in Canada. These equity instruments receive special income tax treatment and are issued by means of agreements between resource companies and their investors. An investor who purchases FTS from a mining or petroleum company under such an agreement receives both an equity

interest in the company and the right to claim income tax deductions for new expenditures by the company on exploration or development.

In exchange for transferring (or renouncing) exploration and development expenses[1] (and the right to the associated income tax deductions) to investors, a resource firm receives for the FTS the price of its common shares plus a premium based on the tax value to the investor of the transferred expenses. Although FTS are available to all mining and petroleum companies, the mechanism is intended to be of principal benefit to non-taxpaying junior exploration companies—that is, companies that cannot immediately use income tax deductions for exploration and development and whose access to alternative sources of financing is limited.

Investors can purchase FTS either directly from mining and petroleum companies or indirectly through limited partnerships that, in turn, acquire FTS from such resource companies. The latter mechanism was the more popular of the two during the FTS boom in the middle and late 1980s.[2] The key advantage of a limited partnership is that it provides investors with portfolio diversification and risk reduction but leaves the choice of individual investments in the hands of professional managers.

Although FTS have been available since 1954, they became especially important, particularly as a financing vehicle for exploration by mining companies, in the second half of the 1980s. Their popularity during this period was the result of several factors, including favourable market conditions for mining (that is, relatively high prices for gold and silver, and for mining stocks), the introduction of new fiscal incentives (such as the 1983 mining earned depletion allowance and the 1985 lifetime capital gains exemption), improvements in the basic design of FTS (specifically,

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[1] That is, expenses included in the income tax categories of Canadian exploration expense, Canadian development expense, and Canadian oil and gas property expense.

[2] Limited partnership intermediaries generally operate in the following manner. First, investors are solicited through a public offering of partnership units and contribute a lump-sum capital payment to subscribe as limited partners. Second, the general partner, who is responsible for managing the daily affairs of the limited partnership, enters into FTS purchase agreements, typically through private placements, with individual mining or petroleum companies. Third, the resource companies incur exploration and development expenses. Fourth, the resource companies renounce their eligible expenses to the limited partnership and issue FTS to the partnership. Fifth, the limited partnership attributes (or flows through) the renounced expenses to the limited partners, who can then use the income tax deductions related to the expenses in computing their taxable income. Sixth, after a predetermined holding period during which all FTS agreements are to be completed and all expenses renounced to the limited partners (generally about 10 months; see infra footnote 17), the assets of the limited partnership (principally the FTS) are transferred to a mutual fund and the partnership is dissolved. At this "conversion date," each limited partner receives a pro rata number of shares in the mutual fund, which is listed on a Canadian stock exchange. As per the terms of the original partnership agreement, the mutual fund may be either open-end or closed-end. An open-end mutual fund does not have a set capitalization, and the management company will issue or redeem shares upon request. A closed-end mutual fund issues a fixed number of shares, which are traded on a stock exchange and are not generally redeemed by the management company itself.

income tax changes in 1986 that limited investor liability), and increased participation in FTS transactions by large limited-partnership intermediaries. The popularity of FTS is evident from the fact that mining and petroleum companies raised $3.3 billion for exploration and development through FTS between 1987 and 1991. Of this total, $2.5 billion was for mining exploration; this amount represented about 60 percent of all funding raised for mining exploration over the period.

This article takes as given the public policy rationale for the existence of the FTS financing mechanism. Our purpose here is to investigate the effectiveness and cost-effectiveness of FTS from the perspectives of issuing companies and investors. To be more specific, the article has three main objectives. The first is to consider how—and why—the FTS premium is shared between issuing companies and investors—or, to state the matter differently, to measure the effectiveness of FTS in delivering the value of income tax deductions to issuing companies. Our second objective is to consider how sharing the premium affects the cost-effectiveness of FTS as a means of encouraging exploration and development by issuing firms. We do this by comparing the marginal effective tax rates for alternative equity-based financing options. Our third objective is to investigate the investment performance of FTS—that is, their cost-effectiveness from the perspective of investors—by examining the rates of return earned on FTS purchased between 1986 and 1990.

The next section provides a brief review of the existing literature on FTS and relates our contribution to that body of work. The third section establishes the basic relation between the prices of FTS and common shares and introduces the notion of sharing of the FTS premium. This background sets the stage for the ensuing discussions of cost-effectiveness and effectiveness. The fourth section introduces the concept of the marginal effective tax rate (METR) and shows that premiums and METRs are related concepts. It then uses METRs to measure the cost-effectiveness for firms of each of the three different means of financing exploration: FTS, common shares, and retained earnings. The section also explores the relation between the sharing of the premium (or tax benefits) and the effectiveness of FTS for the firm. The fifth section investigates the cost-effectiveness of FTS from the perspective of investors. We summarize our key findings in a concluding section.

PREVIOUS RESEARCH

Published research on FTS falls into four broad categories. The first category consists of articles in the financial press (including resource-sector publications);[3] these articles are mainly descriptive and topical. The second category consists of articles in technical journals that concern

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[3] See, for example, "Flow-Through (Mining Shares) Sizzle," *The Financial Post*, May 3, 1986, and "Exchanges Eager To Encourage Financing of Junior Mining Companies," *Northern Miner*, March 31, 1986.

themselves primarily with the tax implications for FTS issuers and inves-
tors of a particular financing structure.[4] The third category consists of
articles and monographs, written as a rule by government departments or
specialized research units, that document FTS-related activity or investi-
gate its policy implications.[5] The fourth category consists of papers that
consider the pricing of FTS, evaluate the capital market implications of
FTS financing, and enhance understanding of the financial and economic
issues associated with FTS.

It is the fourth category that is of particular relevance to this article.
The research papers in this category model the pricing of FTS relative to
the pricing of common shares and take account of the income tax positions
of the issuing company and the investors. For example, Henin and Ryan,[6]
Boadway and McKenzie,[7] and Jenkins[8] all develop theoretical pricing equa-
tions and consider the relative effectiveness of FTS as a mechanism for
delivering the value of income tax deductions to issuing firms. Except for
Jenkins,[9] however, none of the papers provide empirical evidence. Nor do
any of them acknowledge that the sharing of premium between the inves-
tors and the issuing company occurs in well-functioning capital markets
and that this sharing has important implications for assessing effective-
ness. Finally, none of the papers consider the cost-effectiveness of FTS as
a means of encouraging new investment or as an investment vehicle.

The notion of sharing of the FTS premium that we put forward here
shows that Jenkins' benchmark for assessing the effectiveness of FTS may
not be appropriate.[10] Furthermore, we argue that an appropriate alternative

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[4] See, for example, Barry Dent and John Jakolev, "Flow-Through Shares in the Mining
Industry," Personal Tax Planning feature (1985), vol. 33, no. 5 *Canadian Tax Journal*
1014-27; R.B. Parsons, "Improved Flow-Through Share Rules" (Price Waterhouse, 1986);
and Michael A. Carten, "Flow-Through Share Financing," in *Income Tax Considerations
in Corporate Financing*, 1986 Corporate Management Tax Conference (Toronto: Canadian
Tax Foundation, 1986), 385-410.

[5] See, for example, Basil A. Kalymon, *Flow-Through Share Financing*, Working Paper
no. 39 (Kingston, Ont.: Queen's University, Centre for Resource Studies, 1987); Glenn P.
Jenkins, *Cost-Effectiveness of After-Tax Financing: Flow-Through Shares in Canada*, Dis-
cussion Paper no. 327 (Ottawa: Economic Council of Canada, June 1987); "Results of
Latest PDA Flow-Through Share Savings" (Winter 1985-86), *PDA Digest*; and Canada,
Department of Finance, *Flow-Through Shares: An Evaluation Report* (Ottawa: the depart-
ment, October 1994).

[6] Claude Henin and Peter J. Ryan, "Structuring the Flow-Through Share Offer," in
Proceedings of the Administrative Sciences Association of Canada (1987).

[7] Robin Boadway and Ken McKenzie, "The Treatment of Resource Industries in the
1987 Federal Tax Reform," in Jack Mintz and John Walley, eds., *The Economic Impacts of
Tax Reform*, Canadian Tax Paper no. 84 (Toronto: Canadian Tax Foundation, 1989), 286-325.

[8] Jenkins, supra footnote 5, and Glenn P. Jenkins, "Tax Shelter Finance: How Efficient
Is It?" (1990), vol. 38, no. 2 *Canadian Tax Journal* 270-85.

[9] "Tax Shelter Finance," supra footnote 8.

[10] Jenkins views effectiveness in terms of the tax cost to government of delivering the value
of the tax deductions to issuing companies. His benchmark is full refundability of tax losses.

benchmark for assessing the effectiveness of FTS is the financing of new exploration and development through new equity issuance in capital markets. This alternative would result in a similar sharing of the tax benefits between the investors and the firm. We also consider certain other issues associated with Jenkins' analysis.

PREMIUMS AND SHARING
The Maximum Premium

An assessment of the effectiveness or cost-effectiveness of FTS depends crucially on the premium received by the issuing firm. This section establishes the relation between the special income tax features of FTS and the maximum (theoretical) premium—that is, the largest premium that the issuing firm could obtain by selling FTS on capital markets. This premium is valued by investors and depends on the income tax rates, the capital gains inclusion rate, and the writeoff rates for renounced expenses.

In deriving the algebraic relationships that express the essence of a flowthrough share, we employ certain simplifying assumptions:[11]

• We assume that income tax deductions are used each year to the extent allowed by the legislation.

• We assume that no capital gains exemption is available.

• We generally ignore the various forms of government assistance and the bonus deductions that may periodically affect the FTS premium.

• The "quality" of an FTS and the underlying common share of the issuing firm are taken as equivalent. We assume, that is, that these alternative instruments generate identical rates of return when they are held for the same length of time.[12]

• We assume that the purchase and sale of shares occurs instantaneously. This assumption eliminates the need to specify a "time" parameter for the rate of return on FTS or common shares.

• We assume at the outset that capital markets function perfectly— distortions are introduced later in the discussion.

Given these assumptions and the standard "no arbitrage" condition, the after-tax cost of a common share, ATC_{CS}, equals the market price of the

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[11] Appendix V of the Department of Finance's *Flow-Through Shares*, supra footnote 5, provides a more comprehensive treatment that explicitly includes grants, bonus deductions, and differing rates of return on common shares and FTS. Appendix III describes past and present government incentives related to FTS financing. Chapter V contains the formula for calculating the maximum premium when a capital gains exemption is available.

[12] There is no empirical evidence that the market valuation of FTS is less favourable than the market valuation of common shares. If there were any such evidence, it might indicate the existence in capital markets of asymmetric information about flowthrough shares. Investors might be unable to distinguish between true high-quality prospects and low-quality prospects that were misrepresented, with the result that all flowthrough shares would be sold at a discount.

common share, P_C, plus the expected capital gains tax payable by the investor when the share is sold, CGT_{CS}. This after-tax cost can be expressed as

$$ATC_{CS} = P_C + CGT_{CS} = P_C + [E(P_C) - P_C]i_c t_H, \tag{1}$$

where $E(P_C)$ is the expected selling price of the common share, i_c is the capital gains inclusion rate, and t_H is the top income tax rate.

The after-tax cost of an FTS, ATC_{FTS}, is the market price of the share, P_F, minus the income tax savings associated with renounced expenses, ITS, plus the expected capital gains tax payable when the share is sold, CGT_{FTS}. It can be represented as

$$ATC_{FTS} = P_F - ITS + CGT_{FTS} = P_F - P_F z t_H + E(P_C)i_c t_H, \tag{2}$$

where z is a weighted average of the present values of the rates of deductibility for the renounced expenses—renunciations of Canadian exploration expense have a z-value of unity. The expected capital gains tax in equation 2 reflects the impact of the nil adjusted cost base for FTS and the equivalence of the expected selling prices of common shares and FTS.

Equating equations 1 and 2 yields the ratio of the market price of FTS to the market price of common shares, which reflects the maximum FTS premium:

$$P_F/P_C = (1 - i_c t_H)/(1 - z t_H). \tag{3}$$

From equation 3, the maximum premium, P_{MAX}, can be defined as a percentage of the price of a common share:

$$P_{MAX} = P_F/P_C - 1 = (z - i_C)t_H/(1 - z t_H). \tag{4}$$

Equations 3 and 4 show that the maximum premium depends entirely on income tax parameters—the income tax rate for the FTS investor, the capital gains inclusion rate, and the weighted-average present value rate of deductibility for renounced expenses. Furthermore, only "current prices" are relevant;[13] the expected future price of the common share is not a factor. Comparative static analysis shows that the maximum premium increases with (1) increases in the rate at which expenditures can be deducted, (2) decreases in the capital gains inclusion rate, and, (3) if $z > i_C$, increases in the income tax rate.

The Observed Premium

If the market price of a flowthrough share equalled the price of a common share plus the maximum premium, then the investor would be indifferent between purchasing a flowthrough share and a common share of the issuing company. In other words, the tax benefits of the flowthrough share, as valued by investors, would accrue entirely to the issuing firm through the premium.

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[13] "Current" means at the time the sale of a new issue of FTS is announced publicly. This criterion ensures that the pricing of common shares and the pricing of FTS reflect the same information set and differ only because common shares and FTS have different tax features.

Even in a well-functioning capital market, however, the observed price of FTS will invariably reflect a premium—the observed premium—that is less than the maximum premium. And in paying a premium that is less than the maximum, investors effectively share in the tax benefits of the FTS with the issuing firm. This outcome parallels the situation in which two parties settle, through direct bargaining or by auction, on an equilibrium price that is mutually satisfactory. Four reasons why observed premiums differ from maximum premiums are as follows:[14]

1) *Tax-induced investor surplus.* If issuing firms fail to attract investors in the highest marginal tax bracket, then the observed premium will be less than the maximum premium. Evidence compiled by the Department of Finance[15] supports this hypothesis by showing that not all FTS investors in 1989 and 1990 were high-premium clientele and, therefore, that there was probably a small amount of tax-induced investor surplus in those years.[16]

2) *Incremental liquidity risk.* FTS agreements usually do not require immediate delivery of the underlying common share. This is so largely because of provincial securities restrictions that apply to private placement, the method typically used to issue FTS to limited partnerships.[17] The result is that an investor who has committed funds to FTS normally cannot sell the shares until the holding period has expired.[18] This situation imposes

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[14] Of course, the same reasons would apply equally to any market-based mechanism that was designed to help firms finance new expenditures by issuing equity instruments that allowed taxpayers to realize the value of associated tax deductions. For a more comprehensive discussion of the subject, see Department of Finance, *Flow-Through Shares*, supra footnote 5; K.J. McKenzie, "The Effectiveness of Flow Through Shares," a paper prepared for the Department of Finance (March 1994); and Kenneth J. McKenzie, "Refundability and the Incentive Effects of Flowthrough Shares" (1994), vol. 42, no. 4 *Canadian Tax Journal* 1100-14. Peat Marwick Stevenson & Kellogg Management Consultants, *Flow-Through Share—Case Studies*, a report prepared for the Department of Finance (Toronto: KPMG Peat Marwick Stevenson & Kellogg, January 1994), found that the behaviour of FTS partnerships was another important determinant of the premiums received by companies. For example, in order to obtain the participation of senior companies and thus enhance the marketability of the partnership fund, partnerships often offered senior companies premiums higher than the maximum premium. On the other hand, junior companies, whose financing alternatives were very limited, often sold their shares to partnerships at little or no premium. Since the tax incentives for mining companies were generally more favourable than those for oil and gas companies, partnerships could also afford to offer higher premiums to mining companies.

[15] Department of Finance, supra footnote 5.

[16] One could calculate tax-induced investor surplus in table 1 by substituting a personal income tax rate of 51 percent for the 48.5 percent rate in those cases where the effective capital gains tax rate is 0 percent.

[17] As we noted earlier, securities regulations often specify a 12-month holding period for shares issued by means of private placements. Empirical evidence presented in the next section suggests that the average holding period for FTS obtained through the limited partnerships subject to analysis was about 10 months.

[18] In addition, the "at-risk rules" of the Income Tax Act, RSC 1985, c. 1 (5th Supp.), as amended, effectively prevent investors from selling their rights to the shares by prohibiting them from claiming amounts renounced when they do not have money at risk.

a "liquidity risk" on FTS investors that results in an observed premium that is less than the maximum premium.

3) *Incremental transaction costs.* Issuing FTS involves transaction costs—legal, accounting, underwriting, filing, and brokerage fees and, if the shares are sold to a limited partnership, management and operating fees as well. To the extent that these costs exceed those associated with financing the exploration through the issuance of common shares, the cost-effectiveness of FTS will be reduced. This factor too may explain why firms do not receive the full value of the tax benefits as valued by investors.[19]

4) *Common share valuation.* Our formula for calculating the maximum FTS premium assumes that the correct price to use for the issuing firm's common shares is the price on the stock exchanges when the FTS issue is announced. Although this assumption is a standard one, a given firm may in fact not be able to issue the desired quantity of common shares at the established market price, especially if it is a junior firm with a relatively short history. If so, then ideally one would estimate the premium to account for the lower price that would be obtainable on the sale of the underlying common shares. This price cannot be observed, however, and so what might be regarded as a low premium, given the market price, may actually be regarded by the firm as a high premium.

It is important to take these market-based reasons why sharing occurs into account, since they open a variety of perspectives on the question of the effectiveness of the FTS financing mechanism in delivering the value of tax deductions to issuing firms.

COST-EFFECTIVENESS AND EFFECTIVENESS FOR THE FIRM

In financing exploration and development, firms have equity-based options other than FTS—namely, retained earnings and common shares, neither of which involves any renunciation of expenditures to investors. From a firm's viewpoint, the decision whether or not to issue FTS depends on the extent to which FTS will reduce the relative cost of raising equity-based financing for exploration and development. One can evaluate this cost-effectiveness by measuring marginal effective tax rates (METRs). METRs indicate the extent to which a new investment is encouraged by the tax system. A comparison of METRs for retained earnings, common shares, and FTS (based on both the maximum premium and the observed premium) will indicate the relative cost-effectiveness of each form of financing and the relative ability of each to encourage exploration and development.

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[19] Peat Marwick Stevenson & Kellogg, supra footnote 13, found that the incremental transaction costs for FTS over common shares may be about 2 percent of the value of the funds raised through private placements both with investors directly and with multicompany limited partnerships involved more heavily with junior exploration companies.

Premiums and METRs are related concepts that offer alternative possibilities for exploring the effectiveness and cost-effectiveness of FTS. The maximum premium has its counterpart in the theoretical METR; the observed premium, in the empirical METR. The difference between the maximum premium and the observed premium is a measure of the sharing of tax benefits between the investors and the issuing firm. Correspondingly, a comparison of theoretical METRs and empirical METRs reveals the impact of sharing on the ability of the tax system to encourage exploration and development by means of FTS.

It was shown above that premiums depend solely on tax parameters. It will be shown in this section that the same thing is true of METRs, regardless of the financing option employed. In the case of METRs for FTS, however, an additional parameter is particularly important—namely, the firm's taxpaying status. This parameter is important because the tax value of resource expenditures to a firm varies with its ability to claim them as deductions. Other things being equal, a firm that does not expect to be able to use its deductions quickly will accept a lower premium for its FTS than will a firm that can use its deductions quickly. The lower is the premium that an issuing company receives, the higher is the METR on the company's last unit of exploration or development.

METR Methodology

Formulas are provided below for calculating METRs under a stylized tax system similar to the current federal and Ontario income tax systems for mining and petroleum.[20] These formulas use an additional parameter, whose value ranges between zero and unity, to reflect the taxpaying status of the firm.[21] If the firm is fully taxpaying and thus able to deduct Canadian exploration expense (CEE) fully in the year the expense is incurred, the value of this parameter will be unity. If the firm never expects to be able

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[20] This stylized tax system is based on a framework developed by Robin Boadway, Neil Bruce, Ken McKenzie, and Jack Mintz in "Marginal Effective Tax Rates for Capital in the Canadian Mining Industry" (February 1987), 20 *Canadian Journal of Economics* 1-16, and extended by John R. Livernois in "Marginal Effective Tax Rates for Capital in the Canadian Mining Industry: An Extension" (February 1989), 22 *Canadian Journal of Economics* 184-94. See the papers by McKenzie, supra footnote 14, for detailed treatment of the theoretical underpinnings and mathematical derivations for this stylized system.

[21] We have based this parameter on a similar parameter outlined in Jack M. Mintz, "An Empirical Estimate of Corporate Tax Refundability and Effective Tax Rates" (February 1988), 103 *Quarterly Journal of Economics* 225-31. The basic purpose of both parameters is to recognize that the present value of a deduction is reduced for a firm that is currently non-taxpaying. In estimating his parameter, Mintz uses industry data on tax losses and deductions and assumes that a portion of the tax loss from a marginal investment is carried back for an immediate refund and that the remainder is deducted in straight-line fashion. The Mintz estimate of the former portion for the resource sector is 24 percent. This particular parameter value is not a satisfactory one either for the calculation of METRs for exploration under different forms or for determination of the sharing of the maximum premium for exploration; nevertheless, we use it to represent the situation of a hypothetical exploration corporation that is neither fully taxpaying nor permanently non-taxpaying.

to claim CEE, the value of the taxpaying-status parameter will be zero. If the firm is currently non-taxpaying but expects to be able to use the deductions at some point in the future, the parameter will have a fractional value.

Retained Earnings

In simple terms, the firm's problem is to determine what amount of capital it must employ, what amount of exploration it must conduct, and what amount of production it must undertake, over time, in order to maximize the present value of its future expected cash flows, subject to certain constraints related to changes in the stocks of available physical capital and depletable resources. The solution of this dynamic optimization problem leads to the following optimal condition for exploration:

$$MRP_{RE} = METR_{RE} + 1 = (1 - xt_C)/[1 - xt_C(1 - s)], \tag{5}$$

where x is the taxpaying-status parameter, t_C is the combined federal-provincial corporate income tax rate, and s is the resource allowance rate. The left-hand side of equation 5 is the marginal revenue product (MRP) of exploration, or the gross-of-tax value of additional reserves discovered per dollar of exploration. The right-hand side is the user cost of exploration—that is, the cost of an additional dollar of exploration spending to the firm adjusted to reflect the impact of federal and provincial income taxes. The numerator of the user cost is the after-tax cost of a dollar of exploration to the firm adjusted to reflect the firm's taxpaying status. The term $xt_C(1 - s)$ in the denominator is the effective rate at which the incremental revenue generated by the additional dollar of exploration is taxed.

New Common Shares

Similarly, the optimal amount of exploration financed by a new common share issue is given by

$$MRP_{CS} = METR_{CS} + 1 = [(1 - c)/(1 - d) - xt_C]/[1 - xt_C(1 - s)], \tag{6}$$

where c and d are the weighted-average effective tax rates for existing shareholders on capital gains[22] and dividends, respectively. The effective dividend tax rate depends on the marginal income tax rates of the existing shareholders and includes the federal dividend tax credit. The capital gains tax rate depends on marginal income tax rates, the capital gains inclusion rate, the length of time the share is held, and the shareholders' ability to use the capital gains exemption.

Since the effective capital gains tax rate is typically less than the effective dividend tax rate, $(1 - c)/(1 - d)$ is generally greater than unity. In other words, the user cost of an additional dollar spent on exploration is usually greater if the dollar is financed by common shares than it is if the dollar is financed by retained earnings. It follows that less exploration will be financed by common shares.

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[22] This is sometimes referred to as the "accrual-equivalent" capital gains tax rate.

Flowthrough Shares

Similarly, equation 7 shows the gross-of-tax rate of return required by a company from an additional dollar of investment in exploration that is financed by FTS:

$$MRP_{FTS} = METR_{FTS} + 1 = (1 - c)/\{(1 - d)(P_F/P_C)[1 - xt_C(1 - s)]\}. \quad (7)$$

Equation 7 is entirely general in the sense that no particular FTS premium (as reflected in the share-price ratio P_F/P_C) is specified in its formulation. Thus one can use it to determine the METR associated with any premium. If one assumes that the firm receives the maximum premium, the equation will yield a value for the theoretical METR. Alternatively, one can substitute observed premiums from a sample of issuing companies directly into the equation to obtain empirical METRs. Either approach permits comparison of METRs based on equations 5, 6, and 7, and hence estimation of the relative cost-effectiveness of the FTS financing mechanism.

Before we proceed to an examination of cost-effectiveness, however, it will be useful to consider more precisely how one would use equation 7 to calculate the theoretical METR for FTS. Income tax data for 1989 and 1990 indicate that renunciations were made to individuals in all income tax brackets.[23] Given these data, one can calculate weighted-average income and capital gains tax rates (m_F and c_F, respectively) to determine the maximum premium for these FTS investors. By replacing the capital gains tax rate, $i_C t_H$, and the income tax rate, t_H, in equation 3 with c_F and m_F, respectively, and setting the value of z to unity to reflect only exploration spending, one can represent the maximum premium for this particular set of investors as follows:

$$P_F/P_C = (1 - c_F)/(1 - m_F). \quad (8)$$

By substituting equation 8 into equation 7 and subtracting unity, one obtains the theoretical METR for FTS:[24]

$$METR_{FTS} = [(1 - c)(1 - m_F)]/\{(1 - d)(1 - c_F)[1 - x^*t_C^*(1 - s)]\} - 1. \quad (9)$$

The result of the differential taxation of dividends and capital gains for existing shareholders in equation 9 is that FTS are at a tax disadvantage relative to retained earnings (equation 5). As in equation 6 for new common shares, this result follows because the value of the term $(1 - c)/(1 - d)$ is typically greater than one and, therefore, increases the user cost of

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[23] See Department of Finance, *Flow-Through Shares*, supra footnote 5. Table 4.9 of that publication indicates that 90 percent of claims in respect of FTS in 1989 and 1990 were made by individuals in the highest tax bracket, 8 percent were made by individuals in the middle tax bracket, and 2 percent were made by individuals who were either in the lowest tax bracket or non-taxpaying.

[24] Two capital gains rates appear in this equation. One (c) applies to those who hold the corporation's shares immediately before the FTS are issued—that is, to shareholders who must be compensated for the new share issue. The other (c_F) applies to the flowthrough share investors. Since the two sets of shareholders are unlikely to be identical, they will possess different taxation characteristics and thus be subject to different effective capital gains tax rates.

FTS-financed investment relative to the cost of investment financed by retained earnings. The zero-adjusted-cost-base rule for purposes of capital gains tax also increases the user cost of FTS, a result reflected by the term $1/(1 - c_F)$. The income tax deductions associated with exploration, captured by the term $(1 - m_F)$, are evaluated for FTS investors at the personal tax rate, m_F, rather than at the effective corporate tax rate, xt_C. In general, the value that investors place on exploration deductions is likely to be higher than the value placed on them by the firms that issue FTS—that is, m_F is likely to be greater than xt_C. To the extent that it is higher, the user cost of exploration financed by FTS will decrease relative to the user cost of exploration financed by retained earnings.

Cost-Effectiveness Calculations
Comparison with Theoretical METRs
We shall now use equations 5, 6, and 9 to compare the METRs for exploration financed by retained earnings and common shares with the theoretical METR for FTS under various assumptions for personal and corporate income tax parameters. In practice, of course, these tax parameters are likely to be different for each firm and for each FTS issue. Since, however, data disaggregated to the level of the firm are not available, we have calculated illustrative METRs for a variety of cases, each of which corresponds to a different set of assumptions about the underlying tax parameters.

Table 1 sets out nine cases designed to capture the sensitivity of METR calculations to the range of possible parameter values. Cases 1 to 3 concern non-taxpaying firms, cases 4 to 6 involve firms that will eventually become taxpaying, and cases 7 to 9 deal with firms that are fully taxpaying. In each of the nine cases, the statutory corporate tax rate (t_C) is assumed to be 50 percent and the resource allowance (s) is set at its statutory rate of 25 percent. The taxpaying-status parameter (x) is either 0 percent, which implies that the firm is permanently non-taxpaying; 24 percent,[25] which implies that the firm will eventually become taxpaying; or 100 percent, which implies that the firm is fully taxpaying. The weighted-average federal-provincial personal income tax rate (m_F) is assumed to be 48.5 percent in all cases.[26] The dividend tax rate (d), which is a function of the personal income tax rate and the federal dividend tax credit,[27] is fixed at 31.3 percent in all cases. These parameter values make it possible to compare situations in which the effective corporate tax rate, xt_C, exceeds the effective personal tax rate, m_F (cases 1 to 6), with cases in which the effective personal rate exceeds the effective corporate rate (cases 7 to 9).

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[25] This is the estimate obtained by Mintz for the resource sector. See supra footnote 21.

[26] This is an arbitrarily selected rate that is intended only to reflect the evidence that not all individuals who invested in FTS were in the highest tax bracket. See Department of Finance, *Flow-Through Shares*, supra footnote 5.

[27] We use the 1987 value of 16⅔ percent for the credit.

Table 1 Marginal Effective Tax Rates and Maximum Premiums for Exploration

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
METRs									
Retained earnings	0.0%	0.0%	0.0%	-3.3%	-3.3%	-3.3%	-20.0%	-20.0%	-20.0%
Common shares	19.1%	45.6%	19.1%	17.7%	46.8%	17.7%	10.6%	53.0%	10.6%
Flowthrough shares, theoretical	-38.7%	-25.0%	-21.3%	-32.6%	-17.6%	-13.5%	-1.9%	20.0%	25.9%
Premiums									
Maximum premium	94.2%	94.2%	51.4%	94.2%	94.2%	51.4%	94.2%	94.2%	51.4%
Breakeven premium[a]	0.0%	0.0%	0.0%	11.2%	9.0%	11.2%	72.4%	52.3%	72.4%
Assumptions									
Personal income tax rate ($m = mf$)	0.485	0.485	0.485	0.485	0.485	0.485	0.485	0.485	0.485
Capital gains tax rate									
Existing shareholders (c)	0.182	0.000	0.182	0.182	0.000	0.182	0.182	0.000	0.182
Flowthrough shareholders (cf)	0.000	0.000	0.220	0.000	0.000	0.220	0.000	0.000	0.220
Dividend tax rate (d)	0.313	0.313	0.313	0.313	0.313	0.313	0.313	0.313	0.313
Exploration writeoff rate (z)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Taxpaying-status parameter (x)	0.000	0.000	0.000	0.240	0.240	0.240	1.000	1.000	1.000
Corporate income tax rate (tc)	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Resource allowance rate (s)	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250

[a] The premium at which the theoretical METR for exploration financed by flow-through shares would equal the above-noted theoretical METR for common-share financing.

Information does not exist on the extent to which the lifetime capital gains exemption is available to either the existing shareholders or the FTS investors of any given corporation. For simplicity's sake, therefore, we assume that these groups have either full access to this exemption or no access, and ignore the impact of the cumulative net investment loss rules. FTS investors with full access to the lifetime exemption are referred to as "high-premium clientele."

There is evidence that investors usually sell their FTS at the earliest possible opportunity after expiration of the holding period, which suggests that they are not primarily interested in FTS as an investment opportunity.[28] Consequently, we further assume that where the capital gains exemption is not available the average holding period for FTS is less than the holding period for common shares. To be specific, we assume that the holding period for to the corporation's common share investors is three years and that the holding period for FTS investors is only one year. In determining the weighted-average effective capital gains tax rates for existing shareholders (c) and for FTS investors (c_F), we use a 10 percent rate of discount. Finally, we assume a capital gains inclusion rate of 50 percent in all situations.[29] These assumptions yield maximum effective capital gains tax rates of 22 percent for FTS investors and 18.2 percent for existing shareholders.

Table 1 shows that for both non-taxpaying firms and not fully taxpaying firms FTS yield lower (theoretical) METRs than do either retained earnings or common shares, a result that implies that FTS are the most cost-effective of the three financing options. Retained earnings are less cost-effective than FTS but more cost-effective than common-share financing. For taxpaying firms, retained earnings are the most cost-effective method of financing exploration. Whether FTS are more or less cost-effective for such firms than are common shares depends on the relative rate of capital gains tax for FTS investors. Thus, it is the firm's taxpaying status that determines whether or not FTS are preferable to retained earnings as a method of financing exploration. Common-share financing is always less advantageous than financing by retained earnings. The highest METRs for common-share financing occur with effective capital gains tax rates of zero percent for both existing shareholders and FTS investors.

As table 1 shows, the theoretical METRs for FTS are lowest, in both absolute and relative terms, for non-taxpaying firms—that is, firms that

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28 Peat Marwick Stevenson & Kellogg, supra footnote 14, note that mutual fund managers "were unanimous in their view that investors were solely interested in the tax write-offs available from the funds. They felt that few, if any, investors had any interest in resource exploration per se as an investment" (p. 11). Indications of this state of affairs include the finding that "investors typically redeemed their investment units at the earliest possible opportunity" (p. 11) and the finding that investors were typically "not interested in purchasing these shares until the end of the year, when they had a clearer view of their tax situation" (p. 73).

29 This was the rate in effect before 1988.

are unable to use the associated tax deductions. This result is not surprising, since they are the firms that the FTS mechanism was originally designed to benefit. If a non-taxpaying firm receives the maximum premium, then the full value of the renounced tax benefits accrues to the firm. For such firms, therefore, FTS can provide significant encouragement to undertake exploration, even in the absence of other fiscal incentives for that activity such as grants or bonus deductions. Furthermore, since the theoretical METR for FTS can be negative even for taxpaying firms and less than the METR for common shares, it may be that taxpaying firms too derive some encouragement from the FTS mechanism to increase their exploration efforts. Note that the theoretical METR increases (that is, becomes less negative or positive) with both increases in the effective capital gains tax rate for FTS investors and decreases in the effective capital gains tax rate for existing shareholders.

Table 1 also provides the maximum and breakeven premiums for each of the nine cases. A firm that receives the breakeven premium will be indifferent between issuing common shares and FTS. It is, therefore, the premium at which the full value of renounced tax benefits accrues to the investor and, in normal circumstances, the minimum premium acceptable to the firm. As the table indicates, the breakeven premium can range from 0 percent to 72 percent of the price of a firm's common shares, given the assumptions. A positive difference between the maximum premium and the breakeven premium indicates the extent to which sharing of the premium can take place to the benefit of both the firm and the investor. When, however, the theoretical METR for FTS exceeds the METR for common shares, as in case 9, the minimum premium acceptable to the firm is greater than the maximum premium acceptable to investors; FTS would not normally be issued in such a situation.

Comparison with Empirical METRs

Although the METR estimates in table 1 indicate that FTS can be cost-effective in promoting exploration for both taxpaying and non-taxpaying firms, the actual cost-effectiveness of FTS can be determined only through empirical investigation—that is, by using equation 7 to calculate METRs based on the observed premiums. This task requires information on the prices of FTS and the underlying common shares at the time the FTS are issued. If the empirical METR for FTS is less than the METR for a firm's common shares, then one can conclude that the FTS mechanism is a relatively cost-effective financing option for the issuing firm, even though the observed premium is less than the maximum premium.

Table 2 presents METR calculations based, in part, on empirical data for three FTS issues made in 1987 by three different companies. Companies X and Z each earned a 10 percent grant through the Petroleum Incentives Program (PIP), and the calculations assume that the firms have renounced this grant, with their exploration expenses, to their investors. Since, however, the exact taxpaying status of each firm and its investors is unknown, the calculations employ assumptions similar to those in table 1.

Table 2   Marginal Effective Tax Rates and Taxpaying Status, Exploration

	Taxpaying-status parameter	Theoretical METR		Maximum premium	Flowthrough shares		
		Retained earnings	Common shares		Theoretical METR	Observed premium	Empirical METR
Survey participant							
Company X	0.000	−10.0%	9.1%	68.2%	−29.2%	41.8%	−16.0%
	0.240	−13.0%	8.0%		−22.2%		−7.7%
	1.000	−28.0%	2.6%		13.3%		34.4%
Company Y	0.000	0.0%	19.1%	51.4%	−21.3%	41.8%	−16.0%
	0.240	−3.3%	17.7%		−13.5%		−7.7%
	1.000	−20.0%	10.6%		25.9%		34.4%
Company Z	0.000	−10.0%	9.1%	68.2%	−29.2%	60.0%	−25.6%
	0.240	−13.0%	8.0%		−22.2%		−18.2%
	1.000	−28.0%	2.6%		13.3%		19.1%
Assumptions							
Personal income tax rate ($m = mf$) ...		—	0.485	0.485	0.485	—	0.485
Capital gains tax rate							
Existing shareholders (c)		—	0.182	—	0.182	—	0.182
Flowthrough shareholders (cf)		—	—	0.220	—	—	—
Dividend tax rate (d)		—	0.313	—	0.313	—	0.313
Exploration writeoff rate (z)		1.000	1.000	1.000	—	1.000	—
Corporate income tax rate (tc)		0.500	0.500	—	0.500	—	0.500
Resource allowance rate (s)		0.250	0.250	—	0.250	—	0.250
PIP rate[a]		0.100	0.100	0.100	—	0.100	—

[a] Companies X and Z each reported PIP grants earned at a 10 percent rate. The FTS calculations for these companies assume that the grant is renounced to investors.

The table shows both theoretical METRs (based on maximum premiums) and empirical METRs (based on observed premiums) and compares them with the METRs for retained earnings and common shares.

Naturally, as table 2 shows, the empirical METRs for these firms are higher than the theoretical METRs, and the difference in each case is a measure of the extent to which the firm must share the premium with its investors. Since these firms did issue FTS, they cannot have been fully taxpaying, since in that case, as the table also shows, either retained earnings or common shares would have been a less costly alternative to FTS.

If one assumes that the firms are either non-taxpaying or not fully taxpaying, their empirical METRs for FTS are negative. In fact, FTS are more cost-effective than retained earnings if the firms are non-taxpaying and may be more cost-effective than retained earnings if the firms are not fully taxpaying. Common shares are the least cost-effective financing option for both taxpaying and not fully taxpaying firms. Since the three firms did in fact issue FTS, company X must be the one of the three with the least expectation that it would eventually become taxpaying.

Three general observations stem from the findings reported in table 2. First, FTS provided both non-taxpaying and not fully taxpaying firms with a significant incentive for exploration, even given that the premiums were shared between the firms and their investors. Second, given the sharing of the maximum premiums, as reflected by the observed premium for each firm, the incentive for non-taxpaying and not fully taxpaying firms to finance exploration by issuing FTS was much the same as the incentive for a taxpaying firm in a similar situation to finance exploration out of its retained earnings. In fact, if the three firms in the table had obtained the maximum premium, their incentive to use FTS would have exceeded a taxpaying firm's incentive to use retained earnings. Third, incentive grants increased cost-effectiveness and promoted exploration by reducing METRs regardless of the financing option employed.

Sharing and Effectiveness

Measurement of the extent of sharing also allows an assessment of the relative effectiveness of FTS as a mechanism for delivering the value of tax benefits to issuing companies. The notion of sharing that we develop here provides an important alternative to the approach that Jenkins uses to address the question of the effectiveness of FTS.[30] Our approach implies that the Jenkins effectiveness index calculation is a special case of sharing; that is, Jenkins implicitly assumes that FTS are effective only if the entire premium accrues to the firm.

Fundamental to Jenkins' analysis is the notion that FTS are an alternative to full tax-loss offsetting, whereby a firm is taxed on positive income and receives a full refund for negative taxable income. Using full-loss

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[30] "Tax Shelter Finance," supra footnote 8.

offsetting as the benchmark, Jenkins defines an effectiveness index, E, for exploration expenditures:[31]

$$E = [(P_F/P_C)(m_F - xt_C) - c_F]/[P - (P_F/P_C)xt_C]. \tag{10}$$

The intuition behind this equation is as follows. The numerator is the additional tax cost to the government associated with an issue of FTS sold at a price relative to the price of common shares (P_F/P_C). This additional cost has three components: (1) the income tax lost as a result of investors' immediate claim of deductions for the renounced exploration expenditures, or $(P_F/P_C)m_F$; (2) the additional capital gains taxes, c_F, from the future sale of the underlying common share that arises because of the zero adjusted-cost base for capital gains purposes; and (3) the income tax gained because the firm has forgone its prior right to future deductions for the exploration expenditures, or $(P_F/P_C)xt_C$. The denominator is the net tax benefit that the firm actually receives. It consists of the value of the premium that the firm receives, P, minus the expected present value of the forgone corporate tax deductions, $(P_F/P_C)xt_C$. Thus, E is an index measure of the cost to the government per dollar of benefit received by the company.

Alternatively, by using the notion of sharing, one can interpret E as the inverse of the share of the tax benefits received by the company (S_C) rather than by the FTS investors:

$$S_C = 1/E = [P - (P_F/P_C)xt_C]/[(P_F/P_C)(m_F - xt_C) - c_F]. \tag{11}$$

Subtract S_C from unity, and it follows that the investors' share is

$$S_I = 1 - 1/E = [(P_F/P_C)m_F - c_F - P]/[(P_F/P_C)(m_F - xt_C) - c_F]. \tag{12}$$

The denominator in equations 11 and 12 represents the additional cost to the government today of allowing firms to renounce exploration deductions for immediate use by investors instead of carrying them forward for possible use at a later date. The numerator in equation 11 represents the net benefit for the firm, whereas the numerator in equation 12 represents the net benefit for the investor.

Although equation 11 includes the premium for FTS, it can be reformulated in a simpler and more intuitively appealing manner that directly relates the observed premium to the maximum premium. To be more specific, one can calculate the corporate share of the premium in the case of a non-taxpaying firm, S_C^{NT}, as follows:[32]

$$S_C^{NT} = P_{OBS}/[(1 - m_F)P_{MAX} + m_F P_{OBS}], \tag{13}$$

where P_{OBS} is the observed premium and P_{MAX} is the maximum premium. Thus the corporate share is simply the ratio of the observed premium to the weighted average of the observed and maximum premiums, with the weights reflecting the tax rate at which the investors value the tax deductions for exploration expenses.

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[31] One can subtract an additional term from the denominator of this equation to account for incremental transaction costs in respect of FTS.

[32] A similar equation for taxpaying firms is slightly more complicated.

The calculation of corporate and investor shares requires information similar to that required for the calculation of METRs—that is, data on the tax parameters and the observed premium. Table 3 provides illustrative calculations of sharing or effectiveness based on the observed premiums for the three firms in table 2 and the tax parameter assumptions that underlie cases 1 to 6 in table 1.[33] The analysis indicates the factors that are important in determining the effectiveness of FTS as a tax-benefit delivery mechanism.

The calculations for S_C and E vary widely across the companies and cases examined. Thus, corporate shares range from a low of 40 percent to a high of 91 percent. For a given company, S_C increases (or E decreases) as the effective capital gains rate for the company's FTS investors increases or as the company itself becomes more non-taxpaying. The former result suggests that high-premium clientele are more effective than other investors in securing a large share of the tax benefits for themselves. Of course, high-premium clientele are precisely the investors who are willing to pay the highest maximum premium. Thus, there is a tradeoff for companies. They can get either a larger share of the tax benefits by selling FTS to lower-premium clientele or a smaller share by selling them to higher-premium clientele. The calculations suggest that firms are more effective in the former case and, consequently, so are FTS as a tax-benefit delivery mechanism. They also suggest that firms' share of the maximum premium is largest if the firms are non-taxpaying, as Jenkins' calculations assume they are. In case 3, for example, the firm receives between 74 percent and 91 percent of the maximum premium. Even in cases 1 and 2, which assume that the lifetime capital gains exemption is available to investors, the corporate shares exceed 50 percent. For these three issues, therefore, FTS are most effective if the firm is non-taxpaying. In short, FTS are most effective as a delivery mechanism when firms are non-taxpaying and investors are lower-premium clientele.

These conclusions are quite different from those advanced by Jenkins.[34] Jenkins uses empirical data to estimate the effectiveness index, E, for seven FTS partnerships and concludes from his results that FTS are a very ineffective tax delivery mechanism. Clearly, it is necessary to provide some explanation for the differences between Jenkins' findings and our own. Six reasons for these differences are offered below:

1) Jenkins limits his analysis to non-taxpaying firms—that is, to firms for which the deductions have no value. This limitation tends to increase the effectiveness-index values.

2) Jenkins' measure of the premium is based on the common share price six months after the FTS were issued. This common share price,

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[33] Calculations for cases 7 to 9 are not provided because the observed premiums are less than the breakeven or minimum premiums (given in table 1) that would be acceptable to these hypothetical taxpaying firms. These firms would not issue FTS.

[34] "Tax Shelter Finance," supra footnote 8.

Table 3   Flowthrough Share Effectiveness and Sharing, Exploration

Survey participant	Observed premium	Measure[a]	Cases 1 & 2	Case 3	Cases 4 & 5	Case 6
Company X	41.8%	Effectiveness index (E)	1.91	1.36	2.48	1.58
		Corporate share (S_C)	52.3%	73.7%	40.3%	63.2%
Company Y	41.8%	Effectiveness index (E)	1.73	1.17	2.27	1.30
		Corporate share (S_C)	57.9%	85.2%	44.0%	76.7%
Company Z	60.0%	Effectiveness index (E)	1.48	1.10	1.68	1.14
		Corporate share (S_C)	67.6%	90.9%	59.4%	87.5%
Assumptions						
Personal income tax rate (mf)			0.485	0.485	0.485	0.485
Capital gains tax rate (cf)			0.000	0.220	0.000	0.220
Exploration writeoff rate (z)			1.000	1.000	1.000	1.000
Taxpaying-status parameter (x)			0.000	0.000	0.240	0.240
Corporate income tax rate (tc)			0.500	0.500	0.500	0.500
Incremental transaction costs (t)			0.020	0.020	0.020	0.020
PIP rate[b]			0.100	0.100	0.100	0.100

[a] When there are no costs for the government to issue refunds, a value of unity for the effectiveness index would indicate that all tax benefits associated with FTS accrue to the issuing company; that is, FTS shares are fully effective. A corporate share of 100 percent corresponds to an effectiveness-index value of unity.

[b] Companies X and Z each reported PIP grants earned at a 10 percent rate. The calculations for these companies assume that the grant is renounced to investors.

however, is not the appropriate one for an evaluation of the effectiveness of FTS for the firm. As we noted earlier, one should instead calculate the premium by comparing the FTS price with the corresponding common share price on the date of issue for the FTS. In addition, as we shall show in the next section, the common share prices for companies that issued FTS in the middle and late 1980s tended to be significantly lower six months after the fact than they were on the date of issue. Jenkins' use of the lower prices, like his use of non-taxpaying firms only, increases the values for his effectiveness index.

3) Jenkins' effectiveness index ignores the incentive that FTS provide to undertake exploration and development activities, as measured by METRs. The empirical METRs in table 2 show that FTS offer firms a significant incentive for exploration.

4) Jenkins does not consider any of the factors that explain the existence of sharing in well-functioning capital markets.

5) By failing to recognize that the FTS mechanism is not a substitute for symmetric tax-loss treatment, Jenkins also ignores its implications for other equity-based "refunding" mechanisms.[35]

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[35] With reference only to costless full-loss offsetting, Jenkins, "Tax Shelter Finance," supra footnote 8, at 285, concludes that the effectiveness of FTS as a financial instrument "appears to be poor" and that "the taxation authorities would do well to consider other methods of bringing about the refundability of tax losses." The former statement reflects

(The footnote is continued on the next page.)

6) Since his benchmark for comparison is costless full-loss offsetting, Jenkins assumes that an *E*-index value greater than unity for a given issue of FTS implies that the FTS are ineffective as a tax delivery mechanism. This choice of a benchmark, however, fails to take proper account of the fact that the FTS mechanism is directed to incremental expenditures and is available only to firms that raise equity financing through capital markets. In other words, it is not enough to consider the variations in *E*-index estimates that arise from variations in the underlying tax parameter assumptions. It is also necessary to compare the FTS mechanism with some comparable alternative mechanism. For example, an appropriate benchmark for evaluating the effectiveness of FTS as a tax-benefit delivery mechanism would be another equity-based mechanism that operated through capital markets and through which a non-taxpaying firm could obtain a tax refund in respect of its new exploration expenditures. Unfortunately, Jenkins does not distinguish between such a mechanism and a symmetrical tax system.

The last of these six points merits further discussion. Jenkins' theoretical ideal is an *E*-index value of unity, which by his reckoning would represent a perfectly effective delivery mechanism. A value for *E* of unity would mean that the corporation received the full value of the tax benefits, as valued by the investors. The achievement of this result without capital-market intervention would require a tax system that provided full, unconstrained refundability at the corporate level, regardless of how the investment was financed or when it was undertaken. Such a system, however, would raise other problems. One concern would be how to monitor the legitimacy of the expenditures in the absence of the "market discipline" associated with a new share issue. Furthermore, no system of refundability would be costless to administer. In any case, there is no tax system in the world that grants full-loss offsetting. If full-loss offsetting is either an unattainable ideal or involves monitoring and administration costs, then an *E*-index value of unity is not the appropriate benchmark against which to evaluate the effectiveness of flowthrough shares. If full-loss offsetting is not the appropriate benchmark for comparison, then any capital-market alternative to FTS that provided refundability would also result in a "sharing" of tax benefits such that $E > 1$. Unless full-loss offsetting could be provided costlessly by government, the benchmark *E*-index value would also exceed unity.

One alternative mechanism that would achieve the same objectives as FTS is common shares with refundability. This alternative mechanism would require the firm to finance new exploration activities by issuing new common shares. If the firm was non-taxpaying in the year in which

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[35] Continued . . .
Jenkins' choice of a benchmark, the underlying assumptions he uses, and measurement problems in his analysis; the latter statement fails to recognize the causes of sharing in a well-functioning capital market and the incentive effects of FTS in promoting resource activities.

the expenditures were incurred, the government would refund the full value of tax deductions directly to the firm. Thus, in contrast to FTS, this mechanism would deliver the refund to the firm rather than to the investor. Although no such alternative mechanism currently exists, it can be argued that the premium attached to common shares with refundability (that is, the tax benefits valued at some corporate tax rate) would still be shared between the firm and its investors in a manner similar to the sharing of the FTS premium through the setting of an equilibrium price in capital markets.

COST-EFFECTIVENESS FOR THE INVESTOR

The previous section considered the cost-effectiveness and effectiveness of FTS from the perspective of the issuing firm. This section considers cost-effectiveness from the perspective of the other party to the transaction—the investor or buyer.

We address the question of the cost-effectiveness of FTS for the investor by comparing the rates of return for FTS with the rates of return for alternative equity investment opportunities in mining and oil and gas over the period 1986 to 1990. Three outcomes are possible: the rates of return for FTS over the period either exceeded, fell below, or equalled the rates of return for investments in common shares in the resource sector.

If the rates of return for investment in FTS were positive, on a net-of-tax basis, relative to the rates of return for alternative types of equity investment, then one or more of the following things must have been true: (1) FTS investors paid a premium substantially below the maximum premium; (2) the exploration financed by FTS resulted in relatively attractive ore findings and unexpectedly high prices for the underlying shares; or (3) the share prices of issuing companies increased substantially for other reasons.

Alternatively, if the relative rates of return for FTS were negative, in spite of the FTS' attractive tax features, then at least one of the following statements must be true: (1) FTS investors paid a premium higher than the maximum premium; (2) the exploration financed by FTS was relatively unsuccessful and resulted in unexpectedly low prices for the underlying shares; (3) there were high costs associated with intermediation.

Finally, if the relative rates of return for FTS were close to zero (that is, if they were similar to the rates for alternative equity investments), then the FTS were priced so that neither the investor nor the firm benefited at the expense of the other.

Methodology

Our analysis rests on an evaluation of both the absolute rates of return and the relative rates of return to investors for FTS purchased through broadly based limited partnerships. Since the income-tax consequences associated with FTS significantly affect the returns to FTS investors, our calculations of these results are all net of tax. We limit our analysis to

FTS purchases through limited-partnership intermediaries because these intermediaries were the primary source of FTS funding for resource firms during the late 1980s and offered substantial opportunities for asset diversification and risk reduction to investors.

In determining the absolute rates of return, we assume that the investor purchased units in the limited partnership on the date the FTS were issued and sold the investment on the date the partnership units were converted into units of an associated mutual fund. We adjust the gross-of-tax absolute returns from these investments to take into account both the income tax deductions associated with the investment and the capital gains tax payable by the investor.[36] The calculation of absolute rates of return in this way provides an overall indication of the performance of FTS as such.

We also compare the absolute rates of return from investments in FTS via limited partnerships with the rates of return that FTS investors would have earned had they invested instead in an "average" share in the mining industry or the petroleum industry. This comparison makes it possible to determine the extent to which the absolute rates reflect general trends in stock-market activity. For example, increases in the market prices for precious metals might cause the stock market to rise during the period between the issuance date and the conversion date for FTS issued by a company engaged in the mining of precious metals.[37] In this situation, the rate of return realized by the limited partnerships that invested in the company's FTS would be high regardless of the outcome of the exploration activity financed by those particular share issues. Therefore, any evaluation of the rates of return for such limited partnerships must reflect the general change in the level of share prices. It is the resulting relative rates of return that allow inferences to be made about the quality of investment and, consequently, the performance of the exploration activity financed by FTS.

Finally, we also calculate the relative rates of return that investors realized after the conversion date, when the common-share components of FTS became freely tradeable in the open market. If the investments by limited partnerships in FTS generated attractive exploration results, then these shares should have performed at least as well as an average share in that industry. This comparison allows us to evaluate the intrinsic value of the underlying common shares associated with the FTS and thus provides a third way of evaluating the underlying potential of FTS investments.

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[36] The analysis of rates of return ignores certain complications attributable to the cumulative net investment loss rules.

[37] Chapter 3 of the Department of Finance's *Flow-Through Shares*, supra footnote 5, shows that significant increases in prices for precious metals and for the stocks of precious metal companies did occur during this period.

The Analytics of Rates of Return

All of our rate-of-return calculations assume that the investor is resident in Ontario and in the highest marginal tax bracket. The former assumption reflects the fact that Ontario residents accounted for the largest proportion of FTS claims during the period under consideration (an average for 1989 and 1990 of 34 percent of claims). We adopt the latter assumption because FTS are most beneficial to investors who are subject to the highest marginal income tax rate and therefore are primarily of interest to them. In 1989 and 1990, for example, 71 percent of the investors who made claims in respect of FTS were in the highest tax bracket; they accounted for 90 percent of all such claims. In addition, we take into account both situations in which the capital gains exemption is applicable and situations in which it is not.[38]

We calculate both absolute and relative rates of return for the period between the issuance date and the conversion date, termed the "holding period." During this period, the investor is prohibited, by the regulations of provincial securities commissions or by the limited partnership agreement, from disposing of the original investment. We make no attempt to annualize any of the returns.[39] We also assume, for simplicity's sake, that the tax benefits from investing in FTS were immediately available to the investor on the issuance date. Similarly, we assume that any capital gains taxes that arise on the conversion date were paid by the investor at that time.[40] To allow for differences among investors that may affect the tax benefits attributable to FTS, we calculate four absolute and four relative rates of return for each limited partnership in the sample. These rates of return permit evaluation of both the performance of FTS relative to the performance of common shares and the significance of the various tax deductions. The formulas for deriving the four absolute rates of return are described below.

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[38] The specific marginal income tax rates employed are 52.53 percent for 1987, 46.14 percent for 1988, 47.18 percent for 1989, 48.23 percent for 1990, and 49.11 percent for 1991. These tax rates capture all changes in overall federal and provincial tax rates and include all personal surtaxes. The corresponding inclusion rates for capital gains tax were 50 percent for 1987, 66.67 percent for 1988 and 1989, and 75 percent thereafter. Since statutory income tax rates differ among the provinces, after-tax rates of return would also differ for investors residing in other provinces. In general, the lower the statutory income tax rate, the higher would be (1) the after-tax cost of investment and (2) the after-tax return to the investor arising from to the lower effective capital gains tax rate.

[39] Since the average holding period for FTS issues through these limited partnerships was about 10 months, the associated rates of return closely approximate annual returns.

[40] The investor often receives the tax deduction over the course of several months and makes the investment in the limited partnership in a number of instalments. It can also happen that the investor is unable to sell the shares on the conversion date because such an action would significantly depress the market price. The available data, however, do not allow us to account for these complications.

Absolute Rates of Return

Common-Share Equivalent Return, No Capital Gains Exemption

This rate of return represents the theoretical return that the investor would have earned from an investment in common shares instead of FTS. Accordingly, the calculation of this rate of return assumes that the investor in the limited partnership does not benefit from the tax deductions associated with FTS. In addition, it is assumed that the investor is required to pay capital gains tax on disposition of the common shares. This rate of return provides an indication of the inherent quality of the investment and serves as a benchmark against which to compare the other three rates of return. It is given by the formula

$$R_1 = (1 - i_C t_H)(P_S - P_P)/P_P, \tag{14}$$

where P_P is the price on the date of issuance, P_S is the price on the date of conversion, t_H is the highest marginal tax rate in that year, and i_C is the capital gains inclusion rate.

Common-Share Equivalent Return, Capital Gains Exemption

This formula differs from the first only in assuming that the investor is able to benefit from the lifetime capital gains exemption. Since no capital gains tax is applicable at the conversion date, the rate of return is given by

$$R_2 = (P_S - P_P)/P_P, \tag{15}$$

where the variables are the same as in equation 14.

FTS Rate of Return, No Capital Gains Exemption

The third rate of return formula explicitly accounts for the tax deductions available to the FTS investor and assumes that capital gains taxes are payable on the date of conversion. Thus, the difference between the rate of return in this case and the corresponding common-share rate of return given by equation 14 is attributable entirely to the tax deductions enjoyed by the FTS investor. This rate of return is calculated as

$$R_3 = [P_S(1 - i_C t_H) + P_P t_H D - P_P]/P_P. \tag{16}$$

The first term, $P_S(1 - i_C t_H)$, represents the after-tax proceeds from the sale of the FTS, given the zero adjusted-cost base for the purposes of the capital gains tax. The second term, $P_P t_H D$, represents the tax savings from the investment, where D is the present value of the deductions, grants, and bonus deductions in respect of amounts renounced to the investor per dollar of investment. The tax value of these deductions depends upon the investor's marginal tax rate, t_H.

FTS Rate of Return, Capital Gains Exemption

The rate-of-return formula in this case differs from equation 16 only in assuming that the investor pays no capital gains tax on the proceeds of disposition. The formula is

$$R_4 = [P_S + P_P t_H D - P_P]/P_P. \tag{17}$$

One can compare the rate of return derived from equation 17 with the rate of return from equation 15 to evaluate the tax-benefit component of the FTS.

Relative Rates of Return

Equations 14 through 17 describe the net-of-tax absolute rates of return earned by investors in limited partnerships. Relative rates of return, however, provide a better indication of the investment performance of FTS. Accordingly, the analysis goes on to compare the rates of return earned by investors in FTS through limited partnerships with the rates of return from average shares in the resource industry.

The methodology for these relative comparisons was as follows. First, we classified the limited partnerships by type of resource investment. Second, we collected data on monthly share-price levels and rates of return for the subindustry that corresponded to each category of partnership; the subindustries were based on the Toronto Stock Exchange (TSE) 300 subindices for metals and minerals, gold, and oil and gas. We then determined for each partnership the rate of return in the corresponding subindustry during the partnership's holding period. Thus, each of these subindex rates of return represents the rate of return during the holding period for a typical share in the subindustry that corresponds to each partnership.[41] Finally, we calculated relative rates of return by adjusting each of the four absolute rates of return by the corresponding subindex rate of return.

Postconversion Relative Rates of Return

The approach employed in the previous two subsections assumes that the investors in the limited partnerships in the sample liquidated their investments on the conversion date—that is, the first date possible. Although most of the investors did do just that, it is possible that they would have received a better return had they disposed of their investments at a later date.

In order to test this possibility, we calculated rates of return after the conversion date for each partnership in the sample. We began by collecting monthly share prices for each partnership for each of the 12 months after the conversion date. We then calculated for each month an average share price for all of the sample partnerships. Next, in order to make comparison easier, we converted all share prices to a base price of $100. In addition to simple averaging, however, we also calculated a value-weighted average in order to detect any differences that might occur between the results for large partnerships and those for small ones. Finally, we calculated monthly returns for the corresponding stock-market indices and made adjustments to these market-index values similar to those for the partnership data. The resulting "comparison index" makes it possible to evaluate relative rates of return after the conversion date,

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[41] It can be argued that the FTS partnerships may have risk characteristics different from those of the benchmark indices and hence that risk adjustment may be necessary. No such adjustment is possible, however, since no trading history is available for these partnerships. In any case, analysis of the type conducted here is now widely accepted. See, for example, Jay R. Ritter, "The Long Run Performance of Initial Public Offerings" (March 1991), 46 *The Journal of Finance* 3-27.

given the necessary adjustments for changes in the level of share prices in the corresponding subindustry. No adjustments for tax consequences are required, since these consequences would be the same for the sample partnerships and the comparison index.

Data on Limited Partnerships

We required the following information for each limited partnership included in the analysis: the amount raised by the partnership, the issuance date of the FTS, the type of deductions flowed through, the marginal tax rate of the investor, the date at which the investment became liquid (that is, the conversion date), and the value of the investment on the conversion date. For the purposes of comparison, we also required values for the various benchmark portfolios.

Collection of the required data was not straightforward, since no government agency keeps detailed information on individual FTS issues. The Department of Natural Resources tracks aggregate financing, but does not keep information on the specific details of particular issues necessary for our analysis. Consequently, our main source of data for this section was information for 1989, 1990, and 1991 obtained from *The Financial Post*.[42] Data from this source were available for 44 limited partnerships that invested in FTS during the period 1986 through 1990. These 44 limited partnerships accounted for $1.67 billion of FTS financing. Table 4, which provides a breakdown of the partnerships, shows that the sample is dominated by issues in 1987 and 1988; this result corresponds roughly to the trends in overall FTS activity during the sample period. The smallest partnership in the sample raised $1.2 million (in 1988); the largest, $193 million (also in 1988). The sample partnerships together accounted for over 72 percent of the funds renounced through limited partnerships between 1986 and 1990 and, therefore, may be regarded as a representative sample.

Empirical Results
Absolute Rates of Return

Table 5 provides estimates of the absolute rates of return for each of the five years of the sample period and the sample period as a whole. For each year, the table reports mean and median returns, maximum and minimum returns, and standard deviations. In addition, it reports a value-weighted return for each year, a measure that indicates whether the investment performance of smaller partnerships differed from that of larger partnerships.[43] The four columns in the table list the results for the four rate-of-return categories that correspond to equations 14 through 17.

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[42] The specific source was the "Gingrich Flow-Through Share Chart," which was published on the second Tuesday of every month.

[43] The value-weighted mean returns are calculated by weighting the individual returns by the corresponding amount raised in that partnership. If the value-weighted mean return is higher than the unweighted mean return, the implication is that the returns to larger partnerships were higher than the returns to smaller partnerships.

Table 4   Limited Partnerships in the Sample

	Number of partnerships	Size of funds ($ million)	Relative size of funds (%)
1986	7	230.0	13.8
1987	14	586.6	35.1
1988	14	552.3	33.0
1989	7	178.8	10.7
1990	2	124.2	7.4
Total	44	1,671.9	100.0

Column 1 of table 5 indicates that if the investments in the limited partnerships had had no FTS features (that is, if they had been similar to common shares), then the average rate of return would have been −31.1 percent. These calculations assume that the investor was able to apply the capital losses realized by these partnerships against capital gains from other investments. The results in column 2 show the rates of return for an investor who was able to use the lifetime capital gains exemption. Again, in the absence of any deductions associated with FTS, the share price on the conversion date was considerably lower—by 45.5 percent, on average—than its price on the date of issue. For a typical limited partnership in the sample, then, a $10,000 investment on a before-tax basis had declined to $5,450 by the conversion date.

There is some evidence that earlier issues were more attractive to investors than later ones, a circumstance that suggests a deterioration in the quality of investment (or a relative overpricing of the more recent issues). Average conversion prices were lowest relative to the associated issue prices for issues in 1987 and 1988, for which rates of return were −51.9 percent and −54.4 percent, respectively. Since the median and mean rates of return have similar values, there is no outlier in the sample. The standard deviations, however, show that there is considerable variation in these rates of return. The value-weighted mean rates of return are similar to the average rates, an outcome that suggests an absence of major differences in performance between large partnerships and small ones. Overall, the results indicate that in the absence of the tax value associated with FTS investments in the limited partnerships would have earned significantly negative returns.

Columns 3 and 4 of table 5 show rates of return that include the value of the tax deductions associated with exploration expenses. Column 3 indicates that in the absence of the lifetime capital gains exemption the investment of an equal amount in each partnership in the sample would have earned the investor an after-tax rate of return of 2.1 percent. This positive result occurs primarily because the decline in share value over the holding period was more than offset by the reduction in the after-tax cost of a partnership unit attributable to the tax deductions. In our sample, the average after-tax cost of a partnership unit for an Ontario investor

Table 5 Absolute Rates of Return from Investments in Limited Partnerships

	Common share equivalent return		Flowthrough share return			
	Without capital gains exemption (1)	With capital gains exemption (2)	Without capital gains exemption (3)	With capital gains exemption (4)	Column 3 minus column 1	Column 4 minus column 2
			percent			
1986						
Mean return	−16.5	−22.7	28.2	49.6	44.7	72.2
Median return	−14.6	−21.1	27.7	52.5	43.3	71.5
Standard deviation ..	10.8	14.6	10.9	14.6	4.2	3.4
Minimum return	−35.1	−47.6	10.3	24.1	40.8	69.6
Maximum return	−1.5	−2.0	43.8	69.5	54.0	80.2
Value-weighted mean return	−15.1	−5.5	2.5	5.1	48.4	74.7
1987						
Mean return	−35.9	−51.9	2.0	16.7	37.9	68.6
Median return	−35.5	−51.2	1.7	15.9	37.2	68.0
Standard deviation ..	17.4	25.3	17.3	25.0	2.3	2.9
Minimum return	−54.2	−79.1	−18.3	−11.7	35.1	61.4
Maximum return	17.0	24.6	54.2	92.5	44.0	74.7
Value-weighted mean return	−39.7	−57.3	−1.5	11.5	38.3	68.8
1988						
Mean return	−37.3	−54.4	−9.6	4.7	27.7	59.1
Median return	−36.5	−53.3	−9.4	5.2	27.6	58.8
Standard deviation ..	7.3	10.7	8.7	11.8	3.1	3.1
Minimum return	−50.2	−73.2	−26.4	−17.4	22.7	54.1
Maximum return	−25.8	−37.6	1.3	21.0	35.7	67.1
Value-weighted mean return	−37.4	−54.6	−7.8	6.4	29.6	61.0
1989						
Mean return	−25.1	−39.4	0.7	22.7	25.8	62.2
Median return	−19.8	−31.0	4.9	24.9	25.1	61.3
Standard deviation ..	12.0	18.9	13.2	19.6	5.4	5.5
Minimum return	−49.8	−78.0	−27.3	−19.4	19.7	55.9
Maximum return	−13.3	−20.9	12.0	40.5	37.1	73.9
Value-weighted mean return	−21.4	−33.7	2.3	26.4	23.7	60.1
1990						
Mean return	−24.7	−39.2	−2.3	20.2	22.5	59.3
Median return	−24.7	−39.2	−2.3	20.2	22.5	59.3
Standard deviation ..	6.8	10.8	10.6	14.5	3.8	3.8
Minimum return	−31.5	−49.9	−12.8	5.6	18.7	55.5
Maximum return	−17.9	−28.4	8.3	34.7	26.3	63.1
Value-weighted mean return	−28.6	−45.3	−8.3	11.9	20.3	57.2
1986-90						
Mean return	−31.1	−45.5	2.1	19.2	33.1	64.7
Median return	−33.9	−48.9	1.1	16.5	35.1	65.2
Standard deviation ..	14.8	21.6	18.0	23.8	8.0	6.3
Minimum return	−54.2	−79.1	−27.3	−19.4	18.7	54.1
Maximum return	17.0	24.6	54.2	92.5	54.0	80.2
Value-weighted mean return	−32.8	−47.9	1.1	17.3	33.9	65.2

who was subject to the highest marginal tax rate was 35 percent of the issue price. Like columns 1 and 2, columns 3 and 4 show considerable year-to-year variation in the returns earned by investors; the 1986 partnerships realized returns that were significantly higher than the returns to partnerships formed in other years, and the 1988 partnerships, on average, realized negative returns. Moreover, the standard deviation and the minimum and maximum rates of return all indicate that the returns varied widely from partnership to partnership. Not surprisingly, an investor who could claim the capital gains tax exemption received a higher rate of return—19.5 percent on average—than did one who could not.

A comparison of columns 1 and 3 in table 5 shows the relative advantage from FTS to an investor subject to the capital gains tax. On average, FTS investors received a return that was 33 percent higher than the return from the common-share equivalent. There was, however, a significant decrease in this margin over the five years of the sample period. The returns to investors who participated in partnerships in 1986 were significantly higher than the returns to those who invested in later years.

Similarly, a comparison of columns 2 and 4 shows the relative advantage from FTS to investors with access to the capital gains exemption. Because of the capital gains exemption, the zero-adjusted tax base did not affect the returns to these investors. As a result, the return to the FTS investor in this case was, on average, 65 percent higher than the return from the common-share equivalent. As in the case of the investor not exempt from the capital gains tax, this difference (or the attractiveness of FTS) declined significantly between 1986 and 1990.

These results indicate that the most attractive returns from FTS were earned from investments in the earlier years of the sample period and by investors who had access to the lifetime capital gains exemption. Since the lifetime exemption affected returns from all investments, the most representative results for FTS investments would be those, in column 3, that assume an absence of the capital gains exemption. Given this assumption, the earnings from FTS partnerships were not excessive; on average, the investor earned 2 percent over the period, though the returns were highly variable both between and within years. Correspondingly, if the management costs associated with the limited partnerships were small, then the firms rather than the investors received most of the benefits of the flowthrough measure in absolute terms.

As we indicated above, our results depend on certain assumptions about the tax implications of the transaction and may not reflect the actual returns earned by individual investors. In particular, our results assume three things. The first is that the investor pays the entire amount of the investment on the closing date. Since this is not always the case, the effect of the assumption is to bias the results downward; that is, the actual returns, adjusted for the time-value of money, would be higher than those shown in table 5. The second assumption is that the investor receives an immediate tax credit. To the extent that this is not the case, the assumption biases the results upwards. The third assumption is that the investor pays capital

gains tax on the date of disposal. To the extent that the investor does not do this, the effect of the assumption is to bias the results downward.

It is not possible to determine conclusively whether our results understate or overstate the actual results. The overall bias would depend upon the structure of individual partnerships and the circumstances of the individual investor. Nonetheless, the magnitude of our results is such that the various biases would not materially affect the main conclusion of the analysis—namely, that FTS investments made through limited partnerships between 1986 and 1990 did not produce high returns for the investor.

Relative Rates of Return

The results in table 6 take into account changes in the share prices of an average company in the mining industry or the petroleum industry. That is, they indicate the relative rates of return, net of taxes, earned by limited partnerships during the sample period. Each of the two columns in table 6 shows the difference between what the investor earned through an investment in a limited partnership and what he would have earned had the performance of the underlying shares purchased by the partnership been the same as the performance of an average common share in the same subindustry.[44] Positive values indicate that the limited partnerships invested in shares of companies that performed better than the average share in that subindustry; the reverse is true if the values are negative.

As it happens, all of the mean values given by the table are negative. Thus, the average limited partnership that invested in FTS fared worse than it would have fared had it invested instead in an FTS of a "typical" resource sector company in the same subindustry. Nor is the relatively poor performance by limited partnerships confined to any particular year. Moreover, both the median and minimum values in the table are also very negative; this result indicates that, in relative terms, the investors fared even worse than the mean values would indicate. Given these results, the fact that investors in the partnerships earned high absolute rates of return in 1986 and 1987 (see table 5), must be attributable primarily to high share prices in the resource sector generally during those years, rather than to the performance of the limited partnerships as such. Table 5 showed that the rate of return over the five-year period for an investment in a typical partnership in the sample was 2.1 percent. Investment over the same period in a typical resource-sector share would have yielded a rate of return of −0.1 percent.[45] Thus, in spite of the generous tax deductions associated with FTS, the FTS investor was better off by a matter of only 2 percentage points.

In summary, FTS investments did not earn excessive rates of return. In fact, if one leaves the tax deductions out of the equation, their performance

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[44] Only two columns are shown here, since relative returns based on comparisons of R_1 and R_2 are identical to those based on R_3 and R_4.

[45] Based on a weighted average of matched subindex rates of return.

**Table 6   Relative Rates of Return from Investments in
Limited Partnerships**

	Return relative to investment in average common stock	
	Without capital gains exemption	With capital gains exemption
	percent	
1986		
Mean return	−54.3	−73.8
Median return	−63.9	−86.3
Standard deviation	35.9	48.5
Minimum return	−108.9	−147.6
Maximum return	−1.7	−2.5
1987		
Mean return	−27.2	−39.1
Median return	−25.5	−37.0
Standard deviation	23.4	33.5
Minimum return	−63.3	−92.3
Maximum return	30.4	44.0
1988		
Mean return	−31.3	−45.6
Median return	−27.9	−40.7
Standard deviation	14.7	21.5
Minimum return	−65.3	−95.3
Maximum return	−8.9	−12.9
1989		
Mean return	−20.7	−32.6
Median return	−19.7	−30.9
Standard deviation	16.6	26.0
Minimum return	−55.6	−87.0
Maximum return	0.1	0.1
1990		
Mean return	−9.5	−15.0
Median return	−9.5	−15.0
Standard deviation	6.0	9.5
Minimum return	−15.5	−24.5
Maximum return	−3.5	−5.5
1986-90		
Mean return	−31.0	−44.6
Median return	−26.4	−38.6
Standard deviation	25.0	34.6
Minimum return	−108.9	−147.6
Maximum return	30.4	44.0

was significantly below average: the common shares purchased by the limited partnerships in the sample fared much worse than a typical share in the same subindustry. This outcome could be the result of either poor exploration results associated with the expenditures undertaken by the firms or a relatively high premium paid by the investor, which allowed the firms to undertake exploration at a lower cost.

Post-Conversion Relative Rates of Return

The results in tables 5 and 6 assume that the investor liquidated the investment on the conversion date. Since this was not always the case, it is useful to investigate the consequences of relaxing this assumption. The necessary data were available for only 25 of the 44 sample partnerships, which accounted for 66 percent of the total funds raised by the sample. In a few cases, data for each month were not available; in those cases, we used the average of the prices in surrounding months as a proxy. These cases were very few, and this averaging probably does not materially affect the results.
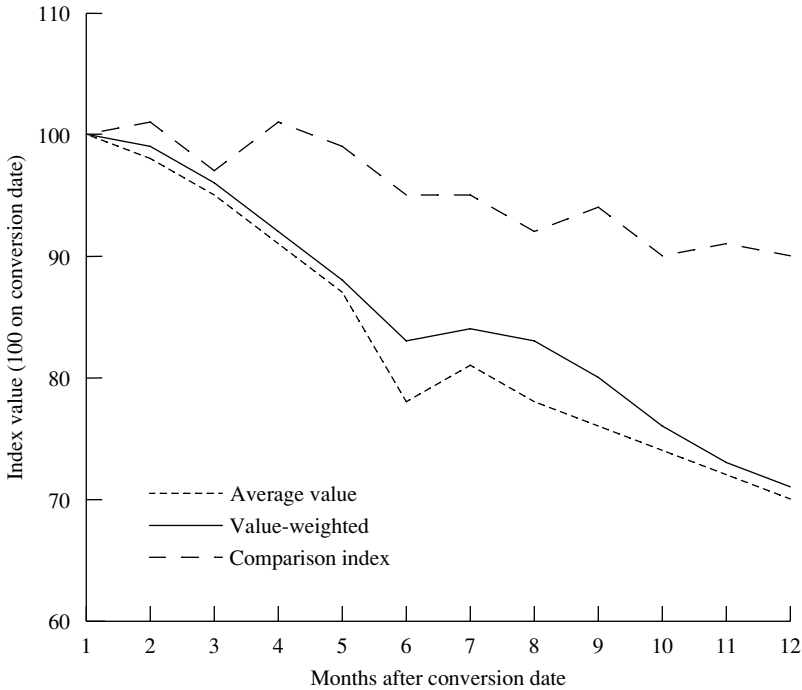
Figure 1 shows the changes over the 12 months after the conversion date in the average price for the 25 partnerships, the price for a value-weighted portfolio, and, for comparison's sake, the price of an average share in the same subindustry.

As the figure shows, the prices of the limited partnership shares continued to fall after the conversion date; by the end of the 12 months, the value of the average investment had declined by 30 percent. The price for the value-weighted portfolio declined as well, by 29 percent; this result indicates that the decline in value was similar for small partnerships and large ones. The comparison index, representing the share price of a typical share in a given subindustry, declined by 10 percent—that is, by 20 percentage points less than either the average price or the price for the value-weighted portfolio. Thus the partnerships fared worse during the first year following conversion than did a typical share in the subindustry. An investor who chose not to sell the partnership shares on or immediately after the conversion date received a lower return than did one who sold the partnership shares and reinvested the proceeds in a typical share in that subindustry. As table 5 showed, the average after-tax return for an investor who sold his shares on the conversion date was 2 percent. This return would have become negative within a month had the investor continued to hold the shares after the conversion date.

SUMMARY AND CONCLUSIONS

The main purpose of this article has been to analyze the effectiveness and cost-effectiveness of the FTS mechanism from the viewpoint of both issuing firms and investors. We did this by developing the concepts of the maximum premium and the theoretical METR, the sharing of tax benefits, and the observed premium and the empirical METR. We provided estimates of sharing and empirical METRs for three actual FTS issues and conducted an analysis of investor returns based on data from a representative sample of FTS partnerships.

Our results have shown that both maximum premiums and theoretical METRs depend entirely on income tax parameters. Owing to the normal functioning of capital markets, the observed premium may be less than the maximum premium and hence the empirical METR may be higher than the theoretical METR. The specific factors that may lead to this outcome include tax-induced investor surplus, incremental liquidity risk,

Figure 1   Portfolio Value After Conversion Date

incremental transaction costs, and the influence of limited-partnership intermediaries.

Comparison of the maximum premium that an FTS investor would in theory be willing to pay with the premium actually observed on capital markets allows estimation of the extent to which the tax benefits associated with FTS are shared between investors and resource firms. A comparison of theoretical and empirical METRs shows how sharing may affect the ability of the tax system to encourage exploration and development by means of FTS. A comparison of the METRs for FTS, retained earnings, and common shares provides indications of the relative cost-effectiveness of each of these three sources of funding and the relative ability of each to encourage exploration and development.

Our results indicate that FTS can be cost-effective for issuing firms and provide significant encouragement to exploration. The actual level of incentive depends on the extent of capital-market sharing, corporate and personal tax parameters, and the opportunity cost to firms of forgone tax deductions. More specifically, theoretical METRs for FTS are lowest, in both absolute and relative terms, for non-taxpaying firms. The theoretical METRs for taxpaying firms, however, can be negative and less than the METRs for common shares. This result implies that FTS can offer

encouragement even to taxpaying firms to increase their exploration efforts. Generally, however, retained earnings are the most cost-effective method of financing exploration for taxpaying firms. Our calculation of illustrative empirical METRs on the basis of observed premiums reinforces the conclusion that FTS provide a significant incentive for exploration by currently non-taxpaying firms in spite of the sharing of the premium between the issuing company and its investors. Furthermore, FTS are a particularly effective delivery mechanism for non-taxpaying firms whose investors are lower-premium clientele.

There is also the matter of FTS as a tax-benefit delivery mechanism. We have shown that the sharing of tax benefits results from the normal functioning of capital markets and that the existence of sharing does not mean that FTS are ineffective in delivering tax benefits to firms. Furthermore, we would argue that the FTS mechanism is as effective as any other equity-based means of financing designed to achieve the same objectives. These conclusions differ significantly from those offered by Jenkins. In our view, the effectiveness measure developed by Jenkins fails to reflect the true nature and intent of the FTS financing mechanism.

Our conclusions about the cost-effectiveness of FTS from an investor's viewpoint are mixed. An analysis of the rates of return earned by investors in certain limited partnerships over the period 1986 through 1990 reveals that the investment performance of FTS was not very attractive. The pricing of FTS may have favoured the investor in 1986, but in later years it favoured the issuing firms or FTS partnerships. If there were no incremental transaction costs associated with issuing FTS, then most of the tax benefits were captured by the issuing firms. Moreover, these benefits accrued to firms whose shares performed relatively worse than did an average share in the corresponding subindustry.