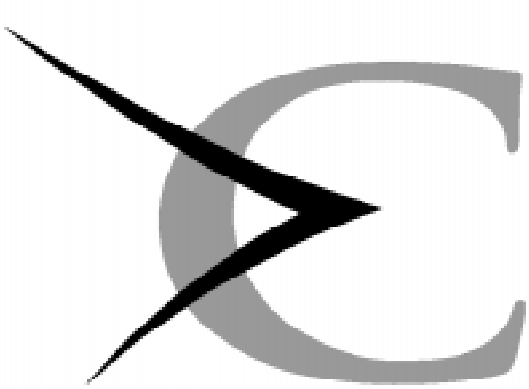


CIRANO

Centre interuniversitaire de recherche
en analyse des organisations

Série Scientifique
Scientific Series

98s-33

Effects of the Fiscal Treatment of Tax Losses on the Efficiency of Markets and the Incidence of Mergers

Michel Poitevin

Montréal
Novembre 1998

CIRANO

Le CIRANO est un organisme sans but lucratif constitué en vertu de la Loi des compagnies du Québec. Le financement de son infrastructure et de ses activités de recherche provient des cotisations de ses organisations-membres, d'une subvention d'infrastructure du ministère de l'Industrie, du Commerce, de la Science et de la Technologie, de même que des subventions et mandats obtenus par ses équipes de recherche. La *Série Scientifique* est la réalisation d'une des missions que s'est données le CIRANO, soit de développer l'analyse scientifique des organisations et des comportements stratégiques.

CIRANO is a private non-profit organization incorporated under the Québec Companies Act. Its infrastructure and research activities are funded through fees paid by member organizations, an infrastructure grant from the Ministère de l'Industrie, du Commerce, de la Science et de la Technologie, and grants and research mandates obtained by its research teams. The Scientific Series *fulfils one of the missions of CIRANO: to develop the scientific analysis of organizations and strategic behaviour.*

Les organisations-partenaires / The Partner Organizations

- École des Hautes Études Commerciales
- École Polytechnique
- McGill University
- Université de Montréal
- Université du Québec à Montréal
- Université Laval
- MEQ
- MICST
- Alcan Aluminium Ltée
- Banque Nationale du Canada
- Bell Canada
- Caisse de dépôt et placement du Québec
- Développement des ressources humaines Canada (DRHC)
- Egis
- Fédération des caisses populaires Desjardins de Montréal et de l'Ouest-du-Québec
- Hydro-Québec
- Imasco
- Industrie Canada
- Microcell Labs inc.
- Raymond Chabot Grant Thornton
- Téléglobe Canada
- Ville de Montréal

ISSN 1198-8177

Effects of the Fiscal Treatment of Tax Losses on the Efficiency of Markets and the Incidence of Mergers*

Michel Poitevin†

Résumé / Abstract

Nous passons en revue dans cette étude les principales questions touchant la transférabilité des pertes fiscales en cas de changement de contrôle d'une entreprise. L'opportunité d'autoriser ou non le transfert des pertes fiscales dépend de l'efficacité du marché des prises de contrôle. Si les prises de contrôle accroissant l'efficacité sont trop peu nombreuses, il convient de les « subventionner ». Si, au contraire, les prises de contrôles sont trop nombreuses (sous l'angle de l'efficacité), il convient de les taxer sous une forme quelconque. Dans un cas comme dans l'autre, le régime de transférabilité des pertes fiscales peut servir à atteindre l'objectif visé. Trois aspects sont abordés ici : (1) l'opportunité d'autoriser le transfert des pertes fiscales en cas de changement de contrôle d'une entreprise; (2) l'opportunité d'autoriser ce transfert uniquement lorsque le type d'activité reste le même; (3) l'opportunité d'autoriser l'utilisation des pertes au même rythme qu'avant la fusion. Ces questions seront analysées dans le contexte du contrôle exercé par les directions d'entreprise, de la concurrence sur le marché des produits, des décisions de financement, ainsi que des décisions d'investissement et de la prise de risque.

This paper surveys the major issues regarding the transferability of tax losses upon a change of control. Whether tax losses should be transferable or not depends on whether the market for corporate control is efficient or not. If there are too few efficiency-enhancing takeovers, then takeovers should be "subsidized". If, on the contrary, there are too many takeovers (from an efficiency point of view), then takeovers should somehow be taxed. In either case, the transferability of tax losses may be an instrument for doing so. Three aspects are considered: (1) whether tax losses should be transferred upon a change of control or not, (2) whether the transfer should be restricted to the same line of business or not, and (3) whether losses should be used at the same speed at which they were (to be) used pre-merger or not. These issues are then discussed in the context of managerial control, product market competition, financing decisions, and investment decisions and risk-taking.

Mots Clés : Pertes fiscales, fusions

Keywords : Tax losses, mergers

---

* Corresponding Author: Michel Poitevin, CIRANO, 2020 University Street, 25th floor, Montréal, Qc, Canada H3A 2A5 Tel: (514) 985-4023 Fax: (514) 985-4039 e-mail: poitevim@cirano.umontreal.ca
This research has appeared as Working Paper 97-13 of the Technical Committee on Business Taxation of the Department of Finance, Government of Canada

† Université de Montréal, CRDE and CIRANO

1 Introduction

It is a well established fact that the asymmetric fiscal treatment of firms' losses and profits introduces distortions in economic decisions. An important question is whether firms can arbitrage away these distortions by any means. Mergers or takeovers may provide one way of eliminating, or at least reducing, distortions due to the tax asymmetry. A firm with accumulated losses can merge with a profitable firm. If this latter firm can use the former's losses against its taxable income, it can reduce its tax bill, and by the same token reduce the distortions induced by the accumulated losses.

This paper surveys the major issues regarding the transferability of tax losses upon a change of control. Four basic areas where distortions could potentially arise are studied: corporate governance and managerial control, competition in product markets, financial decisions, and investment and risk-taking. For each area, the general approach is (1) to detail the economic distortions and inefficiencies and their sources, (2) to study the efficiency with which the market for corporate control acts to reduce these distortions, and finally (3) to ask whether more takeover activity should be encouraged via allowing the transfer of tax losses.

Specifically, three aspects of this issue are studied: 1) whether tax losses should be transferred upon a change of control or not, (2) whether the transfer should be restricted to the same line of business or not, and (3) whether losses should be used at the same speed at which they were (to be) used pre-merger or not.

To answer these questions, it is first necessary to define what tax neutrality is in this context. A global approach would be to define neutrality as the situation where tax losses would be fully refundable, so that all distortions due to tax losses asymmetries would be eliminated. I believe, however, that to address the specific issues set out in this paper with this notion of neutrality would be inappropriate since other aspects of the question of refundability are clearly outside the scope of this paper. For example, even without mergers of firms, tax losses are not fully refundable. I therefore adopt the following narrower definition of neutrality. Neutrality is defined as tax losses being available on the same basis regardless of any takeover activity. As will become clear later, we may want to move away from neutrality for efficiency reasons if the "neutral" situation is inefficient.

Second, the notion of efficiency should also be defined. In this paper, we adopt a notion of efficiency which relates only to the partial environment under study. For example, it may be the case that allowing the transfer of tax losses would improve efficiency in the market for cor-

porate control, but would reduce it globally when taking into account the fact that government revenues would go down and that, probably, distortionary taxes would be needed to make up for the lost revenues. Analyzing such effects is clearly important but beyond the scope of this article.

The next section studies the case of corporate governance and managerial control. Section 3 analyses distortions in product market competition. Section 4 focuses on financial decisions, while Section 5 studies investment decisions and risk-taking. The conclusion follows.

2 Corporate governance and managerial control

It has been known for a long time that the separation of ownership and control in large public companies creates opportunities for managers to divert resources from shareholders and bondholders to themselves (see Berle and Means, 1933). If managers do not own the resources and assets they control, why should they maximize their value? The reply to this question was given by Manne (1965). The threat of takeover or the actual takeover would serve as a disciplinary device to ensure that efficient decision making prevails within the firm. Thus, the market for corporate control would restore economic efficiency. If a manager is misbehaving, a potential raider would immediately spot this inefficiency. He would then buy the firm's stock at a below-value price, restore efficient decision-making, and thus obtain a capital gain on his shares in this firm. The presence of these capital gains would be sufficient to give incentives to raiders to seek economic efficiency.

This argument held for a long time. It was not, however, completely convincing since it implicitly assumed that raiders could better correct inefficiencies than could stakeholders (shareholders and/or bondholders). To understand whether this is an appropriate assumption or not, it is necessary to formally detail what are the sources of the managerial inefficiencies and see how the market for corporate control can correct them. Therefore, more recently, economists have returned to the study of the market for corporate control and made precise what were the inefficiencies induced by the separation of ownership and control. These new studies have shed a new light on our understanding of the market for corporate control.

In this section, I explain how takeovers may or may not improve economic efficiency, and show how the treatment of tax losses can be incorporated in the argument. There are two instances where tax losses

may play a role. First, the asymmetric treatment of tax losses may affect the extent of managerial inefficiencies, which would then feed back on the market for corporate control. Second, the transferability of tax losses affects the market for corporate control per se. These two effects are assessed in the light of modern theories of managerial inefficiencies and the market for corporate control.

There are basically two different theories of the market for corporate control as it relates to managerial inefficiencies. The first theory is the standard one that the separation of ownership and control creates inefficiencies that may be corrected via the market for corporate control which acts as a watch dog, contributing to the improvement of the efficiency of the economy. The second theory argues that the market for corporate control creates a short-term bias in managerial decision-making, thus exacerbating managerial inefficiencies. These two theories produce different conclusions as to whether an active market for corporate control is a good thing or not. I now explain in turn these two theories and relate them to the issue of the treatment of tax losses.

2.1 Managerial inefficiencies and the market for corporate control

The following arguments are mostly due to Grossman and Hart (1980) and Scharfstein (1988). A manager controls a firm's assets which generate a random cash flow. The manager can influence the distribution of this cash flow through his effort and/or efficient decision making. For example, the manager may put more effort into the evaluation of projects to ensure that his decisions are the right ones. Alternatively, the manager may be tempted to invest in projects that are personally important, such as "empire-building" investments, but that are not profitable to the firm. Furthermore, the assets under the manager's control may be worth more to a third party, that is, there may be synergy gains emerging from a takeover by this third party. The value of the assets is thus determined by managerial discretion and potential synergy gains.

A raider who may bring about these synergy gains has gathered a lot of information about the manager's behavior, and he therefore knows whether a takeover is profitable or not. He would like to take the firm over when these synergy gains are positive, that is, when the assets are worth more under his control than under the manager's control. Whether such efficiency is attained depends on informational assumptions about the manager's actions. Before considering different assumptions, it is important to explain how a takeover can take place.

Suppose first that the takeover price is determined through bargain-

ing with the existing shareholders. The price offered by the raider must be such that he expects a capital gain from the transaction. The shareholders know, however, that if a raider has come along, there must be synergy gains to be realized. Given this, why should anyone sell at the offered price if they can appropriate the capital gain by waiting for the raider to take control and implement changes that should increase the firm's value. Grossman and Hart (1980) have argued that a takeover is like a public good that produces value for all shareholders, and that, individually, they all have incentives not to sell, or, in other words, to hold out. Given that they all hold out, no takeover can ever take place with the result that potential synergy gains are not achieved. Grossman and Hart (1980) have argued that corporate charters can be used to dilute the value of a minority share, thus providing incentive for shareholders to tender their shares. The optimal degree of dilution trades off the probability of being taken over with the expected price that such dilution entails. Using the corporate charter, shareholders play the role of a price-setting monopolist that must trade-off a higher price with the probability of selling. We now explain how the market for corporate control works under different assumptions about the information shareholders have about the manager's actions.

Suppose first that shareholders can monitor perfectly the manager's actions. In this case, all managerial inefficiencies are eliminated by shareholders' monitoring and activism. Takeovers can only occur for the realization of synergy gains. For a given degree of dilution chosen in the charter, takeovers will occur for sufficiently large synergy gains that offset the opportunistic behavior of shareholders. In general, there are too few takeovers as the market for corporate control cannot generate all socially optimal takeovers.

Can the fiscal treatment of tax losses improve economic efficiency? First, the asymmetric treatment of tax losses per se is not likely to alter significantly the degree of discretion the manager exerts on the assets under his control. Second, the transferability of tax losses may, however, affect the incidence of takeovers. In this simple example, there is under supply of takeovers. There is, therefore, a case to be made for "subsidizing" takeovers compared to a neutral policy. A neutral policy would restrict the speed of use of tax losses to that prior to the takeover. It may also restrict the line of business in which losses could be used following a takeover. In the present case, an optimal policy should move away from neutrality to encourage more takeovers. Moving towards full transferability of tax losses would be one instrument to increase the financial gains and hence, produce more takeovers. Relaxing restrictions on the speed of use of tax losses should also help. Having a non-neutral

policy is socially desirable. Of course, whether one wants to allow full transferability, or put no restrictions at all on the speed of use, depends on empirical issues that go beyond the scope of this research.

I now turn to the more interesting case where the shareholders cannot or do not monitor the manager's actions, and the raider has the information about the manager's actions. Suppose that the manager has shirked. The price of the firm's share is accordingly low. Shareholders, however, cannot distinguish between the case where the manager has shirked and the case where demand is low. The raider can, however, distinguish between these two cases. The probability of takeover is therefore higher when the manager has shirked. The manager anticipates this outcome on the market for corporate control. Since he gets nothing in the advent of a takeover, he is reluctant to shirk. The threat of takeover therefore disciplines the manager in limiting his discretion over the firm's assets. The key assumption that ensures that takeovers have a disciplinary role is that the raider can monitor the manager's actions, which then makes the occurrence of takeovers correlated with the manager's behavior. This is not an unrealistic assumption as many raiders usually gather firm-specific information about their potential targets before bidding for them.

Is there a policy role for the treatment of tax losses? Again, asymmetric taxation is not likely to play a major role here. Transferable tax losses should affect the probability of a takeover by increasing potential financial gains. Consequently, as in the previous case, subsidizing takeovers by moving away from a neutral policy may enhance economic efficiency since there are too few takeovers in equilibrium. Whether this influences the incentives of the manager to maximize firm's value or not is hard to evaluate. It depends on the distribution of synergy gains, an issue on which it is hard to obtain specific conclusions.

To summarize, the asymmetric treatment of tax losses cannot play a major role in restoring managerial incentives under the threat of takeovers. A non-neutral policy with regards to the transferability of tax losses would increase the number of actual takeovers for synergy reasons, which would be socially desirable. Any judgment along these lines should, however, be deferred until takeovers in the context of product market competition are analyzed. Before doing so, however, I present the other theory of the market for corporate control that emphasizes the short-term bias of financial markets.

2.2 Managerial myopia and the market for corporate control

The informal business press often stresses that pressure from financial markets forces managers into maximizing current earnings to the expense of longer term objectives. This reduces firm value. The argument is even pushed to suggest that this short-term bias puts North American economies at a disadvantage compared with European or Japanese economies where financial pressure is much less, and therefore, where firms maximize long-term value. Even though these arguments were more popular when North American economies were not performing as well as now compared to their foreign rivals, I think they still deserve some attention.

The folk response to the short-term argument was that if a firm was indeed sacrificing long-term gains for short-run profits, it would be taken over by a raider who would restore economic efficiency. Consequently, managerial short-term bias cannot exist when the market itself has no short-run bias. Furthermore, ample evidence of rational financial markets is found in the literature (for a survey of this evidence, see Jensen, 1988).

One potential example of this argument is that financial markets react positively to the announcement that a firm increases its R&D expenditures (its share price increases following the announcement). This is taken as evidence that financial markets correctly value the longer term. Recently, however, Stein (1988, 1989) has convincingly argued that this evidence is not inconsistent with the presence of a short-run bias in managerial decision making. He argues that, if managers focus too much on the short term, more R&D becomes a good signal that the firm is undertaking a long-term investment, and therefore, the stock price should react positively.[1]

Stein's theory is now explained. Two assumptions are essential for this result to hold. First, managers must care about the firm's current share price. This assumption is easy to justify. It may be that the manager is partly compensated by shares of the firm. Or, it may be that the manager needs to finance new investments with equity issues, so that he prefers a higher price to a lower price in order not to dilute too much existing shareholders' ownership. It may also be that the manager is averse to the firm being taken over, and a higher share price minimizes the likelihood of a takeover. The second necessary assumption

[1] I should also point out that I am aware of no empirical study that has tried to test these two competing arguments, which makes the efficiency analysis of takeovers problematic.

is that financial investors do not know the firm's precise value or growth potential. They infer this information from the firm's current earnings.

Under these assumptions, the challenge facing managers is to maximize a weighted sum of today's and tomorrow's share price. To do so, managers can choose projects that have high current earnings but low future prospects, or projects costly in the short run but more profitable in the long run. Stein (1989) shows that the more the manager cares about today's share price, the more he distorts investments in favor of the short run. The manager has a short-run bias which adversely affects the firm's value. In equilibrium, rational financial investors are not fooled and the firm's value is correctly assessed taking into account that the manager has distorted investment. The manager, however, is caught in a kind of prisoner's dilemma. Given the financial investors' expectations that he will boost current earnings, failure to do so will result in investors thinking that the firm has lower value than it really has, thus exacerbating the problem. In equilibrium, it is as if the manager was behaving myopically favoring current earnings rather than maximizing firm's value.

This theory can be related to managerial efficiency and takeovers. The higher the probability of takeovers, the more myopically does the manager behave. Hence, in this theory, takeovers are more detrimental than beneficial to the firm's long-term value.[2]

Stein (1988) considers the trade-off between the synergistic value of takeovers with their cost in terms of managerial short-run bias and asks whether takeovers should be favored or not. He shows that if raiders are informed about the long-term prospects of the firm, takeovers always lead to an improvement in economic efficiency when managers care about the long-term value of the firm.[3] When raiders are uninformed, managers may be tempted to boost current earnings if they expect shareholders to be pessimistic when confronted with a low current share price. In that case, synergy gains are eliminated by the myopic behavior of the manager, and takeovers are detrimental to economic efficiency.

To summarize, "rational" managerial myopia can be motivated by the fact that managers care about a firm's share price and that they are better informed about the firm's long-term value. In such environment, takeovers are generally detrimental to economic efficiency. This conclusion must, however, be qualified once synergy gains are taken into account. Whether takeovers are beneficial or not depends on whether

[2]It should be noted that no synergy gains have been incorporated in the analysis so far.

[3]If they also care about being in control, they may be tempted to boost current earnings (and the current share price) to discourage any raider.

one believes that raiders are usually better informed than other financial investors about the long-term value of the firm. This is surely not an unrealistic assumption.

Is there a role for the treatment of tax losses in this environment? First, it should be noted that given that managers signal their firm's value by boosting current earnings, losses become less likely in equilibrium than if managers were undertaking long-term investments. Second, a non-neutral policy with respect to the transferability of tax losses again can become an instrument for restoring the socially optimal supply of takeovers. Different cases are considered. Without synergy gains, takeovers reduce economic efficiency, which implies that takeovers should be discouraged to reduce managerial myopia. This could partly be achieved by moving away from a neutral policy and restricting the transferability of tax losses upon change of control. Restrictions could then be placed on the line of business and the speed of use of tax losses following the takeover.

When significant synergy gains are present, however, takeovers play an important role in placing assets in the hands of the agents that value them most. As Stein (1988) shows, takeovers play that role optimally as long as raiders are informed of the firm's long-term prospects. If managers value the long run, takeovers are optimal and a neutral policy for the transferability of tax losses is desirable. Losses should be allowed to be transferred to raiders that are likely to have synergy gains with the firm in question. And, tax losses should also be used at the same speed as prior to the takeover. This can be achieved by putting in place a policy similar to that of the U.S. (see Section A.2 in the Appendix for details). The American policy restricts the speed of use of tax losses to that which would have occurred had no takeover taken place. In any given year, losses can only be used up to the acquired firm's fair market value of equity times the long-term return on federal bonds. This implies that losses used cannot exceed the acquired firm's equity value over time. This policy is therefore successful in restricting the speed of use of losses following a takeover.

If, however, managers value control or give value to current share price, then takeovers fail to achieve full efficiency. In that case, a non-neutral policy that moves toward full transferability of losses and relaxes speed of use restrictions may improve economic efficiency by reducing the cost to the raider of taking over the firm.

2.3 Other considerations

In this section, I survey other considerations that are relevant for takeovers.

Shleifer and Summers (1988) have argued that an undesirable consequence of takeovers is that they breach implicit contracts among the firm's stakeholders. Raiders would benefit from the takeovers by "stealing" rents from workers, shareholders or bondholders. If the threat of takeovers is sufficiently high, agents may underinvest in firm-specific human capital for fear of being held up by a raider. In that case, takeovers would generally cause inefficiencies. I do not think this argument should influence public policy regarding takeovers for the following reasons. First, there are many means for breaking implicit contracts, a takeover being but one of them. For example, it has been argued that firms have used outsourcing of formerly vertically integrated activities to steal workers' rents and lower the wage bill. Secondly, golden parachutes have been designed to protect managerial rents in case of a takeover. Consequently, breach-of-trust arguments as put forth by Shleifer and Summers (1988) should not influence tax policy regarding takeovers.

(1986) has argued that an important conflict between managers and shareholders concerns the disposition of the firm's free cash flow. Managers have a tendency to keep resources within the firm by investing in low (or negative) NPV projects rather than pay dividends. Leveraged takeovers can then restore efficiency as debt becomes a commitment to pay out free cash flow to bondholders in the form of interest payments. A firm with free cash flow is likely to have been profitable in the past. Given asymmetric tax treatment of losses, its losses then produce tax refunds. Such tax tratment may then exacerbate the free cash flow problem, and require more drastic solutions.

2.4 Conclusion

What does the efficiency of the market for corporate control teaches us about the optimal policy for transferability of tax losses? The only instances where a non-neutral policy could potentially play a role are the following.

1. If corporate charters set dilution parameters to encourage takeovers and maximize shareholders' gains from doing so, then there are too few takeovers, and they could be encouraged via a non-neutral policy that removes restrictions on line of business and speed of use of losses.

2. If synergy gains are small, takeovers induce myopic behavior and should therefore be discouraged (or not encouraged). Hence, tax losses should not be transferable.

3. If synergy gains are large and raiders are well informed, the occurrence of takeovers is optimal, and the transferability of tax losses is not an issue. A neutral policy is then optimal with line of business restrictions and limited speed of use.

This analysis seems to be in accordance with empirical investigations that show that tax losses do not have a significant impact on the incidence of takeovers (see Auerbach and Reihus, 1988). According to theory, tax losses can only play at the margin. Given that takeovers are costly and that tax losses are usually small compared with these costs and synergy gains, they cannot play a significant role in most cases.

3 Competition in product markets

The analysis of the effects of tax losses on product market competition is split between competitive and imperfectly competitive markets.

3.1 Competitive markets

In competitive markets, Appelbaum and Katz (1987) study the effect of the asymmetric treatment of tax losses on the structure and efficiency of a competitive economy. By assumption, all firms are price takers. The authors show that the asymmetric treatment of losses increases the effective marginal cost the firm is facing. The intuition for this result is the following. When losses are treated symmetrically, firms choose output by equating expected price with their marginal cost of production. When losses are treated asymmetrically (and they can occur with positive probability), firms take into account the fact that losses do not generate a tax refund. They then reduce output to reduce the probability of being in a loss state. Consequently, in the market equilibrium, price is higher than marginal cost even though each firm produces at the minimum of their average-cost curve.[4]

Given that the industry equilibrium is inefficient, is there a role for takeovers to restore efficiency? The answer to this question depends on the definition of neutrality that one adopts. If we use the narrow definition of neutrality, then tax losses should not be transferable upon a takeover since the only inefficiency arises from the economy-wide non-transferability of tax losses.

[4] The equilibrium configuration is similar to one where the product would be taxed. Firms face a higher marginal cost due to the tax and there is an efficiency loss due to the reduction in output.

If, however, one adopts a broader definition of neutrality (that would imply no distortions due to the asymmetric treatment of tax losses), then tax losses transferability upon takeovers may undo (or partially offset) the inefficiency due to the asymmetric treatment of tax losses. This inefficiency implies that industry-wide costs are not minimized at the competitive equilibrium. A restructuring of assets within the industry reduces total costs if tax losses are transferable. Furthermore, removing restrictions regarding the line of business in which they can be used would most likely be efficient. The reason is the following. In competitive industries, losses are more likely to emerge from industry-wide shocks, meaning that the occurrence of losses is correlated across firms. If tax losses are transferable only to firms in the same line of business, takeovers have little effect on efficiency since the losses are not likely to be used by any other firm. There would therefore be too few takeovers. On the contrary, if tax losses are transferable without restrictions, a firm in another industry could take over a firm and use the losses against its profits in unrelated business. Such takeovers would be more likely to occur with a raider and a target for which profits are negatively correlated to maximize the probability of using the tax losses. Finally, the speed of use for losses following the takeover should not be significantly increased in order not to encourage too many takeovers. Since takeovers are costly, however, it may be desirable to increase it slightly to make sure takeover costs do not excessively discourage takeover activity.

As the experience of the 1980's suggests, however, takeovers for the purpose of diversification are not well perceived by financial markets. The general belief seems to be that diversification can be made at the shareholders' level rather than at the corporate level. Can diversification for tax purposes follow the same logic? Not precisely. Shareholders cannot use a firm's tax losses. There are, however, other means of transferring losses such as leasing and preferred share financing (see Jog, 1991, for a recent survey).[5] Whether these means are preferred or not to takeovers is an empirical question. Finally, takeovers in competitive industries should always be closely monitored to ensure that they do not confer market power to any new firm. If one firm gained some market power, the inefficiency that would arise from the exercise of that power would have to be weighed against the efficiency gain arising from the elimination of the asymmetric tax treatment.

To summarize, in competitive industries, to maintain tax neutrality (in a narrow sense), tax losses transferability should not be allowed. A

[5]Jog notes that the use of preferred share financing to transfer tax losses is now subject to more restriction.

broader definition of neutrality may yield a different result, but then it is relevant to ask why not remove the asymmetric treatment of tax losses instead of allowing full transferability upon a takeover if the purpose is to remove tax distortions.

3.2 Imperfectly competitive markets

Two issues are worth discussing in imperfectly competitive markets. First, what is the role of tax asymmetries on the degree of competition and entry in imperfect product markets, and what role can a takeover play in such environment. Second, takeovers can help restructure an oligopolistic industry. Should such restructuring be encouraged or discouraged via tax losses transferability?

Appelbaum and Katz (1996) study the effects of tax asymmetries on behavior and entry in oligopolistic industries. The starting point of their analysis is the fact that tax asymmetries may affect different firms differently (see Jog and Mintz, 1989). The difference comes from the fact that different firms have different profit and loss history which conditions their current tax bill. As is the case with firms in competitive environments, tax asymmetries affect a firm's post-tax marginal cost. If a firm's past profitability affects its marginal cost, it also affects the nature of competition in an oligopolistic industry.

Past profits or losses increase a firm's expected value by reducing current expected tax liabilities. If a firm with past profits incurs losses, it can get a refund on tax paid on past profits, and if a firm with past losses makes profits, it can reduce its tax bill by deducting past losses from its current profits. This means that new firms in an industry are at a disadvantage compared with established firms that are likely to have past profits or losses that may be used against current losses or profits. One may think that tax asymmetries act as a barrier to entry for new firms in an industry. As we will see, this conclusion may be wrong. In some cases, tax asymmetries may put incumbents at a disadvantage compared to an entrant.

I first consider the case where firms fix their prices for long periods of time and thus compete in quantities (Cournot competition). Under Cournot competition, a firm gains from acting aggressively as it forces its rivals to assume a less dominant or aggressive stance. An aggressive firm can then increase its market share to the detriment of its rivals. I then contrast the results with those in an industry where firms compete in prices (Bertrand competition). Under Bertrand competition, a firm does not gain from acting aggressively as it would also induce its rivals to behave aggressively. A firm then has the incentive to increase its price

as it expects its rivals to follow and increase their price also. As we will see, results are sensitive to the nature of competition.

Suppose first that firms compete in quantities. Assume that the incumbent has accumulated past profits. These past profits reduce the burden of the fiscal asymmetry as the incumbent can now get a tax refund if he has current losses. This biases the incumbent's behavior towards favoring the loss region. Consequently, the incumbent can afford to be more aggressive and it produces more. The entrant expecting this aggressivity responds by lowering its own output. Accumulated past profits act as barrier to entry in that they induce the incumbent to be aggressive if the entrant enters the industry. Suppose that accumulated profits are a sign of profitability for an industry. The tax asymmetry is then likely to heighten the level of barriers to entry that make this industry highly profitable.

Suppose now that the incumbent has accumulated losses. As above, these past losses reduce the burden of the asymmetry as the incumbent can now escape taxation if it has current profits. This biases the incumbent's behavior towards favoring the profit region. There are two competing effects. First, the incumbent is less taxed, and it therefore wants to produce more. Second, it favors the profit region, so it wants to reduce the variance of profits by producing less. In general, the overall effect cannot be signed. For a small accumulated loss, the variance-reduction effect dominates and the incumbent reduces output. Losses then have a collusive aspect. The incumbent is then at a competitive disadvantage compared with the entrant. In that case, a small loss acts as an enhancement to entry rather than a barrier to entry. If past losses are an indication of the profitability of an industry, then entry is not as likely in an industry where firms would have accumulated past losses. This case may not be as empirically relevant. If, however, past losses are an indication of tax incentives available in the industry, entry may be likely. In that case, the tax asymmetry would encourage entry beyond tax incentives.

Now suppose that firms compete in prices. When the incumbent has accumulated past profits, the burden of the fiscal asymmetry is reduced as the incumbent can now get a tax refund if he has current losses. This biases the incumbent's behavior towards favoring the loss region. Consequently, the incumbent can afford to be more aggressive: it therefore charges a lower price. The entrant expecting this aggressivity responds by lowering its own price. Again, accumulated past profits act as barrier to entry in that they induce the incumbent to be aggressive in the case of entry. Since entry is more likely in profitable industries (i.e., industries where incumbents have accumulated past profits), the tax asymmetry is

likely to have important effects on entry in this case.

When the incumbent has accumulated losses, the burden of the fiscal asymmetry is lowered as the incumbent can now escape taxation if he realizes current profits. This biases the incumbent's behavior towards favoring the profit region. There are two competing effects. First, the incumbent is less taxed, and it therefore wants to charge a lower price to increase its profits. Second, it favors the profit region, so it wants to reduce the variance of profits by charging a higher price. In general, the overall effect cannot be signed. For a small accumulated loss, the variance-reduction effect dominates and the incumbent charges a higher price. The incumbent is then strategically disadvantaged compared with the entrant. In that case, a small loss acts as an enhancement to entry rather than a barrier to entry. If, however, past losses are an indication of the profitability of an industry, then entry is not as likely in an industry where firms would have accumulated past losses. This case may not be as empirically relevant.

Before discussing tax loss transferability, it should be noted that the above results were derived in a static model of the world. In a dynamic model, the effects of initial conditions often vanish rapidly. Whether they would affect the nature of competition and entry significantly would depend on time preferences and the availability of external financing to smooth out early losses.[6]

Past profits create distortions in oligopolistic industries by artificially affecting the nature of competition.[7] Past profits are likely to favor the incumbent. For example, an entrant with lower costs than an incumbent could still be at a competitive disadvantage if the incumbent has accumulated past profits and the entrant has no profit history. As we saw above, the entrant's effective marginal cost would be higher than the incumbent's, therefore placing the entrant in an adverse strategic position. Small entrants are then strategically disadvantaged not only because their effective after-tax marginal cost is high, but also because the incumbent's is low. In an oligopoly, these two factors make the incumbent strategically aggressive.

Under Cournot competition, entry is then more likely to be successful if the entrant has profits from other lines of business since the existence of past profits makes the entrant more aggressive. The tax asymmetry

[6] I discuss in the next section the interaction between financing decisions and the treatment of tax losses.

[7] Past losses may have opposite effects. I focus on past profits as they probably are the most relevant case to treat when entry is analyzed. Past losses may actually be a signal not to enter an industry, unless they indicate tax incentives available in the industry.

then favors entry by mature firms in unrelated industries. If tax losses are transferable without restrictions, there are also incentives for a profitable firm in an unrelated line of business to take over an entrant. The takeover not only generates tax savings gains, but also gains in terms of market share as the entrant now becomes more aggressive. A potential downside to such takeover, from the point of view of the raider's other businesses, is that the raider sees its accumulated profits for tax purposes be lowered. Depending on the degree and nature of competition in these other industries, this may have adverse strategic consequences which would then have to weighted against the gains. Below, I discuss more specifically these effects.

Under Bertrand competition, an entrant would like to enter without past profits for tax purposes. Past profits would make this entrant more aggressive, which would then force the incumbent to also be more aggressive. In that case, an entrant with past profits would have no strategic advantage over a new firm.[8] Takeovers between a new entrant and a profitable firm in an unrelated line of business are not as likely as under Cournot competition as the tax savings have to be weighed against the lost profitability of the new venture. The potential effects on the raider's other line of business would also have to be taken into account.

Before discussing the optimal policy regarding tax losses transferability (in the next section), I assess whether the presence of transferable tax losses create incentives for mergers between firms with losses and firms with profits or not. The occurrence of mergers is not trivial to analyze in imperfectly competitive markets. If, in competitive markets, a takeover can be evaluated solely on the basis of the tax savings that would accrue to the merging parties, in oligopolistic markets, such analysis is complicated by the fact that the tax status of a firm alters its own behavior and that of its rivals. For example, suppose that an incumbent with past profits takes over another firm with past losses. Suppose that these losses were slightly larger than the first firm's past profits. The aggregate tax status (small losses) of the new entity makes it compete less aggressively than the first firm was competing before. There are two basic cases to consider.

In an industry where firms fix prices for long periods (Cournot competition), rivals compete more aggressively, which is detrimental to the merging firms. Such takeover then has to be evaluated weighing the tax savings against the loss of market power (and possibly market share).[9]

[8] It may nonetheless have cost or financing advantages which are abstracted from for the sake of the argument. See, for example, Poitevin (1989).

[9] The discussion as to whether such takeover is socially beneficial or not is delayed to the end of this section.

The nature of competition in a Cournot industry is likely to reduce the number of mergers for tax purposes.

In an industry where firms adjust prices in the short run (Bertrand competition), such takeovers are more likely to occur. When firms compete in prices, a reduction in a firm's price induces its rivals to also reduce their price. The takeover makes the new entity less aggressive in price competition, thus charging a higher price. Its rivals then respond by also increasing their prices. The resulting equilibrium has firms charging higher prices and earning higher profits. The takeover of the two firms results in a more collusive industry. In that case, the tax savings motive for takeover is reinforced by the increased collusion in the industry. In industries where firms compete in prices, there is an increased motive for merger due to the asymmetric fiscal treatment of losses.

3.3 Effects of mergers in imperfectly competitive industries

As we saw above, mergers in imperfectly competitive industries are likely to have significant impact on the extent of competition. I now step back for a moment and put aside taxation issues to explain the welfare effects of mergers in oligopolies. This is necessary to assess whether merger activity should be taxed or subsidized, possibly through the regulation of the transferability of tax losses.

Farrell and Shapiro (1990) have studied extensively the effect of mergers on welfare in a Cournot industry.[10] At first, a merger may appear to lower welfare in an imperfectly competitive industry as it increases concentration, hence market power. This may be an erroneous conclusion as a merger may help rationalize production in an industry. If all firms have the same constant marginal cost of production, a merger always increases market price and lowers social welfare. If, however, firms differ in their cost of production (a likely outcome in imperfectly competitive industries), a merger may help rationalize production. Keeping aggregate output fixed, a merger may reduce the total costs of production in the industry by shifting some production from a high-cost firm to a low-cost firm. This is not the end of the story, however. Following the merger, firms adjust their behavior to the new industry structure. The contribution of Farrell and Shapiro (1990) is to determine the conditions under which the rationalization effect dominates any market power effect. I now summarize their results and then apply them to our taxation issues.

[10] Social welfare is defined as the sum of consumer surpluses and firm profits.

If a merger generates no cost synergy, then market price increases. In that case, reducing the number of firms only serves to increase market concentration, which results in a higher price. This implies that synergies are necessary for a merger to result in a lower market price. The next step is to show that even if the market price increases following the merger, there are conditions under which social welfare is increasing. When the price increases, consumers are hurt by a takeover as total demand is reduced (and price is above the marginal cost of production of the most efficient firm). Rivals, however, can react to this merger. Since the new merged firm becomes less aggressive than the sum of its parts, rivals increase production, hence their market share and profits.[11] In some cases, this increase in profits is sufficient to outweigh the consumers' losses. For example, if the elasticity of demand is constant and equal to ϵ in absolute value, and if all firms have constant marginal costs, then a (small) merger between firms 1 and 2 that raises the market price is socially desirable if and only if

$$2(s_1 + s_2) < 1 - (1 + \frac{1}{\epsilon}) \sum_{i \in O} s_i^2,$$

where s_i is the pre-merger market share of firm i, and O is the set of outsiders to the merger.

The only mergers that are likely to take place are those which generate positive profits for the merging firms. Merger participants do not take into account the effect of the merger on consumer surpluses and rivals' profits. There is thus an externality that is not taken into account in the decision. The sign of the externality depends on the case at hand. Consider Figure 1. On the vertical axis is the change in profits of the merging firms. On the horizontal axis is the size of the externality on consumers and rivals. All mergers that give an outcome above the negatively-sloped 45° line are socially desirable. Mergers in regions B, C, and D are privately optimal. If antitrust authorities can evaluate the social desirability of a merger, all mergers in region D should be blocked by the Competition Bureau. Mergers in region A do not privately happen given that it is not in the interest of the merging parties to pursue such venture. This implies that, if antitrust authorities can screen for socially desirable mergers, there is an under supply of mergers in a Cournot oligopoly.

The optimal policy for transferability of tax losses should therefore be non-neutral. If tax losses are transferable only to similar lines of business, mergers within the industry would be subsidized and social welfare

[11] Note that this is not inconsistent with the two original firms wanting to merge, since they gain from the price increase.

would be increased when such mergers would take place. Transferability without restrictions would not be an improvement since it would not necessarily encourage mergers that rationalize production. In that case, it would be preferable to restrict the use of tax losses to firms in the same line of business. Relaxing restrictions on the speed of use of tax losses following the merger would also serve to encourage mergers, especially when mergers are costly.

Unfortunately, no welfare analysis seems to exist for firms competing in prices. Such analysis would be complicated by the fact that goods would not be homogeneous.[12]

I now use that intuition to reassess mergers in a Cournot industry when firms face tax asymmetries. As I established earlier, firms have reduced incentives for merging when they want to arbitrage tax bills because of the adverse strategic effect of reducing past profits. As just discussed, without asymmetries, there are likely to be too few mergers for production rationalization in Cournot industries. This only reinforces the argument for a non-neutral policy that allows the transferability of tax losses for mergers in the same line of business (possibly with few restrictions on the speed of use of tax losses by the acquirer).

In Bertrand industries, no general analysis exists of the welfare effects of mergers. Without taking into account the rationalization argument, a (narrowly defined) neutral policy would not allow for the transferability of tax losses as the only other source of inefficiencies is due to the asymmetric treatment of tax losses. Furthermore, mergers of tax losses have anticompetitive effects.

3.4 Conclusion

What does the efficiency of product market competition teaches us about the optimal policy for the transferability of tax losses?

1. In competitive industries, a (narrowly defined) neutral policy is desirable in which no tax losses can be transferred upon a merger.

2. In imperfectly competitive industries, results depend on industrial structure. In Cournot industries, moving away from a neutral policy is desirable to increase the number of welfare-increasing mergers. This can be achieved by allowing tax losses transferability within the same line of business and possibly allow faster use of tax losses by the acquirer.

[12] If they were, the industry would be perfectly competitive.

3. In Bertrand industries, a neutral policy is preferred to avoid anti-competitive mergers (this abstracts from potential synergy gains).

As is often the case in industrial organization theory, conclusions are sensitive to assumptions about industrial structure. It is therefore difficult to assess different policies. Whether firms in a given industry compete in prices or quantities becomes an empirical question, which is clearly outside the scope of this paper.

4 Financial decisions

Tax asymmetries have implications for the optimal financial structure of a firm. Suppose that there are no tax asymmetries. The optimal debt–equity ratio of a decent size firm trades off the corporate tax advantage of debt and the expected bankruptcy costs in the event of default.[13] More debt yields tax savings through the interest rate deductions, while it also increases the probability of bankruptcy. Since bankruptcy can be quite costly in terms of legal fees, lost business, delayed or cancelled investments, firms typically limit the amount of debt they take on. Equity usually provides the remaining necessary financing.[14]

Small and some medium-size firms do not have access to formal equity markets, either for informational reasons or because access to these markets is quite costly. These firms are then financed basically only through debt and bank loans. Furthermore, these small firms often do not generate large enough profits to benefit fully from the interest rate deductions.

4.1 Optimal financial structure with tax asymmetries

With an asymmetric treatment of tax losses, firms with accumulated past losses may face a different trade-off between debt and equity than a firm with past profits. Past losses reduce significantly the current tax bill. Debt then loses its tax advantage. Firms having access to the equity market may reduce their debt–equity ratio to reduce their

[13] There have been numerous refinements and extensions of this basic theory of financial structure. For example, many theories stress the informational role of financial structure and abstract from tax considerations. I do feel that these theories are quite specialized and not necessarily relevant for this paper. Harris and Raviv (1991) provide an excellent survey of recent theories of financial structure.

[14] I abstract here from the issues of personal taxation. In a more complete settings, firms would choose financial policy to minimize the total (corporate and personal) tax bill.

expected bankruptcy costs. This is not a trivial operation, and past losses must be significant before a firm undertakes such venture. A firm with past profits has the opposite incentive of raising its debt–equity ratio since expected tax savings are greater the larger are accumulated profits.

Takeovers are often seen as a means of restoring a firm's optimal financial structure. The wave of LBOs in the 1980s is believed to have been motivated in part by the desire to increase the debt–equity ratio of target firms. Patry and Poitevin (1991) documents a few Canadian cases of hostile takeovers where tax considerations were an important determinant of the takeover decision.

If the asymmetric treatment of tax losses creates distortions in the firm's financial structure, then allowing for the transferability of tax losses is likely to help correct for this distortion. For example, a firm with accumulated tax losses may have to reduce its debt beyond the optimal level. A takeover involving a profitable firm would restore the optimal level as these past losses would be passed on to the raider, thereby restoring the target's incentives to borrow to trade-off the tax savings of debt and the expected bankruptcy costs. There is not a strong case here to put restrictions on the transferability of losses. Optimality of financial structure would dictate allowing transferability without restrictions on the line of business.[15]

A similar logic would hold for a small firm that would have accumulated losses. In that case, the distortions do not result in the wrong debt–equity ratio, since the firm has difficulty financing through equity, but in excessive risk borne by the firm. The transfer of its tax losses to a profitable firm would reduce that risk as it would share in the gains from the tax savings. Again, transferability improves efficiency, and there is not a strong case for restrictions on transferability.

If, however, we stick to the narrow definition of neutrality, then transferability of tax losses cannot be invoked since the only distortions are due to the asymmetric treatment of tax losses. A neutral policy without transferability should therefore be preferred.

Finally, suppose that the preferred tax treatment given to debt financing induces firms to take on too much debt, thereby exposing themselves to a socially inefficient level of risk of bankruptcy (with its associated bankruptcy and agency costs). Then, a non-neutral policy may be an optimal response. It is, however, difficult to assess what this policy should be. On the one hand, not allowing transferability of tax losses would induce a loss firm to take on less debt as it would lose its tax

[15] Below, I consider the strategic aspect of debt which may alter this conclusion.

advantage. On the other hand, allowing transferability may help contribute to reduce the fiscal advantage of debt for firms that would acquire these losses. The first policy would create large asymmetries across firms with respect to the incentives to use debt. The second policy would go towards smoothing out these asymmetries across firms. It becomes an empirical question as to which is socially better.

4.2 The dynamics of financing

The above arguments rest on a static view of the world where default on a loan leads to bankruptcy or at least to a costly reorganization phase. There is a recent literature on dynamic financing models that abstract from these bankruptcy costs to focus on the dynamics of financing, explicitly assuming that even if a firm defaults on its financial obligations, it is still refinanced because, looking ahead, it still has positive net present value. There are two classes of models that consider the problem of financing a risk-averse firm.

In the first class, financial structure matters because neither the firm nor the financier can commit to future transfers. The firm cannot commit to reimburse if bankruptcy is a more profitable course of action, while the financier cannot commit to refinance if it does not expect a high enough return from these new investments. The dynamics of the relationship between the firm and the financier without commitment have been studied by Thomas and Worrall (1988), Gauthier, Poitevin, and Gonzalez (1997) and Kocherlakota (1996a, 1996b). The basic intuition is that the financial contract must ensure that, at any point in the relationship, both parties find it in their own interest not to break the relationship, meaning that the firm reimburses the bank when profits are high, and the bank continues its financing of the firm when profits are low.

The distortions are created in these models by the lack of commitment of the two agents. The nature of these distortions is that the firm cannot insure completely against random shocks to its profits. It is easy to show that the larger the collateral the firm can put up against its loans, the smaller the distortions. As the firm's collateral increases, defaulting becomes less valuable for the firm. It then has more incentives to maintain the relationship, thus improving risk sharing.

Allowing tax losses to be transferable is like increasing the firm's collateral. If these tax losses are lost by the firm (but used by the financier) in the event of bankruptcy, they act as an effective collateral to help the firm secure financing more easily. It should then contribute to reduce risk-sharing distortions created by non-commitment problems.

Again, there is not an issue of whether tax losses are transferred in the same line of business or not. Financing distortions can therefore be alleviated with a non-neutral policy for the transferability of tax losses which creates valuable collateral. Maximal collateral is created when there are few restrictions on the line of business where tax losses can be used and few restrictions on the speed of use of the transferred tax losses.

In the second class of models, distortions in financial structure come from the fact that the financier cannot observe whether the firm is profitable or not. The firm may claim that its profits are low to avoid repaying completely the financier. Incentives to repay are restored by increasing the firm's debt if it does not repay fully today. Green (1987) and Thomas and Worrall (1990) have studied the specifics of this model.

If tax losses are transferable in such environment, they become an alternative source of risk-sharing for the firm. Transferable tax losses are then like "renegotiation" in incentive problems. They would then make truth-telling constraints more stringent, thus increasing the cost of financing of the firm. The same argument would hold in a static model of costly state-verification à la Townsend (1979) or Gale and Hellwig (1985). If you reduce the cost of defaulting by allowing the firm to sell its tax losses, it becomes more difficult to convince the firm to reimburse its debt. It would then be preferable not to allow tax losses transferability.[16]

4.3 Strategic aspects of financial structure

As we saw in the last section, tax asymmetries can affect the nature of competition in oligopolistic industries. It is interesting to combine these results with the literature studying the strategic role of financial structure. Brander and Lewis (1986) have argued that debt could act as a commitment device in a Cournot oligopoly and therefore affect the extent of competition. A firm with a high leverage pursues an aggressive strategy since it figures it has nothing to lose from doing so. Being conservative means almost certain default, while being aggressive is the only chance the firm has of getting ahead. This strategy has been compared to a hockey team trailing by a goal late in the game that decides to pull out its goalie. A firm with high leverage thus behaves aggressively, which, in a Cournot industry, forces its rivals to behave less aggressively. The levered firm can then gain a competitive advantage over its rivals by raising its debt–equity ratio. This is possible under the assumption

[16] I implicitly assume here that only the firm could use these tax losses. If the financial contract forbids the firm from doing so, then transferability of losses becomes a non-issue.

that the firm is committed not to alter its debt-equity ratio ex post once it has been set. This may be a reasonable assumption for firms for which issuing equity is very costly due either to transaction costs or informational asymmetries.

With tax asymmetries, it is not obvious that debt still has the same strategic value. Increasing debt makes it more likely that the firm will realize tax losses since it can deduct interest payments from its taxable income. As we saw in the last section, these losses have a negative strategic value in a Cournot industry. When choosing financial structure, firms therefore trade off the immediate strategic value of debt with the possible future reduction in strategic advantage if the firm realizes losses at the end of the period.

In such case, being able to transfer losses to a firm in a different industry would mitigate that second effect and potentially restore the strategic value of debt. This may be seen as welfare improving since it results in a more competitive industry with a lower price. But since this last effect is solely due to the asymmetric treatment of tax losses, this would go against our definition of a narrow neutral policy which would favor here not allowing transferability of tax losses.

4.4 Conclusion

A neutral policy for transferability of tax losses is socially optimal in static theories of financial structure and in dynamic theories of financing under asymmetric information. A non-neutral policy is optimal when firms and financiers face commitment problems. Transferable tax losses can then act as a valuable collateral that reduces the commitment problem and improves risk sharing. In that case, transferability should not be restricted to the same line of business, and the speed of use of losses may be an instrument that increases the value of the collateral. It is therefore not clear that the speed of use should be the same as before the transfer. Finally, in a global context, it is important to remember that the preferred treatment of debt may induce distortions of its own that may be alleviated by an appropriate policy on transfers of losses, as is discussed at the end of Section 4.1.

5 Investment and risk-taking

The impact of the asymmetric treatment of tax losses and profits on investment decisions and risk-taking has not been studied extensively by economists. Before explaining the results that appear in the literature, it

is useful to explain why the fiscal asymmetry can affect behavior beyond what has already been presented in earlier sections.

When profits and losses are treated asymmetrically, risk-neutral firms have a non-linear after-tax profit function in terms of pre-tax profits. It is composed of two linear segments: one for the taxable region, the other for the non-taxable region. Since firms face different marginal tax rates over these two regions, the function becomes non-linear. If, as is usually the case, profits are taxed while losses are not tax-refunded, the after-tax profit function is concave. The fiscal asymmetry makes a risk-neutral firm risk-averse. Intuitively, a firm facing an asymmetric tax schedule should behave similarly to a risk-averse firm. This is the essence of the result that we find in the literature.

Auerbach (1986) studies the dynamics of investment under an asymmetric tax schedule. Losses are not tax-refunded but can be carried forward. He first studies an income tax where economic depreciation of an investment is deducted against the income of that investment. He shows that regardless of accumulated losses, investment is always smaller than under a symmetric tax schedule. Furthermore, investment is sensitive to the amount of tax losses that the firm has. The higher the losses are, the larger is the investment. In the limit, as losses become infinite, investment is arbitrarily close to the investment under symmetric taxation. There are two ways of explaining this result. First, since losses are not tax-refunded, losses are more costly after tax than profits are profitable. The marginal benefit of investment is then reduced, which implies that the firm reduces its investment. Second, since the firm is effectively risk-averse, it wants to reduce the variance of firm value, which is achieved through a reduction in its investment.

Under a cash-flow tax, investment is immediately expensed if current profits are large enough. Results are then different. Firms choose their investment trading off future after-tax returns with current tax savings. If current profits are high, firms have a tendency to overinvest to get an immediate tax deduction. Thus, when current profits are high, firms invest more than under symmetric taxation. When, however, current profits are relatively low, firms underinvest by the same logic as under an income tax.

These results imply that the way firms deduct their investment expenditures affects significantly their investment policy. It is therefore important to assess taxation policy considering simultaneously the asymmetric treatment of tax losses and investment tax credits (see Mintz, 1991, for arguments along these lines).

The above analysis does not take into account the fact that firms can mitigate some of these effects through an offsetting financial policy.

Basically, if, due to tax losses, a firm reduces its value by changing its investment, it can use its financial policy to offset these effects by effectively endogenizing its tax losses through an appropriate combination of debt and equity. Alternatively, because tax losses make firms risk averse, the firms may seek financing to diversify this risk. Mayer (1986) has shown that a firm could effectively maintain an optimal investment policy (i.e., the same as under symmetric taxation) by judicious adjustment to its financial structure. If one believes that asymmetric taxation affects investment and risk taking, it remains to be explained why firms do not use financial policy to eliminate investment distortions.

Corporate finance theory can answer this question. Informational asymmetries, agency costs, and incentives all have an impact on financial policy. It is therefore likely that firms cannot completely offset investment distortions. Furthermore, empirically, debt–equity ratios are far less volatile than tax losses. We can then conclude that asymmetric taxation does influence investment.

It is not obvious whether small firms are more affected than larger firms or not. On the one hand, small firms do not have the financial flexibility to offset investment distortions. On the other hand, however, as Auerbach (1986) shows, investment is increasing in the amount of tax losses. Since small firms are more likely to have larger losses, their investment may be less distorted. Furthermore, small firms face a lower nominal tax rate than do larger firms. It may well be the case that small firms' investment policy is less distorted than larger firms'.

An important aspect of this literature that does not appear to have been studied is the macroeconomic implications of tax asymmetries. As shown by Auerbach (1986), investment is more variable under an asymmetric tax regime than under a symmetric one. If losses are correlated across firms and industries, it may be the case that tax asymmetries have a countercyclical effect on the economy. In a downturn, many firms would have experienced losses, which would then reduce their implicit marginal tax rate, and therefore increase their investment. So firms would tend to invest more in recessions. It would be interesting to study the smoothing role of tax asymmetries in a real-business cycle model.

Is there a role for tax losses transferability? As in the previous section, tax asymmetries create distortions which may be reduced when firms pool profits. In the limit, when the aggregate risk is low, a coalition of all firms would have positive profits with near certainty, and would thus not be subject to the fiscal asymmetry. So, if losses are transferable without restrictions, distortions can be eliminated with greater probability. It should be stressed, however, that the takeover mechanism is a very imperfect mechanism to reduce these distortions, namely because

it is subject to other imperfections that were discussed earlier. But these considerations should not be taken into account if one adopts the narrow definition of neutrality since the only distortions arise from the asymmetric treatment of tax losses.

6 Conclusion

This paper has surveyed the current literature on tax asymmetries and mergers to understand the efficiency consequences of allowing or not the transferability of tax losses upon a change of control. Economic theory leads to mixed conclusions regarding the transferability of losses. A non-neutral policy is generally optimal if there are too few or too many takeovers. In these cases, policy with respect to transferability of tax losses can be used to encourage or discourage takeovers and thus improve economic efficiency. I refer the reader to the end of each section for more specific conclusions.

References

[1] Appelbaum, E. and E. Katz (1987) "Asymmetric Taxation and the Theory of the Competitive Firm Under Uncertainty," *Canadian Journal of Economics* **20**, 357–369.

[2] ——(1996) "Corporate Taxation, Incumbency Advantage and Entry," *European Economic Review* **40**, 1817–1828.

[3] Auerbach, A.J. (1986) "The Dynamics Effects of Tax Law Asymmetries," *Review of Economic Studies* **53**, 205–225.

[4] Auerbach, A.J. and D. Reishus (1988) "The Effects of Taxation on the Merger Decision," in Auerbach, A.J., ed., *Corporate takeovers: Causes and Consequences*. University of Chicago Press, Chicago.

[5] Berle, A. and G. Means (1933) *The Modern Corporation and Private Capital*. The Macmillan Co., New York.

[6] Brander, J.A. and T.R. Lewis (1986) "Oligopoly and Financial Structure: The Limited Liability Effect," *American Economic Review* **76**, 956–970.

[7] Couzin, R. (1991) "Current Tax Provisions Relating to Deductibility and Transfer of Losses," in *Policy Options for the Treatment of Tax Losses*. Clarkson Gordon Foundation.

[8] Farrell, J. and C. Shapiro (1990) "Horizontal Mergers: An Equilibrium Analysis," *American Economic Review* **80**, 107–126.

[9] Gale, D. and M. Hellwig (1985) "Incentive Compatible Debt Contracts: The One-Period Problem," *Review of Economic Studies* **52**, 647–663.

[10] Gauthier, C., M. Poitevin, and P. González (1997) "Using Ex Ante Payments in Self-Enforcing Risk-Sharing Contracts," forthcoming, *Journal of economic Theory*.

[11] Green, E. (1987) "Lending and the Smoothing of Uninsurable Income," in Prescott, E.C. and N. Wallace, eds., *Contractual Arrangements for Intertemporal Trade*. Minnesota Press.

[12] Grossman, S.J. and O.D. Hart (1980) "Takeover Bids, the Free-Rider Problem, and the Theory of the Corporation," *Bell Journal of Economics* **11**, 42–64.

[13] Harris, M. and A. Raviv (1991) "The Theory of Capital Structure," *Journal of Finance* **46**, 297–335.

[14] Jensen, M.C. (1986) "Agency Costs of Free Cash Flow, Corporate Finance and Takeovers," *American Economic Review* **76**, 323–329.

[15] ——(1988) "Takeovers: Their Causes and Consequences," *Journal of Economic Perspectives* **2**, 21–48.

[16] Jog, V. (1991) "Leasing, Preferred Shares, Financial Innovations, and Tax Loss Utilization," in *Policy Options for the Treatment of Tax Losses*. Clarkson Gordon Foundation.

[17] Jog, V. and J. Mintz (1989) "Corporate Tax Reform and its Economic Impact: An Evaluation of the Phase 1 Proposals," in Mintz, J. and J. Whalley, eds., *The Economic Impacts of Tax Reforms*. Canadian Tax Foundation.

[18] Kocherlakota, N.R. (1996a) "Consumption, Commitment, and Cycles," *Journal of Monetary Economics* **37**, 461–474.

[19] ——(1996b) "Implications of Efficient Risk-Sharing Without Commitment," *Review of Economic Studies* **63**, 595–609.

[20] Manne, H.G. (1965) "Mergers and the Market for Corporate Control," *Journal of Political Economy* **73**, 693–706.

[21] Mayer, C. (1986) "Corporation Tax, Finance, and the Cost of Capital," *Review of Economic Studies* **53**, 93–112.

[22] Mintz, J. (1991) "Economic Implications of Non-Refundability of Tax Losses," in *Policy Options for the Treatment of Tax Losses*. Clarkson Gordon Foundation.

[23] Patry, M. and M. Poitevin (1991) "Hostile Takeovers: The Canadian Evidence," in Waverman, L., ed., *Corporate Globalization Through Mergers and Acquisitions*. University of Calgary Press.

[24] Poitevin, M. (1989) "Financial Signalling and the 'Deep-Pocket' Argument," *Rand Journal of Economics* **20**, 26–40.

[25] Scharfstein, D. (1988) "The Disciplinary Role of Takeovers," *Review of Economic Studies* **55**, 185–199.

[26] Shleifer, A. and L. Summers (1988) "Breach of Trust in Hostile Takeovers," in Auerbach, A.J., ed., *Corporate Takeovers: Causes and Consequences*. University of Chicago Press, Chicago.

[27] Staff of the Joint Committee on Taxation (1987) *General Explanation of the Tax Reform Act of 1986*. U.S. Government Printing Office, Washington.

[28] Stein, J.C. (1988) "Takeover Threats and Managerial Myopia," *Journal of Political Economy* **96**, 61–80.

[29] ——(1989) "Efficient Capital Markets, Inefficient Firms: A model of Myopic Corporate Behaviour," *Quarterly Journal of Economics* **104**, 655–669.

[30] Thomas, J. and T. Worrall (1988) "Self-Enforcing Wage Contracts," *Review of Economic Studies* **55**, 541–554.

[31] ——(1990) "Income Fluctuations and Asymmetric Information: An Example of a Repeated Principal-Agent Problem," *Journal of Economic Theory* **51**, 367–390.

[32] Townsend, R. (1979) "Optimal Contracts and Competitive Markets with Costly State Verification," *Journal of Economic Theory* **21**, 265–293.

APPENDIX

In this Appendix, I provide a short summary of the main aspects of the fiscal treatment of tax losses for Canada and the United States. For additional details, Couzin (1991) provides an excellent non-technical presentation of the various features of the Canadian law.

A.1 Canada

The tax base for corporations in Canada is income (as opposed, for example, to gross revenues). This implies that a negative tax base becomes a definite possibility. Various issues arise regarding the fiscal treatment of income losses. First, when can losses be aggregated with positive income from other sources to reduce taxable income. This issue arises within the same accounting period across activities, and across accounting periods. Finally, the issue of refundability of tax losses is a major concern. If positive income is taxed, should negative income bear a negative income tax? I now review some legal aspects relating to these issues.

The first step is to calculate business income. It is gross revenues from which various deductions can be subtracted. There are some peculiarities that should be mentioned here. For example, interest payments on debt are deductible while dividend payments on equity are not tax deductible. Also, some equipment may be subject to accelerated depreciation for tax purposes. Firms are allowed generous write-offs for R&D expenditures. The resource sector also benefits from preferential tax treatment, namely for exploration expenses. These measures were introduced to stimulate investment in certain sectors of activity, or focus investment in certain areas (such as R&D). These deductions mean that negative business income is more than a theoretical curiosity.

In general, aggregation of business incomes across activities within the same firm is allowed subject to the provision that capital losses can only be applied against capital gains. Aggregation through time is subject to the following limits. Business losses may be carried back three years and forward seven years. Capital losses may be carried back three years and forward indefinitely. Such aggregation allows a kind of refundability, although not at full value since carryforwards do not bear interest and the probability of realizing on a carry forward is generally less than one. It is important to point out that carryforwards can effectively be more than seven years if businesses in a loss status delay some expenses such as depreciation until they become taxable again.

Another way of getting a tax refund is to transfer tax losses from a non-taxable firm to a taxable one. There are four ways of doing so. First, agents can use statutory transfers. In the resource sector, firms can use

flow-through shares to finance exploration expenditures. Such equity financing allows the subscriber to deduct the share price from its taxable income if the issuer has renounced to its deductions on exploration expenses. A non-taxable issuer can therefore raise equity financing at a favorable after-tax price since subscribers get a generous tax deduction by investing in these flow-through shares.

Second, agents can use non-statutory transfers. The general principle is that a non-taxable firm raises capital at an advantageous after-tax cost of funds by providing investors access to some of its deductions or credits. For such a transaction to benefit from this favorable tax status, it has to be the case that it cannot be viewed as a disguised loan. A simple example would be subscribers that borrow to invest in shares of a project. They benefit from the interest deduction while the non-taxable firm would not be able to do so. Leasing of equipment is another mean of transferring deductions. Leasing, however, is subject to the restriction that capital cost allowances cannot create losses that would be applied against positive income elsewhere in the corporation (unless leasing is the main business activity).

Third, the sale of a corporation can allow the transfer of tax losses subject to the restrictions that such losses can only be used in a similar line of business and that the acquirer buy more than 50% of the voting shares of the sold corporation. It should also be mentioned that capital losses are not transferable to the acquiring party. Furthermore, the fiscal year of the acquired company ends on the day of change of control such that current losses are treated as the previous year's losses.

Finally, given the differential fiscal treatment of interest payments and dividends, firms may implicitly transfer tax losses by changing their financial structure and paying dividends instead of interest payments.

As stated above, this is a very succinct summary of some of the legal aspects of the fiscal treatment of tax losses. More details are provided in Couzin (1991).

A.2 United States

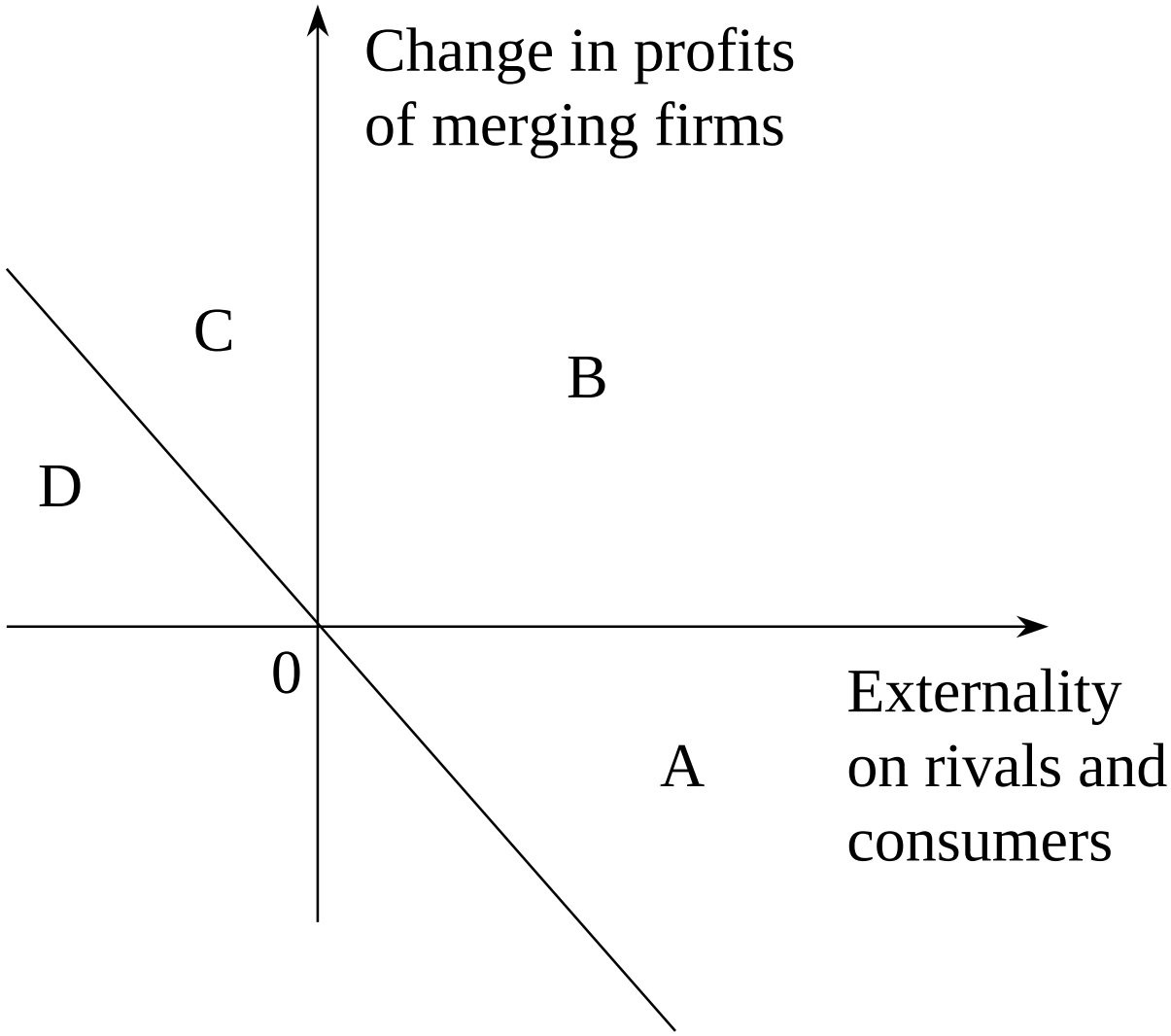
This summary is based on *Joint Committee on Taxation* (1987). The basic principle guiding the American fiscal treatment of losses is that the law should help preserve the needed averaging function over time to reduce distortions caused by the annual accounting system. The law would not then place at a disadvantage firms for which profits are highly volatile. Upon change of control, this principle implies that the law should put limitations on carryover against income earned in unrelated lines of business since the contrary would not serve the averaging function. Upon change of control, the American legislator has therefore opted for imposing limitations on the sources of income against which losses

can be carried over rather than increasing time limitations for which these losses could be used.

Any net operating loss can be carried back three years and forward, fifteen years. Upon change of control (see *Joint Committee on Taxation,* 1987, for a detailed description of what is effectively a change of control), there is an annual limitation on the amount of losses that can be carried forward to the profitable firm (it could be the acquirer or the target). The maximum allowed amount is equal to the pre-acquisition fair market value of the loss corporation's equity times the long term return on federal government bonds. The purpose of this limitation is to ensure that, following a change of control, losses are used at the same speed as they would have been without the change.

There is a limitation to the extent to which losses can be carried forward. The new venture should pass the "continuity of business enterprise" test requiring that a significant portion of the acquired assets be used in a business activity at all times for a two-year period following the ownership change. This implies that, either the loss corporation is pursuing its historic business, or its assets are used in a business activity following the ownership change.

FIGURE 1


Change in profits
of merging firms
C
B
D
0
A
Externality
on rivals and
consumers

Liste des publications au CIRANO *

Cahiers CIRANO / *CIRANO Papers* (ISSN 1198-8169)

96c-1 Peut-on créer des emplois en réglementant le temps de travail ? / Robert Lacroix

95c-2 Anomalies de marché et sélection des titres au Canada / Richard Guay, Jean-François L'Her et Jean-Marc Suret

95c-1 La réglementation incitative / Marcel Boyer

94c-3 L'importance relative des gouvernements : causes, conséquences et organisations alternative / Claude Montmarquette

94c-2 Commercial Bankruptcy and Financial Reorganization in Canada / Jocelyn Martel

94c-1 Faire ou faire faire : La perspective de l'économie des organisations / Michel Patry

Série Scientifique / *Scientific Series* (ISSN 1198-8177)

98s-32 Travail pendant les études et abandon scolaire : Causes, conséquences, et politiques d'intervention / Marcel Dagenais, Claude Montmarquette, Daniel Parent, Benoit Durocher et François Raymond

98s-31 Collusive Allocation of Tradeable Pollution permits / Ngo Van Long et Antoine Soubeyran

98s-30 Pollution, Pigouvian Taxes, and Asymmetric International Oligopoly / Ngo Van Long et Antoine Soubeyran

98s-29 Quadratic M-Estimators for ARCH-Type Processes / Nour Meddahi et Éric Renault

98s-28 Explaining Sales Pay Strategy Using Agency, Transaction Cost and Resource Dependence Theories / Michel Tremblay, Jérôme Côté et David B. Balkin

98s-27 The Moderating Effect of Job Characteristics on Managers' Reactions to Career Plateau / Michel Tremblay et Alain Roger

98s-26 Une étude internationale sur la contingence de l'efficacité perçue des politiques de rémunération / Michel Tremblay, Bruno Sire et Denis Chênevert

98s-25 Resources Dynamics and Endogenous Property Rights Regimes / Ngo Van Long et Huilan Tian

98s-24 Plafonnement objectif et subjectif de carrière, satisfaction et stress au travail / Alain Roger et Michel Tremblay

98s-23 The Role of Organizational Justice in Pay and Employee Benefit Satisfaction, and Its Effects on Work Attitudes / Michel Tremblay, Bruno Sire et David Balkin

98s-22 What Data Should Be Used to Price Options? / Mikhail Chernov et Eric Ghysels

98s-21 Using a Financial Training Criterion Rather than a Prediction Criterion / Yoshua Bengio

98s-20 Inférence fondée sur les statistiques des rendements à long terme / Cosme Vodounou

98s-19 Structural Change Tests for Simulated Method of Moments / Eric Ghysels et Alain Guay

98s-18 Managing the Risk of IT Outsourcing / Benoit A. Aubert, Sylvie Dussault, Michel Patry et Suzanne Rivard

---

* Vous pouvez consulter la liste complète des publications du CIRANO et les publications elles-mêmes sur notre site World Wide Web à l'adresse suivante :
http://www.cirano.umontreal.ca/publication/page1.html