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TAXES AND THE MERGER DECISION: AN EMPIRICAL ANALYSIS

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ABSTRACT

One motive that is often cited for merger activity is the avoidance of federal income taxes by corporations and their shareholders. Yet there is little empirical evidence on the tax consequences of merger activity, or on the postmerger effects on firm policies of tax motivated mergers.

In this paper, we present some initial results based on a large sample of mergers and acquisitions that occurred over the period 1968-83. We find that, in about one fifth of all mergers, there was a potential gain from the transfer of unused tax losses and credits, with an average value of approximately ten percent of the acquired company's market value. Other tax incentives to merge are also measured, but found to be less important quantitatively.

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1. INTRODUCTION

There are many economic explanations for the acquisition of one firm by another, or for the combination of two firms through a merger. Some, such as synergy, better organization of production or the improvement of the management of one of the firms, are associated with the generation of social benefits through more efficient resource allocation. Others, such as increased market power and managers seeking empires, are associated with private gains that may very well be more than offset by the losses of others in society. Hence, it is important that motives underlying a merger be understood for a judgment to be made about its social desirability.

One particular motive that is often cited as generating private rather than social gains is the avoidance of federal income taxes by corporations and their shareholders. At first blush, it may seem that merging for tax reasons alone must be socially undesirable, since it leads to a revenue loss that must be made up with distortionary taxes on others in the economy. It must be noted, however, that reducing their own taxes, combining firms may also facilitate more efficient behavior on their own part. For example, wiping out tax losses may increase the incentive to invest, particularly in the presence of a system of accelerated depreciation[1]. Hence, there can be no presumption that merging for tax purposes reduces aggregate economic efficiency. Nevertheless, there are many cases in which the tax benefits are essentially

lump sum transfers to the merging firms; such outcomes cause concern and generate proposals for policy action.

The recent rise in merger activity, coupled with frequent publicity about tax benefits generated by some of these mergers, has provided an impetus for such proposals. One plan currently under Congressional scrutiny would substantially reduce the tax benefits gained from merging[2]. Yet there is little empirical evidence on the tax consequences of merger activity, or on the postmerger effects on financial and investment policies of tax motivated behavior. Indeed, though there have been theoretical analyses over the years of the tax benefits to be derived from different types of mergers and acquisitions[3], there have been, to our knowledge, no serious attempts to evaluate the importance of these incentives beyond the consideration of particular mergers. From a policy standpoint, it is important to know not only what the potential tax benefits are, and what benefits certain companies have been able to avail themselves of, but also the aggregate importance of such incentives. This requires a broader empirical investigation than the case study method permits, one which considers enough mergers so that patterns can be discerned.

In this paper, we present some initial results based on a large sample of mergers and acquistions that occurred over the period 1968-83. Our aim is to assess the potential tax benefits that these merging firms could have gained in the process, and to take a preliminary look at one of the distortions to firm behavior often associated with the acquisition process, increased leverage of the combined entity. The analysis is largely descriptive, in that we do not estimate behavioral models to measure the relationship between tax

incentives and merger activity. In the future, we hope to determine the extent to which tax factors induce mergers by comparing the tax characteristics of pairs of firms that choose to merge with those that do not. This work will require considerably more data preparation than has been done for the results reported below. However, in developing behavioral models an important first step is to establish the potential importance of tax factors in the merger decision, and to see whether the change in financial policy hypothesized to come from tax motivations (i.e., increased leverage) is present in the data.

The paper's next section reviews the tax treatment of mergers and discusses the various ways in which taxes can be reduced when two firms combine. Section 3 describes the data set which we have constructed from a variety of public sources. Section 4 presents the empirical methodology and the results themselves. In the final section, we interpret these findings, discuss their limitations, and consider directions for future research.

Our results suggest that potential tax benefits associated with the relaxation of constraints on the use of tax losses and tax credits are present in approximately one in five mergers and acquisitions. In about one-third of this subsample, the benefits may exceed 10% of the acquired company's market value. There is less evidence of substantial gains being available through the achievement of higher asset bases and associated tax deductions, though this measure is not calculated very precisely. Finally, we find little evidence, for the pre-1984 sample period studied, that significant changes in leverage are associated with mergers and acquisitions, even when acquired companies are large relative to those making the acquisition.

2. TAXES AND MERGER ACTIVITY

In this section, we discuss the key tax provisions involved when firms combine through a merger or an acquisition. This discussion is not exhaustive, in that it does not touch on every section of the Internal Revenue Code that might be relevant to a particular merger. It is intended to highlight the tax factors that are likely to arise in any merger.

An ambiguity that must be addressed at the start is that in determining whether merger activity is encouraged by the tax code, it is important to know what the best alternative activity would be in the absence of a merger. For example, the tax law may favor a merger relative to the continued operation of the two firms in question, but might be neutral with respect to the merger choice if the alternative were that the target firm liquidated in the absence of a takeover. Likewise, a cash acquisition might be favored relative to the retention of earnings, but not relative to repurchases of the firm's own shares. In most situations, mergers are associated with tax benefits that may be potentially available without the occurence of a merger. Here, one must carefully assess whether the costs of achieving such benefits are reduced substantially when a merger occurs.

A. Stockholder Taxation

Shareholders can receive many forms of payment when they sell their shares as part of a merger or acquisition. If they receive cash or stock as part of a taxable transaction, they must pay capital gains taxes on the

difference between sale price and basis. If they receive voting stock as part of a tax-free reorganization, they carry over the basis on their old stock and defer capital gains taxes until the new stock is sold. If they receive debt as part of an installment sale, they are not taxed until the deferred payments are received.

From a tax standpoint, some types of transactions are better than others. Compared to the taxable receipt of voting stock, for example, the receipt of such stock with taxes deferred is obviously better. Likewise an installment sale allows sellers to defer taxes on payments until they are received even though the purchaser establishes a liability immediately for the amount that must be put aside to satisfy the debt. This has the effect of allowing the seller to accumulate interest tax free on unreceived portions of the sale price. Thus, it is preferable to a straight sale for cash.

In comparing a cash sale to a nontaxable stock sale, however, and in comparing each to the situation in which no acquisition occurs, one must make additional assumptions in order to determine whether a particular activity is favored. If the alternative to a stock sale were continued ownership of the acquired entity, then there would be no tax consequences of the sale. If, however, the investor is less likely to sell shares in the acquiring company, a tax saving is realized. To the extent that the acquiring company is larger and offers the investor greater diversification of his wealth, the probability of holding onto the stock may very well be increased.

A cash sale has tax costs and tax benefits relative both to a nontaxable stock sale and the no-merger situation. The shareholders pay extra taxes, but

the taxes saved by the acquiring company may more than offset these. Suppose that in performing the acquisition, the parent company borrows the amount needed for the purchase. The result is then similar to a firm borrowing to repurchase its own equity. In each case, there has been a change in the debt-equity ratio with cash passing out to equity-holders being subject to partial capital gains taxation. If the debt for equity swap could occur equally well in the presence or absence of an acquisition, there is no particular tax benefit to a cash-financed merger. The same logic holds for any cash purchase, no matter where the cash comes from. If the purchasing firm always has the alternative to use the cash to repurchase its own shares, there is no direct tax benefit from a cash purchase of another firm's shares.

This equivalence could break down for one of two reasons. First, it could be more difficult to purchase one's own shares than those of another firm. If this were the case, then increased leverage without an acquisition could only be achieved by an increase in fully taxable dividends (either immediately, or realistically, gradually over time). Likewise, the ability to borrow to purchase shares might be more difficult if the shares were in one's own company.

There is some presumption, or at least a fear, that it is easier to borrow to distribute cash through the acquisition of another firm's shares than through the acquisition of one's own shares. For example, the Tax Reform Act of 1969 restricted the use of convertible debt in takeovers. According to the General Explanation of the Act issued by the Joint Committee on Taxation (1970, at p. 123), the focus on debt involved in mergers was justified because:

Although it is possible to substitute debt for equity without a merger, this is much easier to bring about at the time of merger. This is because, although stockholders ordinarily would not be willing to substitute debt for their stockholdings, they may be willing to do so pursuant to a corporate acquisition where they are exchanging their holdings in one company for debt in another (the acquiring) company.

There is, indeed, a view expressed by many policymakers that increased merger activity is leading to increased leverage in the corporate sector because it is associated with borrowing that would not otherwise occur. While one might contemplate economic models to explain such an outcome[4], it may be possible here, without doing so, to test the hypothesis that it occurs. We develop a preliminary such test below.

B. Corporate Taxation

At the corporate level (assuming each firm's shareholders are not themselves corporations), the tax treatment of a merger or acquisition depends on whether the acquiring firm elects to treat the acquired firm as having been absorbed into the parent with its tax attributes intact or first liquidated and then received in the form of its component assets. While a tax-free reorganization must follow the first path, a taxable transaction can be either type.

Once again, each form of transaction has potential tax benefits, the magnitude of which depend on the alternative activities of the acquired firm

in the absence of a merger. The acquisition of a firm as a collection of assets leads typically to a stepped-up basis for the assets, with depreciable or depletable assets then receiving higher allowances than would otherwise have been permitted. At the same time, the liquidating target company (and, therefore, its new parent) must pay some taxes due to recapture provisions, but avoids capital gains that would have been due on a simple sale of assets. For some assets, like equipment, this is not a major benefit, since recapture at the ordinary income tax rate applies to all excess of sale price over basis up to the original purchase price. For structures, however, recapture is much more limited and the exemption from capital gains taxes more valuable.[5]

It is easy to see that such an exemption may constitute the difference between a net tax increase and a net tax decrease. For example, suppose a structure has a basis of **b** and a sale price of **s**. Assuming that depreciation allowances follow a declining balance formula[6], and ignoring the truncation of such allowances at the asset's actual tax lifetime, we may approximate the present value of its remaining depreciation allowances as **bz**, where **z** is the present value of depreciation deductions per dollar of new assets. The allowances received on the stepped-up basis would be **sz**. If the depreciation followed the straight-line method, there would be no recapture, so the increased value of depreciation allowances net of capital gains taxes and would be **(s-b) (tz-c)**, where t is the ordinary tax rate and c is the capital gains tax rate. For corporations, c=.28 and t=.46, so z would have to exceed 61 percent, which it generally does not. If c=0, of course, the gain could be substantial[7].

Such gains could be received without any acquisition taking place. The capital gains exemption, based on the General Utilities doctrine, applies to the distribution of property to stockholders and would apply in any liquidation, not just one associated with an acquisition of the company. However, it seems implausible that a large, widely-held company could be reconstituted after distributing its assets to its individual shareholders as part of a real liquidation. Hence, if the firm would have continued operating in the absence of an acquisition, the ability to obtain stepped-up asset bases without suffering capital gains taxes constitutes a tax benefit for the merger.

When an acquiring firm takes over the tax attributes of the acquired company, it does not get the opportunity to step-up asset bases[8], but it does get the benefit of any unused tax credits or tax losses that the target firm has carried forward because it was not able to use them in prior years. The use of such tax benefits is limited by sections 269 and 382 of the Internal Revenue Code, which require the acquisition to have economic substance and impose either conditions requiring the continuation of the target's operations (in the case of a taxable transaction) or restrictions on the extent to which losses can be used based on the relative sizes of target and parent (in the case of a tax-free reorganization)[9]. Even with restrictions, the parent firm may be able to use the acquired losses and credits more easily than the acquired firm would have on its own, given its projected taxable income and other vehicles available, such as leasing, to make its losses fungible.

This incentive to merge was used to justify the liberalized leasing provisions introduced in 1981 as part of the Economic Recovery Tax Act, when

legislators feared that the increased depreciation allowances introduced at the same time would lead to more firms with tax losses and that these firms would come under takeover pressure. More recently, the Treasury has supported pending revisions to the Internal Revenue Code that would impose further restrictions on the ability to apply prior losses and credits of a target against income of a parent[10] This legislative history, along with the observed presence at any given time of large numbers of firms carrying forward large amounts of unused credits and losses, suggests that it may be difficult to transfer such benefits without a merger taking place.

Finally, however the assets and tax attributes of the acquired company are treated, there is an additional tax benefit that may be obtained if the parent company has unused tax losses and credits, since it may set these against the otherwise taxable income of the company it acquires. Restrictions on this are weaker than those of parent using the losses of the acquired company. For example, the rule regarding reorganizations would not be binding as long as the loss company represented more that 20% of the new entity's total value, which it almost certainly would if it were the parent.

Thus, given that liquidation of an ongoing enterprise and the sale of tax losses and credits already being carried forward appear to be facilitated by the act of merger, these must be considered tax incentives for the merger activity itself.

3. DATA

We have used several sources to construct a data set containing information over time on several hundred mergers that occurred over the past two decades. All of the mergers and acquisitions actually studied ocurred during the period 1968-83. Since tax returns themselves are confidential, our tax data are limited to what the firms have chosen to disclose in their financial statements. Fortunately, standard accounting practice is to disclose tax attributes of the type in which we are interested when they are of material importance.

The COMPUSTAT 1983 Industrial File provides balance sheet and income statement information over the twenty year period leading up to 1983 on a larger number of corporations currently listed on the New York and American Stock Exchanges. A companion COMPUSTAT file, the Industrial Research File, provides similar information for firms that were included on previous versions of the regular Industrial File but were removed because they were delisted from their exchanges. The most common reasons were bankruptcy and merger. For each firm on the Research File that was dropped because of a merger, we consulted the Directory of Obsolete Securities to ascertain the year of merger and the parent into which the firm in question merged. We then determined whether the parent was included on the ordinary Industrial File. If it was, then we had time series data on both firms involved in the merger, and included this as one of the observations in our sample. This procedure led to 422 mergers. Many firms from the Industrial File appear more than once, having engaged in more than one merger over the period that was captured by our collection method.

While a typical annual observation form COMPUSTAT provides information on federal taxes paid and tax losses carried forward, the former sometimes includes deferred taxes as well as taxes currently payable, and the latter frequently is an accounting measure that does not reflect the actual value of taxes carried forward, indicating instead what taxes would have been caried forward if the company were taxed on its accounting income rather than its taxable income. Moreover, tax losses carried forward on operations in other countries are usually combined with domestic losses. Hence, the tax loss carry forward data provided by COMPUSTAT are mostly entirely useless for our purposes; they do not necessarily indicate the value of losses that could be used by another firm to offet its own domestic taxable income.

Fortunately, the original annual reports of the companies usually do include the appropriate tax information. For every firm in our sample for which tax data were missing or for which the tax data indicated a potential presence of unused tax benefits[11], we consulted the reports themselves to obtain information on federal taxes paid, tax losses carried forward, and investment and foreign tax credits carried forward. Where data were still substantially missing, or when the year of merger listed by the Directory of Obsolete Securities differed by more than one from that indicated by the dissapearance of the acquired from COMPUSTAT, we were forced to drop this firm (and its merger companion) from our sample. In a few additional cases, what was called a merger was really just the reorganization of an existing company under a new name; these were also dropped from consideration. What remained was a sample of 318 mergers for which we had usable tax information on both firms involved in the merger. Each observation consists of time series information on both firms until the merger date and data on the new enity

thereafter.

It is often difficult to give the precise calendar year in which each merger occurred, because of differences in fiscal years and mergers which did not happen instantaneously. However, it is usually fairly clear from the data when the acquired company ceased to exist as an independent entity. We use the convention of calling the merger year the year after that for which information on the acquired company is last available. By this classification, we have mergers in each year of the period 1968-1983, with the bulk (all but 25) falling in the period 1972-1982 and over three-quarters (247) occurring between 1976 and 1982. This was a period during which the tax treatment of mergers was essentially unchanged.

As might have been expected, the acquiring companies are larger on average than those acquired. Parent companies had an average value of debt plus equity of 1.957 billion dollars, while the average target firm's value was 204 million dollars[12]. There was relatively little difference in financial structure between the two groups, with the ratio of long-term debt to long-term debt plus equity averaging 29.7 percent for acquiring firms and 27.4 percent for those acquired.

Not surprising is the positive sample correlation between the sizes of parent and target firms. A breakdown of the relative sizes of the merger pairs is given in Table 1. Over one fourth of the mergers involved cases where the acquiring company had value less that 250 million dollars and the target less than 50 million. At the other extreme, there were over 10 percent where the parent's value exceeded a billion dollars and the target's 250

billion. There were relatively few cases in which the parent company was not substantially larger than the target.

There is also a positive correlation in the sample between the debt-equity ratios of the two firms merging, but this can only be partly explained by the positive correlation between firms' sizes and the tendency for debt-equity ratios to fall with firm size. Using the ratio of long-term debt to equity plus long-term debt as a measure of financial policy, there remains a partial correlation of .27 between the target and acquiring firms' ratios after controlling for the market value of each.

A majority of companies in the sample are in manufacturing (i.e., have a primary SIC classification beginning with 2 or 3): 65 percent of the targets and 74 percent of the parents. Of the remaining companies, 23 firms in the energy and mining exploration area were acquired, ten by companies in the same industry. (There was only one case of a company in this industry acquiring one in another industry.) Likewise, in the transportation industry, where there were 19 parents and 21 targets, 13 mergers involved two firms in the industry. The same general pattern was also observed in the financial industry, where of the 16 acquired companies and 16 acquiring companies, 10 were matched.

4. MEASURING TAX INCENTIVES

As a measure of the tax incentives for two firms to merge, the conceptually correct measure would be the reduction in the present value of

taxes owed by two firms due to the merger. Ideally, one would project the distribution of future tax payments for each firm in isolation and for the two firms combined and then discount the expected tax payments under each situation by an appropriate discount rate. There are a number of difficulties in doing so. The most important limitation is on the number of years for which data are available for the acquired firms. We may typically have two or three years of federal income tax payments. In cases of firms with tax losses, we may have even less. Hence, it is extremely difficult to know how such firms would have fared in the absence of a takeover. It is also unclear from our data whether acquiring firms chose to step up the bases of assets or to assume the tax attributes of acquired companies. Hence, projections for the combined entity are also difficult to construct.

What we can do is identify mergers in which there were obvious potential tax benefits involved from the transfer of losses and credits or the step-up in asset bases, or in which a substantial change in the debt-equity ratio of the combined companies ocurred.

A. Losses and Credits

If one company with taxable income takes over another with taxable income, and neither has unused tax credits, there are no evident tax benefits to be transferred through merger. There may still be future benefits to be gained by a pooling of fluctuations in taxable income that reduces the possibility of subsequent unused losses and credits, but we have little hope of measuring such effects. Likewise, it is hard to see the obvious tax benefits if two firms that are unable to make full use of their credits and

deductions combine. The clearest case for benefits being present is when one of the firms is fully taxable and the other is not. Here, a more rapid use of the constrained firm's tax benefits is likely to occur because of the merger. How much more rapid we cannot tell, but we can at least get a sense of the order of magnitude of the incentive from the extent to which the taxable firm can use the other firm's losses and credits against its own taxable income.

In this spirit, we classify firms (both target and parent) into four categories according to their tax status in the year before the merger. Group I has positive federal taxes payable and no credits carried forward. This group does not face tax constraints as we have defined them. Group I contains the majority of firms on both sides of the merger. Group II firms have no current federal taxes, but are able to carry back current losses and credits against prior years' taxable income. These firms have no tax benefits to transfer, but they also have little capacity to absorb such transfers from other firms. Group III firms possess unused tax credits that have been carried forward, but no tax losses. Group IV firms have tax losses and credits carried forward. In estimating the gains from the transfer of tax benefits, we assume these to be zero except for mergers between firms from Group I and those from Groups III and IV. For cases where the benefit is assumed to be present, we measure it as the maximum amount of the constrained firm's tax benefits that could be used by its Group I partner over a three year period, assuming that the latter firm has the same taxable income in each year as in the year before the merger.

For example, suppose firm A has taxable income and takes over firm B,

which has tax losses and credits carried forward. We multiply A's taxable income by three and compare this to B's losses. If the losses exceed A's three-year income, the latter figure, multiplied by the corporate tax rate, is the measured benefit. If not, we then offset the credits against the remaining income, taking into account the relevant limitations that applied in each year on the use of credits to offset taxes. We do not take account of the potential restrictions imposed by sections 269 and 382 of the Code, nor do we account for the potential expiration of transferred losses and credits. Finally, we do not attempt to measure the use that the Group III or IV company would have made of its tax benefits had it not merged. Our choice of a three year horizon is meant to prevent an overstatement of benefits that might come from ignoring these various factors. The notion is that benefits that the taxable firm could not use almost immediately are benefits that might have expired or been used by the other company[13].

Table 2 presents a cross-tabulation of target and parent firms by their tax status, as measured by the groupings I-IV described above. We also include an additional group, V, which has ambiguous group membership because firms reported having both tax losses carried forward and positive federal taxes currently payable. This presumably results from the presence of more than one entity for tax purposes being combined on the financial statements. Typically, this occurs for financial companies which have a life insurance subsidiary. Fortunately, there are relatively few cases in which this occurs.

As mentioned earlier, most of the companies are in Group I: 234 of the acquired companies and 260 of the acquiring companies. There are a total of 40 mergers where a Group I parent acquires a company in Group III or Group IV,

and 21 mergers where a Group I company is acquired by Group III or Group IV parent. There are only 9 mergers in which both firms are in one of these groups. Hence, there appear to be potential tax benefits in nearly 20 percent of all mergers.

It is interesting to note that mergers between pairs of Group III/IV firms occur slightly more often than would be predicted by chance[14]. Given the size of this sample, however, this is not a very conclusive finding. In addition, most of the mergers of two constrained firms involved firms in the same industry, for which cyclical profitability would tend to be highly correlated. Hence, the absence of a clear pairing of firms with tax losses and gains may simply be due to the offsetting effect of the tendency of firms in related businesses to merge.

Using the method described above, we calculated the potential tax benefit in each merger of a type I and type III/IV firm. For the sake of completeness, we reclassified the 14 group V firms by assuming their measured tax losses to be zero. This led to an additional two mergers falling into the tax category, both with Group I targets and Group III parents[15]. The results are summarized in Table 3, with the estimated tax gains being expressed as a percentage of the combined value of the acquired firm's equity plus debt[16].

Overall, potential tax benefits are estimated to be present in nearly one fifth of the mergers, with the average gain in these cases being just over one tenth of the target firm's value. In the majority of these cases, the benefits come from losses and credits of the acquired entities. The largest such gain, over 100 million dollars, is estimated for the takeover of Anaconda

by Atlantic Richfield in 1976. There are, however, two particularly important cases of parent companies providing the tax benefits; in each case, the company is involved in more than one takeover in the sample. Allied Corporation's acquisitions of Bunker Ramo, Fisher Scientific and Supron Energy in 1980-81 were estimated to provide benefits over 80 million dollars, and Penn Central's absorption of GK Technologies and Marathon Manufacturing in 1978-80 had measured tax benefits of over 180 million dollars.

Though the ability to transfer unused tax benefits seems to be of some relevance in a substantial number of mergers, it is likely to be economically important in only a relatively small fraction of these. Of the 63 mergers with positive estimated tax benefits, only one third, 21, have benefits in excess of 10 percent of the acquired firm's market value. Given the mean benefit of 10.5 percent, this indicates substantial skewness in the distribution of tax benefits. When weighted by the market value of the target firm the average declines to 6.1 indicating that the mergers for which this tax attribute is of importance tend to be for the smaller targets.

B. Gains from Basis Step-up

This is an area where special circumstances may play a major role. We do not have sufficiently detailed data to identify such cases. Broadly speaking, however, we know that the step-up in basis is most valuable for assets which are classified as structures, including those in the minerals area, for these are subject only to limited recapture. We use a mechanical procedure, described in the appendix, to identify the step-up in basis that each target firm would receive on it structures, and then estimate the increase in the

present value of after-tax income due to the higher associated depreciation allowances. The procedure assumes that the firm's earliest reported book assets that we have available are correctly reported, estimates the fraction of these assets that are structures, and calculates the market and book values of these and subsequently acquired structures at the time of the merger under the assumption that the assets grew in nominal value at the general rate of price inflation, adjusted for economic depreciation of the assets. We do this calculation for all acquired firms.

The estimated benefits from basis step-up are substantially smaller in value than those estimated to have come from the transfer of losses and credits. We must point out, however, that at our level of aggregation of assets we may be missing some important variation in the types of assets being transferred. Our algorithm may greatly understate the step-up in basis possible for assets that have risen in value substantially faster than the general price level or were on the target firm's books for many years before the date at which our data became available, and hence incorrectly valued at that date [17].

For 43 of the 318 target firms, there are additional data problems that prevent a calculation of this benefit. Of the remaining 275 firms, only 7 are estimated to produce a gain from basis step-up in excess of 5 percent of the target firm's value. Of the 40 cases where the target firm also has estimated tax benefits from unused credits and tax losses, the benefit from basis step-up is larger in only two. It should be recognized, however, that it has been possible in the past to get the advantages of both step-up in basis and unused tax losses and credits through a variety of mechanisms, such as partial

liquidations to the parent company of the property to be stepped-up without a liquidation of the acquired company itself[18].

C. Changes in Leverage

The final calculation we perform concerns the change in leverage for firms in our sample, to evaluate the hypothesis that the tax benefits from leverage are made accessible by mergers. Such an investigation might well be limited to cases where a substantial portion of the consideration received by shareholders of the acquired firm was cash, but we do not have sufficient information at present to make this distinction. Hence, we have considered all mergers in our sample.

There is a very serious conceptual problem in trying to estimate how much leverage changes because of a merger. Presumably, one measures the fraction of the two firms' total capitalization that is debt both before and after merger. But an increase in the debt-equity ratio when the merger occurs is not necessarily evidence in support of the hypothesis. Suppose, for example, that a firm accumulates retentions for several years, in anticipation of a merger program, and then makes its acquistion using borrowed funds in addition to its own internal accumulations. There would be an immediate increase in its debt-equity ratio because of the "lumpiness" of the project, but, viewed from a longer perspective, no real change in its underlying financial policy. If a firm makes large investments every five years, we might observe its debt-equity ratio jump with each investments and then decline gradually until the next jump. It would be misleading to describe this as a recurring

change in its financial policy.

We consider this to be an important problem in assessing the impact of mergers on leverage. To deal with it, we look at debt-equity ratios two years before and two years after the merger, rather than immediately before and immediately after. One would hope that this will give us better estimates of the firms' "long-run" debt-equity ratios, but caution is still advised.

We measure equity by the year-end market value of common stock and debt by the book value of long-term debt. The use of book values for long-term debt may cause problems. However, given the lack of information on the maturity structure of each firm's debt, we found there to be little alternative. We also performed the same calculations including short-term debt. However, the data on short-term debt are of poorer quality and we are less confident about results that include them.

As already mentioned, we attempt to measure changes in debt and equity over the period beginning two years before the merger and ending two years after the merger. We have only 162 pairs of merging firms for which all data necessary for this calculation are available. The sample size can be increased to 207 by allowing minor variations in the base years for the calculation (1 to 3 years before to 1 to 3 years after). The results of the two samples are quite similar.

We find that long-term debt as a fraction of long-term debt plus equity increases in each sample from an average of 30.0 percent to one of 32.1 percent. Weighting by the value of long-term debt plus equity of the combined

firms gives smaller changes as the weighted average ratio increases from 25.4 percent to 26.7 percent.

Given that our data ends in 1982 and we require debt-equity ratios two years after the merger for this calculation, no mergers beyond 1980 are included in these calculations. Thus, most of the four-year changes averaged here are from 1972-76 to 1978-82. According to data presented in Taggart (1985)[19] on the first six of these seven four year periods (data on the last are not given), aggregate market debt-equity ratios increased over two, decreased over two, and increased quite negligibly (by 1 percentage point) over two. These year to year changes in average debt-value ratios were sufficiently large to make it difficult for us to view the increases in the sample as significant.

Indeed, this conclusion is reinforced by an examination of mergers where the acquired company was large relative to the acquiring company. One might expect the use of debt to be especially important in such cases. Yet the average combined debt-market value ratio for mergers in which the target's market value was between 25 and 50 percent of the parent's (before the combination) was unchanged at 39.0 percent, unweighted, and actually declined in the weighted sample, from 40.4 percent to 38.3 percent. Even for the small sample of mergers in which the acquired company's market value exceeded half that of the parent, the average rise in debt-market value ratio was small, from 30.0 percent to 35.4 percent, unweighted, and from 32.1 percent to 35.3 percent, weighted.

5. CONCLUSIONS

In this paper, we have examined a sample of 318 mergers and acquisitions that took place over the period 1968-83. Nearly two-thirds of the mergers were between two manufacturing firms; the average acquiring firm was about ten times the size of the average acquired company.

A substantial fraction of the sample companies entered the mergers with some constraints on their ability to use tax benefits. About one fifth of all mergers in the sample involved cases where one firm faced such a constraint (indicated by the presence of tax credits or losses carried forward), while the other had positive current federal taxes and no such constraints. Such firms may have reduced their combined federal taxes by merging. Our estimates suggest, however, that the magnitude of such gains, though averaging 10.5 percent of the acquired firm's market value, exceeded 10 percent in only one third of the cases, or about 6.5 percent of the sample. When expressed as a fraction of equity, rather than total market value, gains this large are of a similar order of magnitude as the average stock price premium paid for target firms in successful tender offers (Jensen and Ruback 1983). Thus, for a small fraction of the mergers, the transfer of tax benefits could have played a significant role.

A second measure of the potential tax gain from merger, associated with the ability to step up the basis of depreciable assets without being subject to capital gains taxes, was generally estimated to be small relative to the acquired firm's market value. Here, however, our measurement technique is limited by the availability of data, and may very well have understated the true gains available in cases where assets had greatly appreciated over time.

Finally, we found that the ratio of combined debt to market value for the parent and target firms in our sample increased slightly over the period beginning two years before and ending two years after the merger. The increase of 2.1 percentage points was small, however, given the magnitude of year to year changes in aggregate debt to value ratios over this period. Even when attention is limited to acquisitions of firms large in size relative to the acquiring companies increases in leverage are small or absent.

In future work, we hope to extend our analysis by looking at different types of mergers within our sample that have been argued to have a special characteristics (e.g., those in the oil industry). We also plan to use data on firms that did not merge to gain a better understanding of the factors, tax related and otherwise, that lead firms to merge.

APPENDIX

In this appendix, we describe our method for calculating the potential value of the step-up in basis an acquired firm would obtain on its structures.

We begin with the firm's book value of fixed assets at the end of the last year before the merger. Using data on the firm's gross investment and the capital stock at the end of the earliest year for which it is available for the firm, we use the "perpetual inventory" method to estimate the rate of declining balance depreciation that is consistent with the firm's initial and terminal capital stocks. Given this estimate of economic depreciation, we then estimate the current market value of the capital stock by multiplying capital remaining from different vintages by the ratio of the price (represented by the GNP deflator) in the current year to that for the year in which the capital was purchased. We also assume that the initial capital stock was valued correctly on the firms books. That is, we solve for δ from the equation:

$$K_T = (1-\delta)^T K_0 + (1-\delta)^{T-1} I_1 + \ldots + I_t \tag{A1}$$

where K_t is the book capital stock at the end of year t and I_t is fixed investment in year t. We then calculate the market value of the capital stock as:

$$K_T^m = (1-\delta)^T K_0 P_T/P_0 + \ldots + I_t \tag{A2}$$

We assume that a fraction θ of this market value is structures, where θ is the

fraction that structures represents for all firms in the same industry (taken from Auerbach 1983). Note that this will understate the market value of assets that have increased in nominal value at a rate in excess of the GNP deflator or were worth more than their book value even at time zero.

Since structures are written off at a different rate from equipment, they will generally represent a different fraction of the book capital stock than of the market value capital stock. Since structures decay more slowly the book fraction will be smaller: inflation has a greater effect on the ratio of current to book value as the time since purchase increases.

If one assumes that the structures fraction of the firm's capital stock at time zero was also θ, and that structures are written off at the declining balance rate ϵ, it follows that the book value of structures at date T is:

$$(A3) \qquad K_T^S = \theta[\, K_o(1-\epsilon)^T + (K_T^m - K_o(1+\pi)^T) \times$$

$$[(1-(1-g+\pi)\,(1-\epsilon)) \,/\, (1-(1-g+\pi)^T(1-\epsilon)^T)] \times$$

$$[\,(1-(1-g)^T(1-\epsilon)^T) \,/\, (1-(1-g)\,(1-\epsilon)\,]\,]$$

where π is the average inflation rate over the period from 0 to T and g is the nominal growth rate of investment in structures. These are easily calculated for each firm. We set ϵ=.033, the aggregate value derived in Auerbach and Hines (1985).

Given the market value of the firm's structures capital stock, we

estimate the after-tax value of depreciation allowances the firm would receive by multiplying the corporate tax rate by the average present value of depreciation allowances on all structures, estimated by Auerbach and Hines (1986). It is somewhat more difficult to estimate the depreciation allowances the firm would receive if continuing along its previous depreciation schedule, since its capital stock purchase dates are not known. We simply assume that they would get the same present value as is available on new capital per each dollar of remaining basis. Moreover, we assume that recapture will neutralize the additional depreciation allowances received on increases in basis up to the straight line basis, and that this latter basis equals the actual book value. Thus, the net estimated gain is the present value of depreciation allowances on new structures, multiplied by the corporate tax rate, multiplied by the difference between the market and book values estimated for structures.

FOOTNOTES

1. See Auerbach (1983, 1986) for empirical and theoretical analyses of this point.

2. The proposal, prepared by the staff of the Senate Finance Committee, would restrict the use of losses and credits of an acquired company by a parent by allowing only a certain percentage of them to be used in each year following the merger.

3. See, for example, Butters et al (1951) and Feld (1982).

4. One that has been suggested to us relates to the smoothing of taxable income discussed further below. In reducing the possibility of a tax loss occurring in the future, the firms may make the interest deduction on additional borrowing more valuable.

5. Martin Ginsburg has pointed out to us that many other assets, such as FIFO inventories, may also be written up without recapture. See also Lowenstein (1985).

6. The declining balance formula specifies that year t's depreciation allowance will be $d(1-d)^t$, where d is the rate of decline.

7. For further discussion on the economic incentives to turn over assets under a variety of circumstances, see Auerbach (1981) and

Auerbach and Kotlikoff (1983).

8. This ignores the possibility that firms can, to a certain extent, utilize both approaches simultaneously. This is discussed further below.

9. The criterion used was that the firm had negative federal taxes, zero investment tax credits, investment tax credits greater than or equal to federal taxes, or a positive reported tax loss carry forward.

10. This is discussed further in Senate Finance Committee (1985).

11. Testimony of Ronald A. Pearlman, Assistant Secretary of the Treasury for Tax Policy, before the Senate Finance Committee, September 30, 1985.

12. The average size of the parent companies is somewhat larger, and that of the target companies considerably smaller, than those of the sample of hostile takeovers analyzed by Herman and Lowenstein in this volume for a similar sample period. The smaller gap in average sizes for hostile takeovers is not surprising.

13. Experiments suggested that lengthening this time period had a relatively minor quantitative impact on the results.

14. Given the overall fractions of acquired and acquiring companies

with unused losses or credits, one would predict fewer than 6, rather than 9 mergers between two firms from this group.

15. We also considered putting the Group V firms into Group IV. Because there are so few of them, this decision had little aggregate impact.

16. For a small fraction of the sample of target firms, we did not have the data necessary to construct a market value, using the sample mean market value in its place. This would probably tend to understate our results somewhat, since one would expect missing data to be more common among smaller firms. Likewise, there were a smaller number of cases in which the taxable firms did not give a breakdown of total taxes into federal taxes and other taxes. For these firms, we imputed a value of .7 times total taxes, based on a regression run on the rest of the sample.

17. This is likely to be a particular problem in the cases of some oil mergers where large amounts of reserves were transferred.

18. Celebrated examples of this led to the restrictions on partial liquidations to corporate shareholders introduced in the Tax Equity and Fiscal Responsibility Act of 1982. Other channels for similar activity may remain.

19. These calculations are based on the Holland-Myers series presented by Taggart.

REFERENCES

Auerbach, A.J., 1981 "Inflation and the Tax Treatment of Firm Behavior," **American Economic Review**, May.

----------, 1983, "Corporate Taxation in the U.S.," **Brookings Papers On Economic Activity**, II.

----------, 1986, "The Dynamic Effects of Tax Law Asymmetries," **Review of Economic Studies**, forthcoming.

---------- and L.J. Kotlikoff, 1983, "Investment Versus Savings Incentives: The Size of the Bang for the Buck and the Potential for Self-Financing Business Tax Cuts," in L.J. Meyer, ed., **The Economic Consequences of Government Deficits.**

---------- and J.R. Hines, 1986, "Tax Reform, Investment and the Value of the Firm," NBER Working Paper no. 1803, January.

Butters, J.K., J. Lintner and W.L. Cary, 1951, **Effects of Taxation on Corporate Mergers** (Harvard Business School).

Feld, A., 1982, **Tax Policy and Corporate Concentration** (Lexington).

Herman, E. S. and L. Lowenstein, 1985, "The Efficiency of Hostile Takeovers: An Empirical Study," mimeo.

Jensen, M.C. and R.S. Ruback, 1983, "The Market for Corporate Control," **Journal of Financial Economics.**

Lowenstein, L., 1985, "Management Buyouts," Columbia Law Review, May.

Pearlman, R.A., 1985, Testimony before the Senate Finance Committee. Subcommittee on Taxation and Debt Management, September 30.

Taggart, R.A., 1985, "Secular Patterns in the Financing of U.S. Corporations," in B. Friedman, ed., **Corporate Capital Structures in the U.S.**

U.S. Joint Committee on Taxation, 1970, **General Explanation of the Tax Reform Act of 1969.**

U.S. Senate Finance Committee, 1985, Staff Report on **The Subchapter C Revision Act of 1985.**

Table 1
Sizes of Merging Firms
(Millions of Dollars in Market Value)

	Target Size				
Parent Size	0-50	50-100	100-250	250+	Total
0-250	86	18	7	0	111
250-500	18	11	9	2	40
500-1000	31	8	11	0	50
1000+	30	21	27	33	111
Total	159	58	54	35	312

Table 2
Mergers by Tax Status

	Parent Group					
Target Group	I	II	III	IV	V	Total
I	199	7	18	3	7	234
II	20	0	2	1	2	25
III	13	3	4	0	0	20
IV	27	3	0	5	2	37
V	1	0	0	0	1	2
Total	260	13	24	9	12	318

Notes:

Group I firms have positive tax payments.

Group II firms have negative tax payments, but no tax losses or credits carried forward.

Group III firms have tax credits but not losses carried foward.

Group IV firms have tax losses carried forward.

Group V firms report both positive tax payments and tax losses carried forward.

Table 3
Potential Gains from Tax Benefit Transfer
(As a Percentage of Target Firm's Market Value)

Potential Gain	Source of Gains (Number of Mergers)						
	Losses	Target Credits	Total	Losses	Parent Credits	Total	Grand Total
none	291	290	278	315	298	295	259
<5%	15	24	22	0	10	10	32
5-10%	1	2	6	0	4	4	10
10-25%	7	2	8	2	6	8	16
>25%	4	0	4	1	0	1	5
# > 0	27	28	40	3	20	23	63
% > 0	8.4	8.7	12.4	0.9	6.2	7.1	19.6
	Average Gain, Conditional on > 0						
unweighted	14.4	3.1	11.9	22.3	5.9	8.0	10.5
weighted by market value of target	9.3	2.4	5.0	20.9	4.3	8.25	6.1