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Tests of a Deferred Tax Explanation of the Negative Association between the LIFO Reserve and Firm Value*

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Abstract

Guenther and Trombley (1994) and Jennings, Simko, and Thompson (1996) document a negative association between a firm's last-in, first-out (LIFO) reserve and the market value of its equity. In this paper, we test a deferred tax explanation of this negative association. Specifically, we argue that investors, conditional on adjusting inventory to as-if first-in, first-out (FIFO), estimate a firm's future LIFO liquidation tax burden as its LIFO reserve multiplied by the appropriate corporate tax rate and include this tax-adjusted LIFO reserve in the valuation of a LIFO firm's net assets. On the basis of this argument, the tax-adjusted LIFO reserve is in effect an estimate of an off-balance-sheet deferred tax liability and, as a result, we predict a negative association between the tax-adjusted LIFO reserve and market value of equity. We test our deferred tax explanation by estimating a valuation model in which a firm's market value of equity is expressed as a function of the firm's assets, liabilities, deferred tax liability, and tax-adjusted LIFO reserve; the model is estimated separately in years preceding and following the reduction of tax rates mandated by the US Tax Reform Act of 1986. Test results provide strong support for the deferred tax explanation of the negative association between a firm's LIFO reserve and the market value of its equity.

Condensé

Guenther et Trombley (1994) ainsi que Jennings, Simko et Thompson (1996) constatent une association négative entre la réserve d'épuisement à rebours (réserve DEPS — dernier entré, premier sorti) d'une entreprise et la valeur de marché de son avoir des actionnaires, et une association moins négative dans le cas des entreprises qui sont davantage capables de répercuter les hausses de prix des intrants sur le prix des extrants. Selon Guenther et Trombley ainsi que Jennings *et al.*, ces résultats corroborent la conclusion selon laquelle

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les investisseurs s'attendent à ce qu'en moyenne, les entreprises soient incapables d'augmenter leurs prix de vente, tout au moins dollar pour dollar, en réponse aux hausses de prix des intrants.

Les auteurs ont ici pour but de vérifier s'il est possible d'expliquer par les impôts reportés l'association négative entre la réserve DEPS et la valeur de marché de l'avoir des actionnaires. Avant de décrire cette explication possible par les impôts reportés, il convient de noter que l'écart entre le coût des stocks établi selon la méthode de l'épuisement successif (PEPS — premier entré, premier sorti) et leur coût déclaré, établi selon la méthode DEPS (soit la réserve DEPS) est habituellement considéré comme un actif non comptabilisé puisque le coût PEPS se rapproche davantage du coût de remplacement que le coût DEPS. Les auteurs ne sont pas en désaccord avec cette optique et s'attendent à ce que les investisseurs convertissent les stocks DEPS à leur valeur PEPS simulée lorsqu'ils évaluent les actifs nets d'une entreprise qui applique la méthode DEPS.

Si les investisseurs effectuent cet ajustement, les auteurs s'attendent à ce que ceux-ci reconnaissent également l'existence d'un passif d'impôts reportés lié aux stocks, égal à la réserve DEPS multipliée par le taux d'imposition des sociétés approprié, dans l'évaluation des actifs nets d'une entreprise qui applique la méthode DEPS. Techniquement, ce passif d'impôts reportés découle du fait que les investisseurs, en convertissant les stocks à leur valeur PEPS simulée, supposent implicitement que l'entreprise applique la méthode PEPS aux fins d'information financière et la méthode DEPS aux fins fiscales. Plus intuitivement, l'on pourrait attribuer l'existence de ce passif d'impôts reportés au fait que l'utilisation de la méthode DEPS donne lieu à un report d'impôts temporaire, par rapport à l'utilisation de la méthode PEPS, qui s'inverse lorsque les tranches de stock constituées servent à répondre à la demande. Le passif d'impôts reportés décrit ici est souvent désigné sous l'appellation de *fardeau fiscal de l'entreprise résultant de la liquidation future des tranches de stock constituées*. Dans ce scénario, la réserve DEPS réduite à son incidence fiscale est, en fait, une estimation du passif d'impôts reportés hors bilan. En conséquence, les auteurs prévoient une association négative entre la réserve DEPS réduite à son incidence fiscale et la valeur de marché de l'avoir des actionnaires, ce qu'ils appellent dans leur étude l'« explication par les impôts reportés de l'association négative entre la réserve DEPS et la valeur de marché de l'avoir des actionnaires ».

À l'aide d'un échantillon de 11 617 années-entreprises qui appliquent la méthode DEPS s'échelonnant de 1975 à 1994, les auteurs testent l'explication par les impôts reportés de l'association négative entre la réserve DEPS et la valeur de marché de l'avoir des actionnaires en estimant le modèle suivant pour toutes les entreprises et chacune des années de l'échantillon (les signes prévus des coefficients du modèle figurent entre crochets) :

$$MV_{i,t} = \alpha_0 + \underset{[+]}{\gamma_1 ASSETS_{i,t}} + \underset{[+]}{\gamma_2 INV_{i,t}} + \underset{[+]}{\gamma_3 LIAB_{i,t}} + \underset{[-]}{\gamma_4 RESV_{i,t}} + \underset{[-]}{\gamma_5 DTL_{i,t}} + \underset{[-]}{\gamma_6 RESV^{*} ABIL_{i,t}} + \varepsilon_{i,t}$$

où i désigne l'entreprise, t, l'exercice courant, *MV*, la valeur de marché des actions ordinaires au terme du quatrième mois suivant la fin de l'exercice t, *ASSETS*, la valeur comptable des actifs autres que les stocks au terme de l'exercice t, *INV*, les stocks à leur valeur PEPS simulée au terme de l'exercice t, *LIAB*, la valeur comptable des passifs autres que le *DTL*, additionnée des actions privilégiées au terme de l'exercice t, *RESV*, la réserve DEPS ramenée à un montant d'impôts reportés au terme de l'exercice t, *DTL*, le passif d'impôts reportés au terme de l'exercice t et *ABIL*RESV*, une mesure de la capacité de répercuter les hausses de prix des intrants en interaction avec la réserve DEPS brute. Pour réduire les effets de taille, les éléments de la matrice de données sont déflatés des actions ordinaires en circulation.

Dans le modèle, les stocks figurent à leur valeur PEPS simulée pour tenir compte de la prévision des auteurs selon laquelle les investisseurs convertissent les stocks DEPS à leur valeur PEPS simulée lorsqu'ils évaluent les actifs nets d'une entreprise qui applique la méthode DEPS. La réserve DEPS est ramenée à un montant d'impôts reportés de manière à tenir compte de la prévision des auteurs selon laquelle les investisseurs, sous réserve de la conversion des stocks à leur valeur PEPS simulée, considèrent la réserve DEPS ramenée à un montant d'impôts reportés comme un indicateur du fardeau fiscal résultant de la liquidation future des tranches de stock constituées, lorsqu'ils évaluent les actifs nets d'une entreprise qui applique la méthode DEPS. Les auteurs incluent le solde du passif d'impôts reportés dans l'équation (1) parce qu'ils peuvent ainsi comparer l'association *réserve DEPS réduite à son incidence fiscale/valeur de marché de l'avoir des actionnaires* avec l'association *passif d'impôts reportés/valeur de marché de l'avoir des actionnaires*.

La *Tax Reform Act of 1986* (TRA 86) ramenait en deux ans le taux d'imposition maximum des sociétés de 46 à 34 pour cent. Conformément aux règles de comptabilité générale en vigueur au moment de l'adoption de la TRA 86, les entreprises n'ajustaient pas leur passif d'impôts reportés pour tenir compte de la réduction des taux d'imposition exigés par la TRA 86. Donc, la diminution dans les taux exigés par la TRA 86 réduirait la valeur réelle tant du passif d'impôts reportés au bilan que le passif d'impôts reportés hors bilan évalué approximativement par la réserve DEPS réduite à son incidence fiscale, du fait que ce passif serait éventuellement réglé à 34 pour cent plutôt que 46 pour cent. En conséquence, le coefficient de la variable *RESV*, si les investisseurs considèrent la réserve DEPS réduite à son incidence fiscale comme un indicateur du fardeau fiscal de l'entreprise résultant de la liquidation DEPS future, et le coefficient de la variable *DTL* devraient être tous deux moins négatifs dans les estimations de l'équation (1) postérieures à la TRA 86.

Afin de tester la prévision qui précède, les auteurs estiment l'équation (1) pour toutes les entreprises et chacune des onze années de l'échantillon antérieures à la TRA 86 (soit 1975 à 1985) ainsi que pour toutes les entreprises et chacune des huit années de l'échantillon postérieures à la TRA 86 (soit 1987 à 1994). Conformément au pronostic, les coefficients estimés des variables *RESV* et *DTL* sont généralement négatifs, et les moyennes des coefficients estimés postérieurs à la TRA 86 pour les variables *RESV* et *DTL* sont beaucoup moins négatives que les moyennes des coefficients estimés antérieurs à la TRA 86. De plus, le coefficient de la variable *DTL* ne diffère pas du coefficient de la variable *RESV* aux seuils de signification habituels dans 12 des 19 estimations de l'équation (1), et la moyenne des 19 coefficients estimés de la variable *DTL* ne diffère pas de la moyenne des 19 coefficients estimés de la variable *RESV* aux seuils de signification habituels. La similarité de l'importance des coefficients estimés des variables *RESV* et *DTL*, en conjonction avec la similarité des réactions à la TRA 86 de l'association *réserve DEPS réduite à son incidence fiscale/valeur de marché de l'avoir des actionnaires* et de l'association *passif d'impôts reportés/valeur de marché de l'avoir des actionnaires*, confirme l'explication par les impôts reportés de l'association négative entre la réserve DEPS et la valeur de marché de l'avoir des actionnaires.

Guenther et Trombley (1994) et Jennings *et al.* (1996) élaborent un argument d'élasticité-prix en vertu duquel l'association négative entre la réserve DEPS et la valeur de marché de l'avoir des actionnaires est interprétée comme une indication que les investisseurs s'attendent à ce qu'en moyenne, les entreprises ne puissent hausser le prix des extrants, tout au moins dollar pour dollar, en réponse aux hausses de prix des intrants. Pour tenir compte de l'argument d'élasticité-prix, l'équation (1) inclut une variable, *ABIL*RESV*, qui mesure la capacité de l'entreprise à répercuter les hausses de prix des intrants, après le contrôle de la taille de sa réserve DEPS, cette capacité étant assimilée à la corrélation, pour l'ensemble de la période étudiée, entre le profit brut annuel de l'entreprise en pourcentage des ventes

et le niveau de l'indice des prix à la consommation à la fin de l'exercice. Les résultats des tests appliqués à la variable *ABIL*RESV* corroborent les résultats dont font état Guenther et Trombley ainsi que Jennings *et al.*

Les auteurs testent trois explications possibles de la constatation selon laquelle le coefficient de la variable *RESV* est moins négatif dans les estimations de l'équation (1) postérieures à la TRA 86. Premièrement, un virage structurel dans l'évaluation des actifs et des passifs au cours de la période postérieure à la TRA 86 est possible, ce qui pourrait expliquer les résultats relatifs aux variables *RESV* et *DTL*. Les auteurs constatent cependant que, bien que l'association de chacune des variables *RESV* et *DTL* avec la variable *MV* soit devenue moins négative dans les années postérieures à la TRA 86, la réaction à la TRA 86 a été non significative ou moins prononcée pour les variables *ASSETS*, *INV* et *LIAB*. Étant donné qu'une association moins négative entre une variable donnée et la variable *MV* en réaction à la réduction des taux d'imposition exigés par la TRA 86 n'est prévue que pour les variables *RESV* et *DTL*, ces résultats démontrent indirectement que la valeur de l'avoir des actionnaires est sensible aux variations des taux d'imposition. Deuxièmement, compte tenu de la tendance de l'inflation au cours de la période de l'échantillon, l'on s'attendait sans doute à une inflation plus faible au cours de la période postérieure à la TRA 86. Si la probabilité d'inflation réduit la valeur de marché de l'avoir des actionnaires et si le coefficient de la variable *RESV* reflète la probabilité d'inflation, l'autre explication de la diminution du coefficient de la variable *RESV* après la TRA 86 serait alors la réduction de l'inflation prévue au cours de la période postérieure à la TRA 86. Toutefois, les résultats des tests portant uniquement sur les années de faible inflation donnent à penser que les prévisions d'inflation réduite au cours de la période postérieure à la TRA 86 n'expliquent pas la diminution du coefficient de la variable *RESV* postérieure à la TRA 86. Troisièmement, il semble vraisemblable que les bénéfices d'une entreprise soient en corrélation avec sa capacité de répercuter les hausses de prix des intrants. Par exemple, une entreprise qui éprouve de la difficulté à répercuter les hausses de prix des intrants devrait enregistrer des bénéfices plus faibles, toutes proportions gardées. Les bénéfices étant un facteur important dans l'évaluation de l'avoir des actionnaires d'une entreprise, cette supposition soulève la possibilité que l'association négative entre les variables *MV* et *RESV*, dans la mesure où elle reflète l'incapacité de répercuter les hausses de prix des intrants, traduise, en fait, la variable corrélée omise des bénéfices. Or, lorsque les auteurs estiment un modèle d'évaluation qui englobe les bénéfices de l'entreprise à titre de variable indépendante, ils obtiennent des résultats qui appuient toujours l'explication par les impôts reportés de l'association négative entre la réserve DEPS et la valeur de marché de l'avoir des actionnaires.

La présente étude a pour principale richesse de contribuer à expliquer l'association négative imprévue *ex ante* entre la réserve DEPS et la valeur de marché de l'avoir des actionnaires et, ce faisant, d'aider à clarifier la nature de l'information fournie par une donnée importante présentée sous forme de note complémentaire : la réserve DEPS. Les résultats de l'étude offrent également plusieurs renseignements précieux aux analystes financiers et aux chercheurs qui s'intéressent à l'analyse de la fiscalité et des états financiers. Premièrement, ils confirment les conclusions voulant que la présentation de la réserve DEPS soit utile parce qu'elle livre de l'information relative au fardeau fiscal de l'entreprise. Deuxièmement, conformément aux recherches préalables, les résultats de la présente étude démontrent que les investisseurs considèrent les impôts reportés comme de véritables passifs qui réduisent la valeur de marché de l'avoir des actionnaires de l'entreprise. Enfin, ces résultats prouvent indirectement que la valeur de l'avoir des actionnaires est sensible aux changements des taux d'imposition exigés par la loi.

1. Introduction

Guenther and Trombley (1994) and Jennings, Simko, and Thompson (1996) document a negative association between a firm's last-in, first-out (LIFO) reserve and the market value of its equity, with a less negative association observed for firms that are better able to pass on input price increases to their customers.[1] Guenther and Trombley and Jennings et al. interpret their results as consistent with the conclusion that investors expect that firms on average are unable to raise prices at least dollar for dollar in response to input price increases.

The purpose of this paper is to test a deferred tax explanation of the negative association between the LIFO reserve and market value of equity. Before we describe the deferred tax explanation, we should first note that the difference between first-in, first-out (FIFO) cost of inventory and its reported LIFO cost (i.e., the LIFO reserve) is typically viewed as an unrecorded asset because, relative to LIFO cost, FIFO cost is closer to replacement cost (e.g., White, Sondhi, and Fried 1998). We do not disagree with this view and we expect that investors adjust LIFO inventory to as-if FIFO when valuing a LIFO firm's net assets.

If investors do adjust a LIFO firm's inventory to as-if FIFO, then we expect that investors also recognize a deferred tax liability related to inventory, equal to the LIFO reserve multiplied by the appropriate corporate tax rate, when valuing a LIFO firm's net assets. Technically, this deferred tax liability would arise because investors, by converting inventory to as-if FIFO, are implicitly assuming that a firm uses FIFO for financial reporting purposes and LIFO for tax purposes.[2] More intuitively, this deferred tax liability would exist because the use of LIFO results in a temporary deferral of taxes relative to the use of FIFO that reverses when LIFO layers are liquidated.[3]

To summarize, we expect that after adjusting inventory to as-if FIFO, investors estimate a firm's future LIFO liquidation tax burden as its LIFO reserve multiplied by the appropriate corporate tax rate, and then include this tax-adjusted LIFO reserve in the valuation of a LIFO firm's net assets. In this scenario, the tax-adjusted LIFO reserve is, in effect, an estimate of an off-balance-sheet deferred tax liability. As a result, we predict a negative association between the tax-adjusted LIFO reserve and market value of equity. Throughout the paper, we refer to this as the deferred tax explanation of the negative association between the LIFO reserve and market value of equity.

The results of our tests support the deferred tax explanation. Specifically, after adjusting inventory to as-if FIFO and calculating the deferred tax liability associated with this adjustment (equal to the tax-adjusted LIFO reserve), we document that the association between the tax-adjusted LIFO reserve and market value of equity is negative and that this association is less negative in the years following the passage of the U.S. Tax Reform Act of 1986 (TRA 86). This latter result is consistent with the deferred tax explanation because the decrease in tax rates mandated by TRA 86 reduced the real value of the deferred tax liability proxied by the tax-adjusted LIFO reserve.

We also find that in tests of the association of the tax-adjusted LIFO reserve and deferred tax liability with market value of equity, (1) the response to TRA 86

of the tax-adjusted LIFO reserve/market value of equity association is similar to that of the deferred tax liability/market value of equity association; and (2) the estimated coefficients on the tax-adjusted LIFO reserve and the deferred tax liability are similar. The fact that the association of the tax-adjusted LIFO reserve and deferred tax liability with market value of equity each became less negative in post-TRA 86 years, in conjunction with the similarity of the magnitude of the tax-adjusted LIFO reserve and deferred tax liability coefficients, provides additional support for the deferred tax explanation.

The primary contribution of this paper is that it helps to explain the ex ante unexpected negative association between the LIFO reserve and market value of equity. This contribution is important for several reasons. First, our results clarify the nature of the information provided by an important footnote disclosure, the LIFO reserve. In addition, our results provide evidence on whether investors view deferred taxes as real liabilities.[4] Finally, our tests examine how the association of the tax-adjusted LIFO reserve and deferred tax liability with market value of equity changed in response to the decrease in tax rates mandated by TRA 86, which allows us to provide indirect evidence on the sensitivity of equity value to tax rate changes.

The paper is organized as follows. Section 2 describes sample selection; section 3 discusses models and test design and reports test results; and section 4 concludes the paper with a brief summary and a discussion of its major findings.

2. Sample selection

Data are from COMPUSTAT primary, supplementary, tertiary, full coverage, and research files and from files of the Center for Research in Security Prices (CRSP). The years covered are 1975, the first year for which COMPUSTAT reports LIFO reserve data, through 1994, the last year for which all required data items are available. The sample is limited to firm years that report LIFO as their primary method of accounting for inventory because the LIFO reserve should be an important consideration for these firms. We reduced the initial sample of 20,894 firm-years to 11,617 firm-years after removing 7,881 firm-years with missing data, 849 firm-years that do not fall in pre-TRA 86 or fully phased in post-TRA 86 years (as defined below), and 547 firm-years with a test variable whose value falls in the top percentile of the distribution for that test variable.[5]

Table 1 summarizes descriptive data for the sample. The percentage of observations falling in a given year ranges from 2.6 percent in 1975 to 6.9 percent in 1983, and 62.2 percent of observations occur in pre-TRA 86 years. In addition, the median of inventory as a percentage of total assets ranges from 18.5 percent in 1994 to 27.2 percent in 1979, the range in the median of the LIFO reserve as a percentage of total assets is from 2.8 percent in 1994 to 7.2 percent in 1981; and the median of the LIFO reserve as a percentage of owners' equity ranges from 6.1 percent in 1994 to 14.3 percent in 1981.[6] These percentages suggest that inventory and the LIFO reserve are important considerations for the firms in our sample.

TABLE 1
Descriptive data for the sample

Year	*N*	*INV/ ASSETS*	*RES/ ASSETS*	*RES/OE*
1994	511	18.5%	2.8%	6.1%
1993	516	19.2	3.0	6.5
1992	530	19.9	3.1	6.7
1991	538	20.0	3.5	7.3
1990	565	21.0	3.9	8.2
1989	583	21.9	3.8	8.8
1988	623	22.8	3.8	8.4
1987	528	21.3	3.8	7.6
1985	735	23.7	4.7	9.7
1984	767	23.7	5.7	11.2
1983	796	22.6	6.3	12.2
1982	792	24.1	7.0	14.1
1981	772	25.6	7.2	14.3
1980	747	26.5	7.1	14.2
1979	698	27.2	6.7	14.0
1978	640	26.2	6.0	12.1
1977	573	26.5	5.9	11.3
1976	403	25.9	5.6	10.8
1975	300	25.0	5.6	11.0
Total	11,617			

Notes:

Data are from COMPUSTAT primary, supplementary, tertiary, full coverage, and research files and from the Center for Research in Security Prices (CRSP) files. The years covered are 1975 through 1994. The initial sample of 20,894 firm-years that report LIFO as their primary method of accounting for inventory is reduced to 11,617 firm-years after removing 7,881 firm years with missing data, 849 firm years that do not fall in pre-TRA 86 or fully phased in post-TRA 86 years, and 547 firm-years with a test variable whose value falls in the top percentile of the distribution for that test variable. For each year, the table presents the number of observations in the sample, the median of inventory as a percentage of total assets (*INV/ASSETS*), the median of the LIFO reserve as a percentage of total assets (*RES/ASSETS*), and the median of the LIFO reserve as a percentage of owners' equity (*RES/OE*).

3. Model, test design, and results

Tests that use all years

As discussed earlier, we expect that when investors value a LIFO firm's net assets, they adjust LIFO inventory to as-if FIFO because, relative to LIFO cost, FIFO cost is closer to replacement cost. We also expect that, conditional on adjusting inventory to as-if FIFO, investors estimate a firm's future LIFO liquidation tax

burden as its LIFO reserve multiplied by the appropriate corporate tax rate, and then include this tax-adjusted LIFO reserve in the valuation of a LIFO firm's net assets. In this scenario, the tax-adjusted LIFO reserve is, in effect, an estimate of an off-balance-sheet deferred tax liability and, as a result, we predict a negative association between a firm's tax-adjusted LIFO reserve and the market value of its equity. As an initial test of this argument, we estimate the following model across firms in each of the 19 sample years (predicted signs for model coefficients are in brackets):

$$MV_{i,t} = \alpha_0 + \underset{[+]}{\gamma_1 ASSETS_{i,t}} + \underset{[+]}{\gamma_2 INV_{i,t}} + \underset{[-]}{\gamma_3 LIAB_{i,t}} + \underset{[-]}{\gamma_4 RESV_{i,t}} + \varepsilon_{i,t} \quad (1)$$

where i is firm i and t is the current (fiscal) year; *MV* is the market value of common equity at the end of the fourth month following the end of year t; *ASSETS* is the book value of assets other than inventory at the end of year t; *INV* is as-if FIFO inventory at the end of year t; *LIAB* is the book value of liabilities plus preferred stock at the end of year t; and *RESV* is the LIFO reserve reduced to a deferred tax amount at the end of year t. To reduce size effects, elements of the data matrix are deflated by shares of common stock outstanding.

In the model, *MV* is measured four months after the end of the year on the assumption that investors will have analyzed a firm's annual financial statements by this time. Inventory is stated at as-if FIFO to account for our expectation that investors adjust LIFO inventory to as-if FIFO. The LIFO reserve is reduced to a deferred tax amount (as described next) to reflect our expectation that, conditional on adjusting inventory to as-if FIFO, investors view the LIFO reserve reduced to a deferred tax amount as an indicator of a firm's future LIFO liquidation tax burden.[7]

The tax-adjusted LIFO reserve (*RESV*) is computed using the Accounting Principles Board's Opinion no. 11 (APB 11 1967) rules.[8] We begin by multiplying the 1975 LIFO reserve by the 1975 maximum corporate tax rate. In each succeeding year, we multiply the annual change in the LIFO reserve by that year's maximum corporate tax rate and use the resulting number to adjust the previous year's tax-adjusted LIFO reserve.[9]

In estimates of the model represented by equation 1, the coefficients on *ASSETS* and *INV* are expected to be positive and the coefficients on *LIAB* and *RESV* are expected to be negative. As reported in Table 2, the mean of the 19 estimated coefficients on each regression variable is in the predicted direction and significant at less than the 0.01 one-tail level. These results provide preliminary evidence consistent with our deferred tax explanation of the negative association between the tax-adjusted LIFO reserve and market value of equity.

Tests that compare pre-TRA 86 with post-TRA 86 years

TRA 86 reduced the maximum corporate tax rate, over a two-year period, from 46 percent to 34 percent. Assuming that taxes are paid at the maximum marginal rate

TABLE 2
Estimation of $MV_{i,t} = \alpha_0 + \gamma_1 ASSETS_{i,t} + \gamma_2 INV_{i,t} + \gamma_3 LIAB_{i,t} + \gamma_4 RESV_{i,t} + \varepsilon_{i,t}$

	γ_1	γ_2	γ_3	γ_4
Maximum estimate	1.49	1.64	-0.80	1.09
Median estimate	1.12*	1.06*	-1.05*	-0.73*
Minimum estimate	0.94	0.77	-1.50	-2.99
Mean estimate	1.15*	1.13*	-1.07*	-0.93*

Notes:

* Mean (median) differs from zero in the predicted direction at less than the 0.01 one-tail significance level

The sample consists of the 11,617 firm-years described in the notes to Table 1. The model is estimated across firms in each of 19 sample years. In the model:

MV = the market value of common equity at the end of the fourth month following the end of the current year.

ASSETS = the book value of assets other than inventory at the end of the current year.

INV = the book value of as-if FIFO inventory at the end of the current year.

LIAB = the book value of liabilities plus preferred stock at the end of the current year.

RESV = the LIFO reserve reduced to a deferred tax amount at the end of the current year.

All elements of the data matrix are deflated by shares of common stock outstanding at the end of the current year. In the columns headed γ_n, descriptive statistics for γ_n in the 19 regressions are reported.

over time, this decrease in rates would reduce the real value of the deferred tax liability approximated by the tax-adjusted LIFO reserve because this liability would eventually be settled at 34 percent rather than at 46 percent. As a result, if investors view the tax-adjusted LIFO reserve as an indicator of a firm's future LIFO liquidation tax burden, then the coefficient on *RESV* should be less negative in post-TRA 86 estimates of equation 1.[10]

To test the preceding prediction, we estimate equation 1 across firms in each of 11 pre-TRA 86 years as well as across firms in each of 8 post-TRA 86 years. We define pre-TRA 86 years as years for which *MV* is measured before TRA 86's enactment date (i.e., pre-TRA 86 years are fiscal years ending before June 1986).[11] Post-TRA 86 years are years for which future LIFO liquidations would be subject to a maximum tax rate of 34 percent (i.e., post-TRA 86 years are fiscal years ending after May 1987). On the basis of these definitions, only 151 January-to-May firms, before data screens, are available to estimate models in 1986. Since it is difficult to draw inferences using this small sample, we do not estimate models in 1986.

As can be seen in panel A of Table 3, the mean of the coefficients on *RESV* in the 8 post-TRA 86 estimates of equation 1 is less negative than the mean of the coefficients on *RESV* in the 11 pre-TRA 86 estimates at the 0.078 one-tail significance level. This result is consistent with the argument that the negative association between the tax-adjusted LIFO reserve and market value of equity

TABLE 3

Estimation of $MV_{i,t} = \alpha_0 + \gamma_1 ASSETS_{i,t} + \gamma_2 INV_{i,t} + \gamma_3 LIAB_{i,t} + \gamma_4 RESV_{i,t} + \gamma_5 DTL_{i,t} + \gamma_6 ABIL_i * RESV_{i,t} + \varepsilon_{i,t}$

Panel A: Estimation through γ_4

	$\gamma_4(RESV)$		
	Pre-TRA 86 years	Post-TRA 86 years	Sig.
Maximum estimate	0.04	1.09	
Median estimate	-1.28	-0.28	0.074
Minimum estimate	-2.92	-2.99	
Mean estimate	-1.26	-0.47	0.078

Panel B: Estimation of full model: Results for *RESV*, *DTL*, and *ABIL*RESV*

	$\gamma_4(RESV)$			$\gamma_5(DTL)$			$\gamma_6(ABIL*RESV)$	
	Pre-TRA 86 years	Post-TRA 86 years	Sig.	Pre-TRA 86 years	Post-TRA 86 years	Sig.	All years	Sig.
Maximum estimate	-0.17	1.04		-0.03	0.71		0.88	
Median estimate	-0.89	-0.51	0.151	-0.79	-0.11	0.021	0.11	0.027
Minimum estimate	-3.00	-2.81		-3.18	-1.41		-0.23	
Mean estimate	-1.23	-0.58	0.115	-1.13	-0.27	0.020	0.21	0.009

Panel C: Estimation of full model: Results for *ASSETS*, *INV*, and *LIAB*

	$\gamma_1(ASSETS)$			$\gamma_2(INV)$			$\gamma_3(LIAB)$		
	Pre-TRA 86 years	Post-TRA 86 years	Sig.	Pre-TRA 86 years	Post-TRA 86 years	Sig.	Pre-TRA 86 years	Post-TRA 86 years	Sig.
Maximum estimate	1.40	1.37		1.65	1.40		-0.91	-0.77	
Median estimate	1.13	1.12	0.966	1.07	1.07	0.976	-1.19	-0.88	0.001
Minimum estimate	0.91	0.94		0.79	0.85		-1.46	-1.05	
Mean estimate	1.13	1.12	0.986	1.14	1.10	0.750	-1.16	-0.90	0.001

Notes:

The sample consists of the 11,617 firm-years described in the notes to Table 1. The model is estimated across firms in each of 11 pre-TRA 86 years and 8 post-TRA 86 years. In panel A:

MV = market value of common equity at the end of the fourth month following the end of year *t*.

ASSETS = book value of assets other than inventory at the end of year *t*.

INV = book value of as-if FIFO inventory at the end of year *t*.

TABLE 3 (continued)

LIAB	=	book value of liabilities plus preferred stock at the end of year *t*.
RESV	=	LIFO reserve reduced to a deferred tax amount at the end of year *t*.
In panels B and C:		
MV, ASSETS, INV, and *RESV*	=	as defined in panel A.
LIAB	=	book value of liabilities, other than deferred tax liability, plus preferred stock at the end of year year *t*.
DTL	=	deferred tax liability at the end of year year *t*.
*ABIL*RESV*	=	the correlation across the study period between a firm's yearly gross profit as a percentage of sales and the year-end Consumers' Price Index level interacted with the gross LIFO reserve.

All elements of the data matrix are deflated by shares of common stock outstanding at the end of the year *t*.

In the columns headed $\gamma_1,...,\gamma_5$ (1) descriptive statistics for $\gamma_1,...,\gamma_5$ in the 11 pre-TRA 86 regressions and in he 8 post-TRA 86 regressions are reported; and (2) the "Sig." column reports the one-tail significance level of a *t*-test of the difference in means (of a rank-sum test) that tests the alternative hypothesis that the mean (median) coefficient in the 8 post-TRA 86 estimates of the model is less negative than the mean (median) coefficient in the 11 pre-TRA 86 estimates of the model. In the column headed γ_6, (1) descriptive statistics for γ_6 in all 19 regressions are reported; and (2) the "Sig." column reports the one-tail significance level of a *t*-test (of a sign-rank test) that tests the alternative hypothesis that mean (median) γ_6 is greater than zero in the 19 estimates of the model.

reflects the fact that investors view the LIFO reserve reduced to a deferred tax amount as an indicator of a firm's future LIFO liquidation tax burden.

In post-TRA 86 years, maximum corporate tax rates decreased from 46 percent to 34 percent, which suggests that, ceteris paribus the estimated coefficient on *RESV* should decline by at most 26 percent in post-TRA 86 years (i.e., [46 - 34]/46). However, the actual decline observed in Table 3 is much more than 26 percent. We have no explanation for this result. However, we do point out that in tests of the association between a firm's deferred tax liability and the market value of its equity reported in the following section, the post-TRA 86 decline in the estimated coefficient on the deferred tax liability is also much more than 26 percent. Moreover, as reported later, there is a 22.4 percent decline in the estimated coefficient on *LIAB* from the pre-TRA 86 period to the post-TRA 86 period, which suggests that there may have been a post-TRA 86 structural shift in the valuation of all liabilities that helps to explain why the post-TRA 86 decline in the estimated coefficients on *RESV* and the deferred tax liability is greater than 26 percent.[12]

Tests that use an augmented model

In this section, we report the results of tests that augment equation 1 with (1) a firm's deferred tax liability balance; and (2) a proxy for the price-elasticity argument, which is described in detail later. The deferred tax liability balance is added to equation 1 because this allows us to compare the tax-adjusted LIFO reserve/market value of equity association with the deferred tax liability/market

value of equity association. If these associations are similar, we will interpret this as additional support for the deferred tax explanation of the negative association between the tax-adjusted LIFO reserve and market value of equity. A proxy for the price-elasticity argument is added to equation 1 to account for the price-elasticity explanation as to why there is a negative association between the LIFO reserve and market value of equity.

The specific model estimated in this section is as follows:

$$MV_{i,t} = \alpha_0 + \underset{[+]}{\gamma_1 ASSETS_{i,t}} + \underset{[+]}{\gamma_2 INV_{i,t}} + \underset{[-]}{\gamma_3 LIAB_{i,t}} + \underset{[-]}{\gamma_4 RESV_{i,t}} + \underset{[-]}{\gamma_5 DTL_{i,t}} + \underset{[+]}{\gamma_6 ABIL_i * RESV_{i,t}} + \varepsilon_{i,t} \quad (2)$$

where *MV*, *ASSETS*, *INV*, and *RESV* are defined as in equation 1, *LIAB* is *LIAB* in equation 1 other than *DTL*, *DTL* is the deferred tax liability at the end of the current year deflated by shares of common stock outstanding, and *ABIL*RESV* is a measure of ability to pass on input price increases interacted with the gross LIFO reserve deflated by shares of common stock outstanding.

Previous research[13] finds that investors view deferred taxes as a real liability. On the basis of this research, in estimates of equation 2, the coefficient on *DTL* is expected to be negative.

Furthermore, under the provisions of APB 11, which was in effect when TRA 86 was enacted into law, a firm would not adjust its deferred tax liability to account for the reduction of tax rates mandated by TRA 86. For this reason, after the passage of TRA 86, the portion of a firm's deferred tax liability that was established prior to TRA 86 using a 46 percent tax rate would overstate the taxes that would result from the eventual settlement of the deferred tax liability at 34 percent. As a result of this post-TRA 86 overstatement, the *DTL* coefficient is expected to be less negative in post-TRA 86 estimates of equation 2.

Guenther and Trombley (1994) and Jennings et al. (1996) develop a price-elasticity argument that they use to interpret the negative association between the LIFO reserve and market value of equity. This argument states that, conditional on the LIFO reserve providing information to investors about a firm's future input price increases,[14] a negative (non-negative) association between the LIFO reserve and market value of equity is consistent with the conclusion that investors expect that firms on average cannot (can) raise output prices at least dollar for dollar in response to input price increases. In their empirical analysis, Guenther and Trombley and Jennings et al. observe a negative association between the LIFO reserve and market value of equity, and a less negative association for firms that are better able to pass on input price increases to their customers. On the basis of price-elasticity argument, these results are interpreted as consistent with the conclusion that investors expect that firms on average are unable to raise prices at least dollar for dollar in response to input price increases.

To account for the price-elasticity argument, equation 2 includes a variable, *ABIL*RESV*, that measures a firm's ability to pass on input price increases after controlling for the size of its LIFO reserve. Ability to pass on input price increases, *ABIL*, is proxied by a measure used in Jennings et al. (1996). Specifically, *ABIL* is equal to the correlation across the study period between a firm's yearly gross profit as a percentage of sales and the year-end level of the Consumers' Price Index, with a higher (i.e., more positive) *ABIL* reflecting a greater ability to pass on input price increases.[15] On the basis of the evidence in Guenther and Trombley (1994) and Jennings et al., the coefficient on *ABIL*RESV* is expected to be positive in estimates of equation 2.

The results of estimating equation 2 across firms in each sample year are summarized in panel B of Table 3. As before, the mean of the post-TRA 86 estimated coefficients on *RESV* is less negative than the mean of the pre-TRA 86 estimated coefficients (0.115 one-tail significance level). Regarding this marginal result, we later show that, as predicted, the difference between post-TRA 86 and pre-TRA 86 estimated *RESV* coefficients is more significant when we narrow the test window surrounding TRA 86.

The estimated coefficient on *DTL* is generally negative and the mean of the post-TRA 86 estimated coefficients on *DTL* is less negative than the mean of the pre-TRA 86 estimated coefficients (0.020 one-tail significance level). Moreover, the *DTL* coefficient does not differ from the *RESV* coefficient at the 0.05 two-tail significance level in 12 of 19 estimates of equation 2 and the mean of the 19 estimated *DTL* coefficients does not differ from the mean of the 19 estimated *RESV* coefficients at conventional significance levels (two-tail p-value is 0.532). The similarity of the magnitude of the estimated *RESV* and *DTL* coefficients, in conjunction with the similarity of the response to TRA 86 of the tax-adjusted LIFO reserve/market value of equity association and the deferred tax liability/market value of equity association, provides additional support for the deferred tax explanation of the negative association between the tax-adjusted LIFO reserve and market value of equity.

The mean of the 19 estimated coefficients on *ABIL*RESV* is positive (0.009 one-tail significance level). On the basis of the price-elasticity argument and consistent with previous research, this result suggests that investors expect that firms on average cannot raise output prices at least dollar for dollar in response to input price increases.[16]

Tests for a post-TRA 86 structural shift in valuations

It is possible that there was a structural shift in the valuation of assets and liabilities in the post-TRA 86 period that is related to factors not included in our models. Such a structural shift could explain the results for *RESV* and *DTL* reported to this point. To provide evidence whether a structural valuation shift did occur in the post-TRA 86 period, we examine the post-TRA 86 behavior of the coefficients on *ASSETS*, *INV*, and *LIAB* in estimates of equation 2. If only the coefficients on *RESV* and *DTL* exhibit the post-TRA 86 behavior documented earlier, this would

provide evidence that our results are not well explained by a post-TRA 86 structural valuation shift.

As seen in panel C of Table 3, the mean of the post-TRA 86 estimated coefficients on *ASSETS* and *INV* do not differ from the mean of the pre-TRA 86 estimated coefficients at conventional significance levels. However, the mean of the post-TRA 86 estimated coefficients on *LIAB* is less negative than the mean of the pre-TRA 86 estimated coefficients at the 0.001 two-tail significance level. This latter result suggests that there may have been a structural shift in the valuation of liabilities that caused all types of liabilities, including *RESV* and *DTL*, to have a less negative association with market value of equity in post-TRA 86 years. However, the post-TRA 86 decrease in the estimated coefficient on *LIAB* is much smaller in magnitude than the post-TRA 86 decrease in the estimated coefficients on *RESV* and *DTL*, which suggests that the TRA 86 decrease in tax rates did have a separate, additional impact on *RESV* and *DTL* that it did not have on *LIAB*.

The results reported in this section provide indirect evidence on the sensitivity of equity value to tax rate changes. Specifically, the results indicate that the association of *RESV* and *DTL* with *MV* each became less negative in post-TRA 86 years. Furthermore, this reaction to TRA 86 is insignificant or less pronounced for *ASSETS*, *INV*, and *LIAB*. Since a less negative association between a given variable and *MV* in response to the reduction of tax rates mandated by TRA 86 is predicted only for the variables *RESV* and *DTL*, these results provide indirect evidence that equity value is sensitive to changes in tax rates.

Tests that use narrower windows around TRA 86

The results reported to this point are based on comparing the mean of the estimated coefficients on *RESV* and *DTL* in all pre-TRA 86 years (i.e., 1975 to 1985) with the mean of the estimated coefficients on *RESV* and *DTL* in all post-TRA 86 years (i.e., 1987 to 1994). If we narrow the test window around TRA 86, our results should be stronger for the following reason. After the passage of TRA 86, it is the portion of a firm's tax-adjusted LIFO reserve (deferred tax liability) that was established prior to TRA 86 that overstates the taxes that would result from the eventual liquidation of the LIFO reserve (settlement of the deferred tax liability) at 34 percent. Since this pre-TRA 86 portion decays as a firm liquidates LIFO layers (settles deferred tax liabilities), the hypothesis that the *RESV* (*DTL*) coefficient is less negative in post-TRA 86 estimates of equation 2 should receive stronger support in the years immediately surrounding TRA 86. An additional reason that this hypothesis should receive stronger support in the years immediately surrounding TRA 86 is that test data are less likely to be "contaminated" by firms that adopted SFAS 96 or SFAS 109 during the sample period.[17]

Our narrow-window tests are conducted using the two (three; four) years falling before and after the passage of TRA 86. As expected, test results are stronger using these narrower windows. Specifically, using the two- (three-; four-) year window, the mean of *RESV* and *DTL* coefficients in post-TRA 86 estimates of equation 2 are less negative than the mean of *RESV* and *DTL* coefficients in pre-

TRA 86 estimates at the 0.025 and 0.021 (0.001 and 0.005; 0.049 and 0.003) one-tail significance levels, respectively.

Tests that account for changes in inflationary expectations

Inflationary expectations should have been lower in the post-TRA 86 period. For example, on the basis of data reported in *Statistical Abstracts of the United States*, the annual percentage change in the Consumers' Price Index exceeds 9.0 (5.5) percent in 4 (8) of 11 pre-TRA 86 years and it never exceeds 5.5 percent in any post-TRA 86 year. If susceptibility to inflation reduces market value of equity and if the *RESV* coefficient reflects susceptibility to inflation, then an alternative explanation for the post-TRA 86 decline in the *RESV* coefficient is that there was a reduction of inflationary expectations in the post-TRA 86 period.[18]

To explore this issue, we estimate equation 2 using only years in which the annual percentage change in the Consumers' Price Index (ΔCPI) is relatively low. On the basis of on an inspection of the CPI time series from 1975 to 1994, we define low-ΔCPI years as 1983 to 1994, with qualitatively similar results obtained using alternative definitions of low-ΔCPI years. In low-ΔCPI estimates of equation 2, the mean of the post-TRA 86 coefficients on *RESV* is less negative than the mean of the pre-TRA 86 coefficients at the 0.004 one-tail significance level. Since only low-ΔCPI years are used in these tests, this result suggests that reduced post-TRA 86 inflationary expectations do not explain the post-TRA 86 decline in the *RESV* coefficient.

Tests that use an alternative valuation model

This section reports the results of estimating a valuation model that includes a firm's earnings less net dividends as an independent variable. The reason for this additional analysis is as follows. It seems reasonable that a firm's earnings are correlated with its ability to pass on input price increases. For example, a firm that is relatively unsuccessful at passing on input price increases should have relatively lower earnings. Since earnings less net dividends are an important factor for valuing a firm's equity (see, e.g., Ohlson 1995), this raises the possibility that the negative association between the LIFO reserve and market value of equity, to the extent that it reflects inability to pass on input price increases, is actually reflective of the correlated omitted variable earnings less net dividends.[19] To explore this issue, we estimate the following model:[20]

$$MV_{i,t} = \alpha_0 + \gamma_1(\phi(EBEXT_{i,t} - DIV_{i,t})) + \gamma_2 BVCE_{i,t} + \gamma_3 RESV_{i,t} + \varepsilon_{i,t} \qquad (3)$$

where *MV* and *RESV* are defined as in equation 1, ϕ is $(1 + Rf)/Rf$ where *Rf* is the average annual return on 30-day Treasury securities, *EBEXT* is net income before extraordinary items per share, *DIV* is dividends net of new capital contributions per share, and *BVCE* is the book value of common equity (with inventory stated at as-if FIFO) per share.

In estimates of equation 3, the mean of the coefficients on *RESV* in the 8 post-TRA 86 estimates is less negative than the mean of the coefficients on *RESV* in the

11 pre-TRA 86 estimates at the 0.043 one-tail significance level.[21] Assuming that earnings less net dividends captures a firm's ability to pass on input price increases, this result provides additional support for the deferred tax explanation of the negative association between the tax-adjusted LIFO reserve and market value of equity.

4. Summary

Recent research by Guenther and Trombley (1994) and Jennings et al. (1996) documents a negative association between a firm's LIFO reserve and the market value of its equity. This study tests a deferred tax explanation of this negative association. Specifically, we argue that investors, conditional on adjusting inventory to as-if FIFO, estimate a firm's future LIFO liquidation tax burden as its LIFO reserve multiplied by the appropriate corporate tax rate, and then include this tax-adjusted LIFO reserve in the valuation of a LIFO firm's net assets. On the basis of this argument, the tax-adjusted LIFO reserve is in effect an estimate of an off-balance-sheet deferred tax liability and, as a result, we predict a negative association between the tax-adjusted LIFO reserve and market value of equity.

The results of our tests support the deferred tax explanation. In particular, we find that the association between the tax-adjusted LIFO reserve and market value of equity is negative and that this association is less negative after the passage of TRA 86. This latter result is consistent with the deferred tax explanation because the decrease in tax rates mandated by TRA 86 reduced the real value of the deferred tax liability proxied by the tax-adjusted LIFO reserve. We also find that in tests of the association of the tax-adjusted LIFO reserve and deferred tax liability with market value of equity, (1) the response to TRA 86 of the tax-adjusted LIFO reserve/market value of equity association is similar to that of the deferred tax liability/market value of equity association; and (2) the magnitudes of the estimated coefficients on the tax-adjusted LIFO reserve and the deferred tax liability are similar.

The results of this paper provide several insights for financial analysts and for the financial statement analysis literature. First, this paper provides evidence consistent with the conclusion that disclosure of the LIFO reserve is useful because it provides information about a firm's tax burden. Second, consistent with previous research (e.g., Givoly and Hayn 1992; Amir, Kirschenheiter, and Willars 1997; Sansing 1997; Cheung, Krishnan, and Min 1997), the results of this paper provide evidence that investors view deferred taxes as real liabilities that reduce a firm's market value of equity. Finally, our results provide indirect evidence that equity value is sensitive to changes in tax rates.

Endnotes

1. The LIFO reserve, a required disclosure for LIFO firms, is the difference between inventory at the lower of LIFO cost and market and inventory at either (1) the lower of cost determined by some acceptable non-LIFO inventory accounting method, such as FIFO, and market; or (2) replacement cost. For expositional clarity, we assume that lower of FIFO cost and market is the non-LIFO inventory method used to compute the LIFO reserve.

2. In reality, if a firm uses LIFO for tax purposes, it must also use LIFO for financial reporting purposes (Internal Revenue Code sections 472(c) and 474(e)). However, this LIFO conformity rule would not prevent investors from converting a LIFO firm's balance sheet to as-if FIFO when valuing a LIFO firm's net assets.
3. This discussion assumes inflation in a firm's input prices. The deferred tax liability described here is often referred to as a firm's future LIFO liquidation tax burden.
4. Previous evidence that investors regard deferred taxes as a real liability includes Givoly and Hayn (1992) and Amir, Kirschenheiter, and Willard (1997), who find that a firm's deferred tax liability is negatively associated with its equity value; the analytical model of Sansing (1997) in which deferred taxes are shown to be a real economic liability of the firm; and Cheung, Krishnan, and Min (1997, 14), who find "that consideration of deferred tax information leads to superior forecasts of future tax payments and that deferred tax data enhance prediction of future cash flows".
5. Qualitatively similar results are obtained using alternate definitions of outliers based on the diagnostic tests of Belsley, Kuh, and Welsch (1980).
6. As noted in Jennings et al. 1996, the magnitude of the LIFO reserve is positively associated with inflation. The generally declining trend over time in the magnitude of the LIFO reserve observed in Table 1 likely reflects the generally declining trend in inflation over our test period.
7. In equation 1, *INV* (*RESV*) is analogous to *FIXED* (*DTL*) in the model *MV* = *ASSETS* + *FIXED* + *LIAB* + *DTL*, where *MV* is market value of equity, *ASSETS* are assets other than *FIXED*, *FIXED* are depreciable assets, *LIAB* are liabilities other than *DTL*, and *DTL* is deferred tax liability related to depreciation. Note that *DTL* in this model (and *RESV* in equation 1) is expected to reduce *MV* because *DTL* captures a firm's future tax burden. However, *DTL* also captures taxes saved in the past by taking larger-than-book tax deductions. As a result of this latter factor, firms with a larger *DTL* would be expected to have a larger *MV*. This relationship is captured in the model by *ASSETS* or *LIAB* because firms with a larger *DTL* would have a larger cash balance (or, if cash were used to pay down debt, a smaller debt balance; or, if cash were used to buy an asset, a larger asset balance; etc.) due to taxes saved in the past.

   Equation 1 is similar to equation 6 in Jennings et al. 1996. However, in equation 1, inventory is stated at as-if FIFO and the LIFO reserve is reduced to a deferred tax amount.
8. APB 11 rules are used for two reasons. First, these rules were in effect when TRA 86 was enacted into law. Second, the use of APB 11 rules allows a more direct comparison of the tax-adjusted LIFO reserve with the deferred tax liability (DTL) recognized on a firm's balance sheet. When a firm adopts SFAS 109 (FASB 1992), it adjusts its entire DTL to reflect expected DTL settlement rates. SFAS 109 required adoption for fiscal years starting after December 15, 1992. As a sensitivity test, we adjust the LIFO reserve using SFAS 109 rules from 1992 to 1994, with similar results. We do not attempt to adjust the LIFO reserve using SFAS 96 (FASB 1987) rules because evidence in Gujarathi and Hoskin (1992) suggests that many firms did not adopt SFAS 96 (i.e., they moved directly from APB 11 to SFAS 109).
9. For example, assume that a firm's LIFO reserve is \$100 at the end of 1981, its tax-adjusted LIFO reserve at the end of 1981 is \$46, and its LIFO reserve at the end of 1982 is \$90 [\$130]. The maximum corporate tax rate for 1982 is 46 percent. The firm's tax-adjusted LIFO reserve at the end of 1982 would be \$41.40 (\$46 - \$10 × .46) [\$59.80 (\$46 + \$30 × .46)].

10. *RESV* is computed using APB 11 rules. Under APB 11, a firm would not adjust its deferred tax liability to account for the reduction of tax rates mandated by TRA 86. Thus, in post-TRA 86 years the portion of *RESV* that was established prior to TRA 86 using a 46 percent tax rate would overstate the taxes that would result from the eventual liquidation of the LIFO reserve at 34 percent. As a result of this post-TRA 86 overstatement, the *RESV* coefficient is expected to be less negative in post-TRA 86 years.
11. As described in Givoly and Hayn (1992, 398–9), "Discussions and proposals pertaining to tax reform appear to have begun in September, 1984.... Subsequently, the pace of events leading to tax reform accelerated rapidly in 1985 and 1986." If firms' market value of equity began to respond to the implications of TRA 86 as early as September 1984, then the classification of years for which *MV* is measured between September 1984 and TRA 86's enactment date as pre-TRA 86 years makes it more difficult to find support for the deferred tax explanation.
12. As discussed later, such a structural shift would not explain the entire post-TRA 86 decline in the estimated coefficients on *RESV* and the deferred tax liability, because the post-TRA 86 decline in the estimated coefficient on *LIAB* is much smaller in magnitude than the post-TRA 86 decline in the estimated coefficients on *RESV* and the deferred tax liability.
13. Summarized in note 4, supra.
14. The price-elasticity argument holds as long as the LIFO reserve is at least associated with the information used by investors to infer a firm's future input price increases. That is, the price-elasticity argument could hold even if investors do not use the LIFO reserve itself to make inferences about a firm's future input price increases. For this reason, the price-elasticity argument does not necessarily imply that the LIFO reserve itself is value relevant. We thank a referee for pointing this out to us.
15. In constructing *ABIL*, we require that a firm have at least five years of gross profit data.
16. A referee pointed out that given inflation in input prices, gross profit (and thus *MV*) should be greater, the greater are days-inventory-on-hand (*DAYSINV*). The intuition of this argument is that an older, lower-priced unit of inventory would be reported as cost of goods sold, the greater are *DAYSINV*. When we augment equation 2 with *DAYSINV*RESV*, this argument is supported at the 0.012 one-tail significance level and other test results are very similar to those reported here.
17. See note 8, supra.
18. Inflation reduces market value of equity if a firm cannot raise prices at a rate exceeding the inflation rate of input prices (Damodaran 1996). Given the evidence in Guenther and Trombley (1994) and Jennings et al. (1996) suggesting that firms are unable to raise prices at least dollar for dollar in response to input price increases, it seems prudent to examine this explanation of our results.
19. We thank a referee for drawing our attention to this point. Also, as pointed out by this same referee, the inclusion of the potential correlated omitted variable $\phi(EBEXT_{i,t} - DIV_{i,t})$ in equation 3 below may introduce multicollinearity problems. We test for multicollinearity using condition indices (Belsley et al. 1980). No condition index exceeds 14. On the basis of the rule of thumb that a condition index exceeding 30 indicates strong collinearity (Kennedy 1992), we conclude that multicollinearity is not a serious problem in estimates of equation 3.

20. We thank a referee for suggesting that we estimate this model. Equation 3 is similar to equation 2 in Guenther and Trombley (1994). However, in equation 3 *BVCE* is based on inventory stated at as-if FIFO and *RESV* is reduced to a deferred tax amount.
21. When we include *DTL* in equation 3, the mean of the post-TRA 86 estimated coefficients on *RESV* (*DTL*) is less negative than the mean of the pre-TRA 86 estimated coefficients at the 0.016 (0.001) one-tail significance level. Also, similar test results are obtained if the term $\phi EBEXT_{i,t} - DIV_{i,t}$ is replaced with the term $EBEXT_{i,t}$, $EBEXT_{i,t} - DIV_{i,t}$, $EBEXT_{i,t}$ - cash $\text{dividends}_{i,t}$, or $\phi EBEXT_{i,t}$ - cash $\text{dividends}_{i,t}$.

References

Accounting Principles Board. 1967. *Opinion no. 11: Accounting for income taxes.* American Institute of Certified Public Accountants.

Amir, E., M. Kirschenheiter, and K. Willard. 1997. The valuation of deferred taxes. *Contemporary Accounting Research* 14 (Winter): 597–622.

Belsley, D. A., E. Kuh, and R. E. Welsch. 1980. *Regression diagnostics: Identifying influential data and sources of collinearity.* New York: Wiley.

Cheung, J. K., G. V. Krishnan, and C. Min. 1997. Does interperiod tax allocation enhance prediction of cash flows? *Accounting Horizons* 11 (December): 1–15.

Damodaran, A. 1996. *Investment valuation,* university ed. New York: Wiley.

Financial Accounting Standards Board (FASB). 1987. *Statement of Financial Accounting Standards no. 96: Accounting for Income Taxes.* Stamford, CT: FASB.

———. 1992. *Statement of Financial Accounting Standards no. 109: Accounting for Income Taxes.* Stamford, CT: FASB.

Givoly, D., and C. Hayn. 1992. The valuation of the deferred tax liability: Evidence from the stock market. *The Accounting Review* 67 (April): 394–410.

Guenther, D. A., and M. A. Trombley. 1994. The "LIFO reserve" and the value of the firm: Theory and empirical evidence. *Contemporary Accounting Research* 10 (Spring): 433–52.

Gujarathi, M. R., and R. E. Hoskin. 1992. Evidence of earnings management by the early adopters of SFAS 96. *Accounting Horizons* 6 (December): 18–31.

Jennings, R., P. J. Simko, and R. B. Thompson III. 1996. Does LIFO inventory accounting improve the income statement at the expense of the balance sheet? *Journal of Accounting Research* 34 (Spring): 573–608.

Kennedy, P. 1992. *A Guide to econometrics,* 3rd ed. Cambridge, MA: MIT Press.

Ohlson, J. A. 1995. Earnings, book values, and dividends in equity valuation. *Contemporary Accounting Research* 10 (Spring): 661–87.

Sansing, R. 1997. Valuing the deferred tax liability. Working paper, Dartmouth College.

White, G. I., A. C. Sondhi, and D. Fried. 1998. *The analysis and use of financial statements,* 2nd ed. New York: Wiley.