The Financial Review *Vol. 27 No. 2 May 1992 Pp. 151–184*

The Asset Price Theory of Shareholder Revaluations: Tests with the Tax Reforms of the 1980s

Thomas W. Downs and Cuneyt Demirgures**

Abstract

A tax reform providing incentives for fixed investment may increase shareholder wealth because after-tax cash flows on planned investment increase. Alternatively, shareholder wealth may decline because existing assets receive disadvantageous tax treatment relative to new ones and equities are largely claims on existing assets. This study tests the alternative hypothesis by predicting in a simulation model the revaluation of existing assets resulting from the 1981 and 1986 tax acts and then by comparing the predictions to stock returns data. The results reject the hypothesis that cumulative excess returns accruing because of tax reform equal the revaluation on existing assets.

Introduction

In the past ten years, Congress changed the rules affecting the taxation of corporate capital income perhaps more significantly than in the previous thirty years combined. Major tax overhauls were enacted through the Economic Recovery Tax Act of 1981 and the Tax Reform Act of 1986; lesser legislative changes to the corporate tax code were passed in 1982, 1984, and 1987. The effect of tax reform on financial behavior has been investigated on several fronts. Bolster, Lindsey, and Mitrusi [4] find that the 1986 changes in tax law affected the year-end trading behavior of securities with long-term capital gains or losses. Poterba [19] provides clear evidence that the yield spread between long-term taxable and tax-exempt bonds responded to the 1986 change

*University of Alabama, Tuscaloosa, AL 35487. Financial support provided by the College of Commerce and Business Administration Summer Research Award Program is gratefully acknowledged. Suggested improvements by Andrew Lyon are gratefully acknowledged.

in personal tax rates. Chiang and Lasser [5] report that in the foreign currency futures market there is a significant opening of the futures-forward price differential on three-month contracts immediately after enactment of the 1981 tax law changes. Scholes and Wolfson [20] find that the 1981 tax law increased corporate mergers and acquisitions activity, but the 1986 law decreased it. These studies, and many others, indicate general agreement that financial behavior is affected by tax reform. There is no consensus, though, about how tax reform affects shareholder wealth.

In a recent study, Lyon [16] examines legislated changes in the rate of the investment tax credit (ITC) and explains two alternative theories:

> A change in the tax law that increases investment incentives for new assets may result in excess returns on new investment, causing firm value to increase. Alternatively, because the investment incentives apply only to new investments, the value of existing assets that compete with these investments may decline. [16, p. 227]

The view espoused in the first statement is the "traditional cash flow theory," predicting that investment incentives benefit shareholders because the net cost of planned investment declines and residual cash flow increases. The view in the second statement that investment incentives diminish shareholder wealth is the "asset price theory" (Summers [22], Abel [1], and Auerbach and Kotlikoff [3]). According to this theory, shareholder wealth declines because preferential tax treatment is extended to new investments, existing assets are disadvantaged, and equities largely represent claims on existing assets. The alternative theories predict opposite outcomes. Research studies deducing which theory is correct have yielded mixed results.

The empirical evidence provided by Lyon [16] supports the traditional cash flow theory. His analysis of four changes to the ITC between 1966 and 1971 indicates that shareholder wealth in firms with heavy planned investment increased significantly when the ITC was raised, and it fell when the ITC was reduced.

He finds no evidence indicating opposite movements in the revaluation of existing assets.

Several studies find inconclusive evidence about either theory. Lyon [17] examines whether introduction of the Accelerated Cost Recovery System (ACRS) with the 1981 tax reform caused stock prices to rise, as suggested by the traditional cash flow theory, or to fall, as suggested by the asset price theory. His results suggest that neither theory is an important determinant of cross-sectional differences in excess returns. Cutler [7] examines the association between firm characteristics and stock returns around two key events in the legislative history of the 1986 tax reform. He finds some evidence in favor of the asset price theory, but generally his results are insignificant.

The empirical evidence provided by Downs and Tehranian [12] (hereafter D&T [12]) supports the asset price theory. They use the theory to predict the effect in three alternative industries of the 1981 tax act. Analysis of industry common stock returns during periods of legislative activity shows that for two of three interindustry comparisons the actual excess returns are significantly different from zero but insignificantly different from predicted. In their third interindustry comparison, results are inconclusive.

The current study augments existing evidence about the effect of tax reform on shareholder wealth. The asset price theory is used to predict changes in shareholder wealth for both the 1981 and 1986 tax acts for ten different industry groups. Subsequently, industry portfolios of common stocks are formed, and excess stock returns are analyzed. While the theoretical constructs employed herein are the same as in D&T [12], our sample is more extensive. We find that support for the asset price theory presented by D&T for their three-industry, one-reform sample does not extend to the ten-industry, two-reform sample examined herein. In fact, the hypothesis that the excess stock returns for the ten industries jointly equal the predictions from the asset price model is rejected for each reform.

The study proceeds as follows. The asset price model is summarized in the first section. The model is used to simulate the effects of the 1981 and 1986 tax acts on

shareholder wealth for ten industry groups in the second section. In the third section, a portfolio analysis of stock returns data is conducted, and inferences about the asset price theory are made. A brief conclusion closes the study.

The Asset Price Theory: Model and Estimates

The asset price model adopted herein values existing fixed assets (plant and equipment) in a framework that incorporates tax policy parameters and other variables. First, valuation estimates are computed by relying on variables and parameters reflective of the prereform environment. Subsequently, they are revalued using postreform settings. The change in the valuation estimate represents the asset price prediction of the change in shareholder wealth induced by the tax reform. The values of nonfixed assets and the net present values of future investments are not estimated because in the asset price model they are invariant to tax policy changes. Lyon [16] describes alternative theoretical conditions under which either the asset price or the traditional cash flow theory is correct. In short, though, the asset price theory assumes that capital goods are produced at their marginal cost, adjustment costs for altering the real capital stock are zero, and production is characterized by constant return to scale technology. This section outlines the asset price model used herein, and by D&T [12], and describes its empirical implementation. The appendix presents more detailed information on the data and algorithms. Other attributes of this model are examined by Downs [9, 10].

The value of existing fixed assets at time s, denoted V_s, is computed as the discounted sum of expected pretax cash flow (earnings before depreciation, taxes, and interest), denoted I_s, minus proportional taxes at the rate τ, plus the discounted tax savings from the depreciation tax shield, denoted τD_s:

$$V_s = (1 - \tau)I_s + \tau D_s. \tag{1}$$

The discount rate used in computing present values is the weighted average of after-tax debt and equity financing rates. Therefore, V equals the intrinsic worth of

debt and equity claims. The value of shareholder wealth equals V times $1 - b$, where b is the ratio of the market value of debt to the market value of debt plus equity. Computation of V requires the estimation of I and D. These, in turn, require specification of expected cash flows. Valuation estimates are constructed according to equation (1) for ten industry groups and for the total nonfinancial corporate (NFC) sector. The estimates are constructed for two benchmark dates, the beginning of years 1981 and 1986, corresponding to the years in which the tax reforms were enacted.

Computing the present value of depreciation tax savings, τD, requires construction of the stream of expected tax depreciation deductions on existing assets. This stream is constructed by depreciating all historical capital expenditures (gross capital investments) with the tax practices in effect at times of installation. The investments are depreciated into the future, thereby yielding the stream of expected tax depreciation deductions. The present value of the stream when discounted with the weighted average financing rate is D. The computation of D is summarized in the following formula:

$$D_s = \sum_{t=1}^{\infty} (1 + r)^{-t} \left(\sum_{u=1}^{\infty} E_{s-u+1} \, z_{s-u+1,\, t+u-1} \right). \qquad (2)$$

The discount rate r is the weighted average after-tax financial rate for the industry, E_s is the dollar amount of capital expenditures made at time s, and $z_{s,t}$ is the proportion of capital expenditures made at time s that is deductible for tax purposes at time $s + t$. The depreciation tax savings equals D multiplied by the statutory income tax rate.

Table 1 lists the present values of tax depreciation deductions for the beginning of years 1981 and 1986. These numbers are obtained for 1981 by using the tax depreciation schedules discussed in the Appendix to allocate beyond 1981 the capital expenditures from all previous years. For example, expenditures from 1951 (the service life of structures is thirty years) are depreciated by the tax practices in effect at that time, and the deductions remaining beyond 1981 are measured, as are the deductions remaining on expenditures from 1952,

TABLE 1

Sources of Cash Flow Sustaining Existing Fixed Asset Values

Industry (SIC No.)	Economic Recovery Tax Act of 1981			Tax Reform Act of 1986		
	I^* (1)	D^{**} (2)	V^{***} (3)	I^* (4)	D^{**} (5)	V^{***} (6)
Food Products (20)	$49.35	$16.96	$34.45	$51.75	$25.34	$39.60
Textile Products (22)	15.76	5.07	10.84	13.92	7.03	10.75
Paper Products (26)	36.45	12.97	25.65	40.49	18.54	30.39
Chemical Products (28)	81.10	25.64	55.59	85.79	30.03	60.14
Petroleum Products (29)	38.07	10.43	25.35	42.36	19.00	31.62
Rubber & Plastics (30)	20.24	7.11	14.20	23.41	8.67	16.63
Stone, Clay & Glass (32)	24.34	8.14	16.89	20.28	9.71	15.42
Primary Metals (33)	57.60	18.18	39.47	48.97	20.64	35.94
Nonelectrical Machinery (35)	53.54	18.09	37.23	62.32	27.49	46.30
Electrical Machinery (36)	39.69	13.29	27.55	67.18	28.27	49.28
Total Nonfinancial Corporate Sector (NFC)	$1,965.08	$610.09	$1,341.79	$2,360.28	$1,037.71	$1,751.90

NOTE: All entries are in billions and are reflective of the prereform environment.

* I is the present value of pretax cash flow and is constructed according to equation (3).

** D is the present value of tax depreciation deductions and is computed according to equation (2).

*** V is the present value of after-tax cash flow and is computed from equation (1) as $(1 - \tau)I + \tau D$, where τ is the statutory corporate tax rate of 0.46.

1953, etc.. The total deductions expected beyond 1981 constitute the tax depreciation stream relevant for the computation of D_{1981}. The stream is discounted with the weighted average financing rate (its construction is described in the Appendix) and, for the NFC sector, its present value is \$610.09 billion (listed in column 2).

For the NFC in 1986, D_{1986} is \$1,037.71 billion. This computation differs from D_{1981} for three reasons: discounted depreciation deductions for the expenditures made between 1981 and 1986 are included; five additional years of tax depreciation are applied to the expenditures made before 1981; and a discount rate reflective of the 1986 environment is used. Estimates of D also are constructed for the ten industry groups in the sample by applying the same methodology to the industry data.

The present value of pretax cash flow for existing fixed assets, I_s, is obtained by specifying the quantity of capital services provided by the assets and the unit value of the capital services. The quantity of capital services is measured by depreciating the real capital expenditures data over its useful service life according to its capacity depreciation patterns (U.S. Bureau of Economic Analysis [24]). This enables an estimate of the real capital service stream expected throughout each year remaining in the life of existing assets. The real capital services available in each year are multiplied by the value of capital services, thereby giving the pretax cash flow for that year. The value of capital services is measured through the rental price of capital (Jorgenson [15]). The computation of I is summarized as follows:

$$I_s = \sum_{t=1}^{\infty} (1 + r - \pi)^{-t} c_s K_{s,s+t}, \tag{3}$$

where c_s is the rental price of capital at time s, π is the expected inflation rate, and $K_{s,s+t}$ is the quantity of the real capital in place at time s that remains productive at time $s + t$.

Table 1 also lists the present value of pretax cash flow, I, for the beginning of years 1981 and 1986. Fixed assets for the NFC in 1981 promise discounted pretax cash flow equal to \$1,965.08 billion (column 1). Pretax cash flow net of proportional taxes, $(1 - \tau)I_{1981}$, where τ

is 0.46, equals \$1,061.14 billion. The depreciation tax savings, τD_{1981}, is \$280.64 billion. Thus, according to our calibration of the asset price model, the value of NFC fixed assets that are in place at the beginning of 1981, denoted V_{1981}, is \$1,341.79 billion (column 3). This entry differs from the estimate in D&T [12] (\$1,218 billion), primarily due to reliance on updated capital expenditures data; e.g., current cost of structures and equipment equals \$1,766.8 billion herein and \$1,640 billion in D&T.

The same approach is used to estimate fixed asset values for 1986. Discounted pretax cash flow for the NFC equals \$2,360.28 billion (column 4). Netting proportional taxes and adding discounted depreciation tax savings results in an estimate of V_{1986} equal to \$1,751.90 billion (column 6). Estimates for the ten industries also are listed in Table 1.

These estimates of V_{1981} and V_{1986} are computed through a series of equations that incorporate tax policy parameters. Thus far, all estimates have relied upon settings for the parameters reflective of the prereform environment. The settings are changed to reflect the postreform environment and the resultant change in the valuation estimates constitutes a prediction about the effect of tax reform on shareholder wealth.

The Effects of Tax Reform under the Asset Price Theory

The two reforms being considered, the Economic Recovery Tax Act of 1981 (ERTA) and the Tax Reform Act of 1986 (TRA), are strikingly different. ERTA represents incentive tax legislation because new investments are offered liberalized tax depreciation schedules through introduction of the ACRS. TRA represents disincentive legislation because new investments face lengthened tax lives, investment tax credits are repealed, and the long-term capital gain exclusion is removed. TRA offers slight investment incentive through reduction of the maximum statutory corporate income tax rate, but as shown by Auerbach [2], the rental price for investment increases and disincentive effects dominate. As discussed below, our asset price model predicts that the incentive reform (ERTA) causes a decline in shareholder

wealth, whereas the disincentive reform (TRA) causes an increase.

Existing assets in 1981 are revalued for a post-ERTA environment by changing the variables in equations (1) through (3) to reflect (a) the introduction of ACRS and (b) a rise in the discount rate resulting from an increase in the pretax interest rate and a reduction in the maximum statutory personal tax rate from 0.70 to 0.50. These two changes are considered incrementally.

Introduction of ACRS increases the present value of tax depreciation deductions on new assets. Even though this provision only applies to new investments, the value of existing assets is affected. The liberalized tax depreciation policy diminishes the pretax cash flow that new investments must return such that they net the required after-tax financing rate. Under the asset price theory, the pretax cash flow on all capital, especially existing assets, declines as well and I falls. Revaluing fixed assets by using the postreform rental price shows that introduction of ACRS leads to a $173.85 billion reduction in NFC asset values. Although equity is directly affected by this loss, there is an indirect effect on debt values resulting from the erosion in residual earnings and increased risk. It is assumed that the reduction in NFC asset values is shared between debt and equity such that the proportion $1 - b$ is borne by shareholders. The predicted change in shareholder wealth is $-$84.20 billion (not listed in table). The market value of outstanding NFC equities is $1,292.97 billion (column 2 of Table 2). The predicted loss represents a change in shareholder wealth of -6.51 percent (not listed).

The introduction of ACRS, coupled with the decline in personal tax rates, is estimated by Hendershott [13] to increase the demand for capital to such an extent that the taxable interest rate rises by 106 basis points. These changes are manifested in our equations as an increase in the weighted average after-tax financing rate for the NFC of 56 basis points. The higher discounting effect definitely causes a decline in the present value of depreciation tax savings because the stream of deductions from existing assets is predetermined. However, the change in present value of pretax cash flow, I, is ambig-

TABLE 2

Revaluation of Existing Fixed Assets Resulting from Tax Reform
(in Billions of Dollars)

Industry (SIC No.)	Economic Recovery Tax Act of 1981			Tax Reform Act of 1986		
	$(1 - b)\Delta V$* (1)	Equity MV** (2)	$(1 - b)\Delta V$ as % of Shareholder Wealth (3)	$(1 - b)\Delta V$* (4)	Equity MV** (5)	$(1 - b)\Delta V$ as % of Shareholder Wealth (6)
Food Products (20)	$-1.62	$44.16	-3.68%	$5.22	$114.32	4.56%
Textile Products (22)	-0.49	11.04	-4.43	1.65	18.28	9.03
Paper Products (26)	-1.47	29.31	-5.00	4.69	35.11	13.36
Chemical Products (28)	-2.43	99.16	-2.45	8.30	156.36	5.31
Petroleum Products (29)	-1.32	24.95	-5.32	4.03	23.21	17.37
Rubber & Plastics (30)	-0.63	11.22	-5.65	2.20	24.99	8.80
Stone, Clay & Glass (32)	-1.14	17.84	-6.40	1.93	26.11	7.38
Primary Metals (33)	-2.61	39.83	-6.55	4.91	39.98	12.29
Nonelectrical Machinery (35)	-1.91	95.55	-2.00	5.32	119.01	4.47
Electrical Machinery (36)	-1.25	77.10	-1.63	5.76	265.20	2.17
Total Nonfinancial Corporate Sector (NFC)	$-71.13	$1,292.97	-5.50%	$236.29	$2,026.01	11.66%

* ΔV is the change in the value of existing fixed assets that is induced by tax reform and $(1 - b)$ is the ratio of equity market value to debt plus equity market value.

** Equity MV is the financial market value of the industry's common stocks.

uous. A discounting effect causes I to fall, but conversely, there is upward pressure on I from an increase in the rental price and the return on capital. In essence, the higher discount rate penalizes new investments, and relatively speaking, the claimants on existing assets are benefited. NFC shareholder wealth is predicted to rise incrementally by $13.06 billion, or 1.01 percent, because of the change in personal tax rates and rise in interest rate.

The net effect of ERTA on NFC asset values is a loss of $71.13 billion (column 1 of Table 2), representing a −5.50 percent change in shareholder wealth (column 3). For the ten industries in the sample, also listed in Table 2, the net effect of ERTA on shareholder wealth ranges from −1.63 percent (Electrical Machinery) to −6.55 percent (Primary Metals). Shareholders in Electrical Machinery, although experiencing losses, are predicted nonetheless to fare better than market. Their predicted cumulative excess return (relative to the NFC) is +3.87 percent, and in Primary Metals the predicted excess return is −1.05. Three industries are predicted to have negative excess returns; seven should have positive excess returns.

D&T [12] estimate predicted excess returns for three industries that also are covered in our sample. For these three, the D&T prediction and ours are, respectively: SIC 20, Food Products, 1.80 and 1.82; SIC 26, Paper Products, 0.18 and 0.50; SIC 30, Rubber and Plastics, −2.56 and −0.15. The differences between the studies occur for two reasons, both related to input data differences. First, the capital expenditures data in our study reflect updates from the U.S. Bureau of Economic Analysis [24]. Second, the studies rely on the industry sample of firms present on the *Compustat Industrial File*, and different annual tapes are used in the studies. For example, the ratio of "*Compustat* Industry Sample Total Net Fixed Assets" to "BEA 2-digit SIC Industry Historic Cost Replacement Cost," which is used in the computations, is reported by D&T to equal for the three industries 0.8580, 0.8248, and 0.7120, respectively. In our study, those ratios are 0.6580, 0.6052, and 0.2765. Apparently, throughout the various annual updates occurring between the 1984 and 1988 *Compustat* tapes, many firms have been reclassified out of SIC 30.

The provisions modeled with enactment of TRA follow Downs and Hendershott [11] and include: (a) the reduction in the maximum statutory corporate tax rate from 0.46 to 0.34; (b) the repeal of the investment tax credit and lengthening of depreciation tax lives; and (c) a decline in personal tax rates, the removal of the capital gains exclusion, and a decline in the pretax interest rate.

The reduction in the maximum statutory corporate tax rate has a large positive effect on shareholder wealth. This provision causes the tax liability on pretax cash flow to decrease substantially (and after-tax cash flow rises), although the effect is somewhat offset because of a decline in the discounted depreciation tax savings and rental price. Nonetheless, reestimation of equations (1) through (3) with the new tax rate shows that NFC shareholder wealth is predicted to increase by $128.83 billion, or 6.36 percent of outstanding equity values.

A large positive effect on shareholder wealth also is produced by the repeal of the investment tax credit, coupled with the lengthening of tax depreciation schedules. The disadvantageous treatment extended new assets leads to an increase in pretax cash flow from existing assets, and NFC shareholder wealth is predicted to rise by an additional $127.21 billion, a windfall gain of 6.28 percent.

TRA alters personal tax rates by reducing the maximum statutory rate to 0.33 and by removing the capital gains exclusion. These changes, together with the decline in pretax interest rate that occurs because of the disincentive effect on capital investment, lead to a 63 basis point reduction in the weighted average financing rate. The effect of the falling discount rate is advantageous for new assets but disadvantageous for existing ones, and an incremental decline of $19.75 billion (0.97 percent) in NFC shareholder wealth is predicted.

The net change in NFC shareholder wealth resulting from TRA is a predicted gain of $236.29 billion (column 4 of Table 2), representing an 11.66 percent rise in equity values (column 6). Table 2 also shows that the net effect of TRA on shareholder wealth in the ten in-

dustries ranges from 2.17 percent (Electrical Machinery) to 17.37 percent (Petroleum Products). Positive excess returns are expected to accrue in three industries and negative excess returns in seven.

Analysis of Actual Responses to Tax Reform

This section analyzes whether the excess returns predicted by the asset price model in the previous section are consistent with actual share price movements. Risk-adjusted excess returns are computed for industry portfolios of common stocks on dates information is released about important legislative action on tax reform. These dates are determined by reviewing the *Wall Street Journal* and the *Congressional Quarterly Almanac*. Nine events, coincidentally, are selected for each reform, and the dates for ERTA are the same ones as selected by D&T [12]. The dates on which the *Wall Street Journal* published the initial news stories about the events are listed in Table 3. For ERTA, the event period spans February 19, 1981 through August 14, 1981. Eight of the nine events are concentrated during the summer months. For TRA, the event period spans from November 27, 1984 through October 22, 1986.

Industry portfolios of common stocks are constructed with the Center for Research in Security Prices (CRSP) database. A security is classified into an industry according to its primary two-digit SIC code as of the first event date. The daily return for the industry portfolio is a simple average of the daily returns for all firms in that industry. A security is excluded if daily returns are missing for four consecutive trading days during the sample period. The number of securities in each industry portfolio is listed in Table 4, and it ranges for ERTA from 33 in Petroleum Products to 155 in Electrical Machinery and for TRA from 24 in Textile Products to 142 in Electrical Machinery (Table 5).

Excess returns are estimated independently for ERTA and TRA using a seemingly unrelated regression (SUR) estimation of the standard market model. For each reform, the estimation period extends from the day before the first event through the day of the last event.

TABLE 3

Dates of Important Legislative Activity

Date*	Description
ERTA Events (all are in 1981)	
1) February 19	Reagan formally announces tax reform proposal to Congress.
2) June 8	Reagan offers revised tax reform proposal.
3) June 10	Compromise agreed between Reagan and business on tax treatment of depreciation.
4) June 19	House Ways & Means Committee tentatively approves depreciation guidelines.
5) June 25	Senate Finance Committee tentatively approves new depreciation guidelines.
6) July 24	Reagan and House Ways & Means Committee work out a compromise bill.
7) July 30	Senate and House each pass their version of tax reform; panel set to resolve differences.
8) August 5	House and Senate pass compromise bill.
9) August 14	Reagan signs the Economic Recovery Tax Act of 1981.
TRA Events	
1) November 27, 1984	Treasury 1 is unveiled by Treasury Secretary Regan.
2) May 29, 1985	Treasury 2 is endorsed by President Reagan.
3) November 25, 1985	A tax bill is passed by Ways & Means Committee.
4) December 18, 1985	Two bills reach the floor of the house and one is passed.
5) April 25, 1986	Senate Finance Committee unveils another plan.
6) May 7, 1986	Senate Finance Committee approves bill.
7) June 24, 1986	Senate passes bill.
8) August 18, 1986	House-Senate conference committee approves compromise bill.
9) October 22, 1986	President Reagan signs the Tax Reform Act of 1986.

* Date of publication of the news story in the *Wall Street Journal*.

TABLE 4

Excess Stock Returns in Nine Event Windows and Ten Industries for the Economic Recovery Tax Act of 1981
(*t*-Statistics in Parentheses)

	Industry SIC Code									
	20	22	26	28	29	30	32	33	35	36
Overall CAR										
	2.17*	−2.60	.20	−.02	9.98**	−1.47	.71	.31	−1.37	−1.17
	(1.76)	(−1.09)	(.11)	(−.02)	(2.15)	(−.74)	(.38)	(.20)	(−1.08)	(−.84)
By Event* **										
1	.59	.14	1.04	−.30	−1.11	.63	.36	−.14	−.32	−.28
	(1.58)	(.19)	(2.01)**	(−.95)	(−.78)	(1.05)	(.65)	(−.30)	(−.84)	(−.66)
2	.33	−.58	−.59	.19	1.31	.58	−.55	−.54	−.46	−.16
	(.90)	(−.79)	(−1.13)	(.59)	(.93)	(.96)	(−.99)	(−1.15)	(−1.21)	(−.36)
3	−.00	.96	.29	−.20	1.16	−.12	.97*	.20	−.54	−.33
	(−.01)	(1.33)	(.56)	(−.64)	(.82)	(−.20)	(1.76)	(.43)	(−1.40)	(−.76)
4	−.09	−.46	−.73	−.25	1.86	−.33	−.53	.64	−.24	−.09
	(−.23)	(−.63)	(−1.40)	(−.76)	(1.31)	(−.56)	(−.96)	(1.38)	(−.62)	(−.21)

(*Continued*)

TABLE 4—*Continued*

Excess Stock Returns in Nine Event Windows and Ten Industries for the Economic Recovery Tax Act of 1981
(*t*-Statistics in Parentheses)

	Industry SIC Code									
	20	22	26	28	29	30	32	33	35	36
5	−.12	−1.04	1.02**	−.24	1.70	−.06	.63	.52	.01	−.25
	(−.31)	(−1.45)	(1.98)	(−.75)	(1.21)	(−.10)	(1.15)	(1.11)	(.01)	(−.58)
6	.95**	−.71	.62	−.29	2.08	−.25	.47	.06	.52	.13
	(2.55)	(−.98)	(1.20)	(−.90)	(1.48)	(−.42)	(.86)	(.14)	(1.36)	(.30)
7	.24	.12	−.64	.12	.07	−1.14*	.10	.26	−.04	−.45
	(.65)	(.17)	(−1.25)	(.38)	(.05)	(−1.90)	(.17)	(.55)	(−.11)	(−1.04)
8	−.05	−.61	−.44	.36	2.92**	−.68	−.37	−.54	−.05	−.01
	(−.14)	(−.84)	(−.86)	(1.14)	(2.08)	(−1.14)	(−.67)	(−1.16)	(−.14)	(−.03)
9	.30	−.41	−.36	.58*	−.06	−.07	−.37	−.15	−.24	.27
	(.82)	(−.56)	(−.70)	(1.82)	(−.04)	(−.11)	(−.67)	(−.32)	(−.62)	(.63)
Number of firms										
	79	41	42	112	33	40	43	67	146	155

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Events are identified in Table 3.

TABLE 5

Excess Stock Returns for Nine Event Windows and Ten Industries for the Tax Reform Act of 1986
(*t*-Statistics in Parentheses)

	Industry SIC Code									
	20	22	26	28	29	30	32	33	35	36
Overall CAR										
	1.65	.83	−2.39	1.09	1.45	.55	−2.64	−2.93	−1.42	−.48
	(1.05)	(.35)	(−1.26)	(.90)	(.46)	(.22)	(−1.43)	(−1.53)	(−1.11)	(−.38)
By Event*										
1	.35	.24	1.01**	.13	−.70	.47	−.32	−.94	.55	−.60
	(.68)	(.33)	(1.64)	(.32)	(−.69)	(.58)	(−.54)	(−1.52)	(1.33)	(−1.51)
2	.06	−.42	−.03	.08	−.98	.48	−.36	.03	−.52	.09
	(.13)	(−.57)	(−.05)	(.21)	(−.96)	(.59)	(−.59)	(.06)	(−1.25)	(.23)
3	.45	.02	−1.06**	.42	.21	−1.14	−.03	−.44	−.56	.59
	(.89)	(.02)	(−1.73)	(1.08)	(.20)	(−1.40)	(−.06)	(−.71)	(−1.38)	(1.49)
4	.23	.20	−.04	.04	−.16	.15	−.25	−.18	−.20	−.85***
	(.45)	(.26)	(−.06)	(.11)	(−.16)	(.18)	(−.41)	(−.29)	(−.48)	(−2.15)
5	−.29	.31	−.34	.36	2.06***	−.12	−.26	−.12	.88***	.47
	(−.57)	(.43)	(−.60)	(.91)	(2.03)	(−.15)	(−.43)	(−.19)	(2.14)	(1.19)
6	−.27	−1.35**	−.02	−.11	.74	.19	−.92	.25	−.01	−.20
	(−.53)	(−1.81)	(−.03)	(−.28)	(.73)	(.23)	(−1.52)	(.40)	(−.02)	(−.52)

(*Continued*)

TABLE 5—*Continued*

Excess Stock Returns for Nine Event Windows and Ten Industries for the Tax Reform Act of 1986
(*t*-Statistics in Parentheses)

	Industry SIC Code									
	20	22	26	28	29	30	32	33	35	36
7	.41	.47	−.78	.13	−1.19	.67	.32	−.92	−.28	−.56
	(.82)	(.63)	(−1.27)	(.32)	(−1.17)	(.82)	(.52)	(−1.47)	(−.68)	(−1.40)
8	.82	−.21	−.96	−.10	1.60	−.30	−.79	−.24	−.62	.03
	(1.61)	(−.29)	(−1.56)	(−.25)	(1.57)	(−.37)	(−1.32)	(−.38)	(−1.50)	(.07)
9	−.13	1.57***	.02	.13	−.14	.16	−.02	−.37	−.66	.55
	(−.25)	(2.11)	(.03)	(.32)	(−.14)	(.20)	(−.03)	(−.59)	(−1.60)	(1.38)
Number of firms										
	56	24	32	99	27	30	33	49	128	142

* Events are identified in Table 3.

** Significant at the 10 percent level.

*** Significant at the 5 percent level.

There is an equation for each industry, thereby resulting in the following system:

$$\mathbf{K}^{20} = \alpha^{20}\mathbf{U} + \beta^{20}\,\mathbf{K}^{\mathbf{mkt}} + \sum_{j=1}^{9} \gamma_j^{20}\,\mathbf{D}^{\mathbf{j}} + \mathbf{E}^{20},$$

$$\mathbf{K}^{22} = \alpha^{22}\,\mathbf{U} + \beta^{22}\,\mathbf{K}^{\mathbf{mkt}} + \sum_{j=1}^{9} \gamma_j^{22}\,\mathbf{D}^{\mathbf{j}} + \mathbf{E}^{22},$$

$$\ldots,$$

$$\mathbf{K}^{36} = \alpha^{36}\,\mathbf{U} + \beta^{36}\,\mathbf{K}^{\mathbf{mkt}} + \sum_{j=1}^{9} \gamma_j^{36}\,\mathbf{D}^{\mathbf{j}} + \mathbf{E}^{36}. \quad (4)$$

The SUR methodology is appropriate for this situation because there is likely contemporaneous residual correlation across industry equations.

$\mathbf{K}^s$ represents the vector of common stock returns in industry s (s = 20, 22, 26, 28, 29, 30, 32, 33, 35, 36); $\mathbf{K}^{\mathbf{mkt}}$ is the vector of daily returns on the equal weighted CRSP index; $\mathbf{D}^{\mathbf{j}}$ is a dummy variable vector that is set to unity on the day before and the day of event number j, and it is set to zero otherwise (there are nine such vectors, j = 1, . . . , 9); and $\mathbf{E}^s$ is the vector of residual errors. Among the structural coefficients, α^s is the intercept for industry s ($\mathbf{U}$ is a unit vector); β^s is the equity beta for industry s; and γ_j^s is the excess return for industry s in response to event j (the reported γ have been multiplied by two because the event window contains two days). Excess returns are estimated by reliance on dummy variables rather than out-of-sample forecasts as in D&T [12], primarily because of the length of the TRA event period.

Table 4 lists the excess returns for the nine ERTA events throughout the ten industries. There are ninety excess return estimates and only seven are different from zero at the 10 percent significance level. These results indicate that, generally, there are not significant differential movements in stock prices on days of important legislative activity.

For any one industry, the hypothesis that the nine events jointly equal zero is tested. The tests are conducted by estimating restricted versions of equation (4)

and by computing standard Wald statistics. The tests are summarized as:

H_0^1: $\gamma_j^s = 0.0$ for $j = 1, \ldots, 9$; the nine excess returns in industry s jointly equal zero.

Outcome: Rejected in SIC 26 at the 6.60 percent significance level; not rejected in the other nine industries.

In SIC 26 (Paper Products), the hypothesis that jointly all of the excess returns equal zero is rejected. Inspection of the excess returns for this industry shows the rejection likely occurs because events 1 and 5 independently are different from zero. In nine of the ten industries, though, the hypothesis is not rejected. Acceptance of this hypothesis indicates that no particular event induced excess returns.

To test whether any one event causes a response throughout all ten industries, the following hypothesis is tested:

H_0^2: $\gamma_j^s = 0.0$ for $s = 20, \ldots, 36$; excess returns for event j are jointly zero in all industries.

Outcome: Rejected for event 6 at the 3.54 percent significance level; not rejected for the other eight events.

This hypothesis is tested by estimating equation (4) with a constraint that equates the slope coefficients (γ_j, $j = 1, \ldots, 9$) across equations. The t-statistic on the restricted slope coefficient tests whether it is significantly different from zero. For event 6, the coefficient (γ_6) is 0.29 percent and its t-statistic is 2.10. Throughout the ten industries, the hypothesis that the excess return accruing with event 6 equals zero is rejected.

The front page synopsis in the *Wall Street Journal* (July 24, 1981) describes event 6 as follows: "Senate tax writers tentatively approved a series of Reagan's tax-cut provisions, ..." A reading of the *Wall Street Journal* for the preceding days indicates surprise at the speed with which the Senate Finance Committee arrived at approval, as evidenced in the continuation of that day's synopsis: "The actions were in contrast to the House

Ways and Means Committee, which put off any votes. . . ." A case could be made that the significant return for this particular event refutes, as well as supports, the asset price theory, but the evidence is not definitive either way. It is interesting to note, though, that for the other eight events, there is not a uniform response across industries.

The sum of an industry's nine γ coefficients yields an estimate of the cumulative excess return (CAR) for all events. The CAR, listed in the top row of Table 4, measures the net change in shareholder wealth occurring during all legislative events. They range from -2.60 percent in Textile Products to 9.98 percent in Petroleum Products. Statistics are constructed to test the following hypothesis:

H_0^3: $\sum_{j=1}^{9} \gamma_j^s = 0.0$; the CAR for industry s is zero.

Outcome: Rejected for SIC 20 at the 7.89 percent significance level; rejected for SIC 29 at the 3.15 percent significance level; not rejected for the other eight industries.

In two of ten industries, the CAR differs significantly from zero. In Food Products (SIC 20) the CAR is relatively small, 2.17 percent, yet significant. In Petroleum Products (SIC 29), the large positive CAR likely accrues because there are many provisions in the legislation aimed specifically at the oil industry: e.g., taxes on newly discovered oil are halved; the oil depletion allowance is frozen at 0.22 instead of falling to 0.15 as previously scheduled; and taxes on oil royalties are reduced. Stock prices responded to these industry-specific provisions.

For the ten industries jointly, the CARs are not significantly different from zero, as summarized below:

H_0^4: $\sum_{j=1}^{9} \gamma_j^s = 0.0$ for $s = 20, \ldots, 36$; the CAR for all industries jointly equal zero.

Outcome: Not rejected (significance level is 12.74 percent).

The evidence indicates that for the ten-industry sample there are not differential stock price movements in response to ERTA. These results echo the conclusion of Cutler ([7], p. 1107) that "the paper finds little evidence of a large market response to tax news."

Results presented herein for the three industries overlapping with D&T [12] are qualitatively similar to their results. For example, among the three, the CARs (and *t*-statistics) in D&T and herein are: SIC 20, 2.25 (2.75) and 2.17 (1.76); SIC 26, 2.06 (1.13) and 0.20 (0.11); SIC 30, −2.18 (−1.26) and −1.47 (−0.74). The *t*-statistics in D&T are biased upward because their analysis neglects cross-equation residual correlation.

The inference arrived at by D&T in support of the asset price theory also would be arrived at by the current study if the sample were to include only SICs 20, 26, and 30. The support arises because of the correspondence between the predicted and actual cumulative excess returns. Let $PCAR^s$ denote the predicted cumulative excess return derived in the previous section for industry *s*. The PCARs are listed in the top row of Table 6. In D&T [12] as well as in the current study, the CAR in SIC 20 is significantly different from zero, but not significantly different from PCAR. Furthermore, in both studies the difference between CARs in SICs 20 and 30 is statistically distinguishable from zero, but indistinguishable from predicted.

When the analysis is extended to the full ten-industry sample, the support provided to the asset price theory is reversed because the results for SIC 20 are anomalous. For example, a test of the equality between the CAR and PCAR shows:

H_0^5: $\sum_{j=1}^{9} \gamma_j^s = PCAR^s$; the CAR for industry *s* equals the PCAR.

Outcome: Rejected in SICs 28, 29, 35, and 36 at the 0.4, 3.5, 0.1, and 0.3 percent significance levels; not rejected in the other six industries.

In SIC 20, the CAR, although significantly different from zero, is not different from PCAR. However, in SIC

TABLE 6

Cumulative Excess Returns (CARs) for Alternative Analyses
(*t*-Statistics in Parentheses)

Industry SIC Code									
20	22	26	28	29	30	32	33	35	36
Economic Recovery Tax Act of 1981									
1) PCAR, predicted cumulative excess return									
1.82	1.07	.50	3.05	.18	−.15	−.90	−1.05	3.50	3.87
2) CARS for full sample of firms									
2.17*	−2.60	.20	−.02	9.98**	−1.47	.71	.31	−1.37	−1.17
(1.76)	(−1.09)	(.11)	(−.02)	(2.15)	(−.74)	(.38)	(.20)	(−1.08)	(−.84)
3) CARs for one-day windows									
1.52*	−.67	.28	−.51	3.71	−1.92	.72	.28	−.64	−.23
(1.82)	(−.41)	(.23)	(−.70)	(1.16)	(−1.43)	(.58)	(.27)	(−.74)	(−.25)
4) CARs with firms dropped due to confounding news									
1.42	−2.60	.32	−.05	10.07**	−2.01	.67	.14	−1.30	−1.56
(1.17)	(−1.08)	(.17)	(−.04)	(2.25)	(−.94)	(.34)	(.09)	(−1.00)	(−1.06)
5) CARs with firms dropped that have daily returns that are 3 percentage points greater or less than the market									
2.18*	−3.46	−.69	.45	10.31**	−1.41	1.39	.25	−1.51	−1.48
(1.86)	(−1.50)	(−.39)	(.42)	(2.36)	(−.66)	(.95)	(.15)	(−1.17)	(−1.05)
Tax Reform Act of 1986									
6) PCAR, predicted cumulative excess return									
−7.52	−3.27	.77	−6.67	4.79	−3.03	−4.34	.58	−7.29	−9.60

(*Continued*)

TABLE 6—*Continued*

Cumulative Excess Returns (CARs) for Alternative Analyses
(*t*-Statistics in Parentheses)

	Industry SIC Code								
	20	22	26	28	29	30	32	33	35	36
7) CARs for full sample of firms										
	1.65	.83	−2.39	1.09	1.45	.55	−2.64	−2.93	−1.42	−.48
	(1.05)	(.35)	(−1.26)	(.90)	(.46)	(.22)	(−1.43)	(−1.53)	(−1.11)	(−.38)
8) CARs for one-day windows										
	1.61	.88	−1.29	1.42*	1.48	1.15	−.53	−1.87	−.19	−.34
	(1.47)	(.55)	(−.97)	(1.68)	(.67)	(.66)	(−.41)	(−1.40)	(−.13)	(−.40)
9) CARs with firms dropped that have daily returns that are 3 percentage points greater or less than the market										
	1.66	.46	−1.62	1.05	1.58	2.44	−2.96	−3.09	−1.47	−.04
	(1.07)	(.19)	(−.90)	(.82)	(.53)	(1.17)	(−1.51)	(−1.51)	(−1.11)	(−.03)

* Significant at the 10 percent level.

** Significant at the 5 percent level.

29, the only other industry in which the CAR is different from zero, the CAR is significantly different from PCAR. Likewise, in three industries (SICs 28, 35, and 36), the CAR is significantly different from its predicted value even though it is indistinguishable from zero.

The equality between the actual and predicted cumulative excess returns for the ten industries jointly is summarized in the following hypothesis:

H_0^6: $\sum_{j=1}^{9} \gamma_j^s = \text{PCAR}^s$ for $s = 20, \ldots, 36$; the CAR for all industries jointly equal the PCARs.

Outcome: Rejected at the 0.039 percent significance level.

Hypotheses 4 and 6 together point to a disturbing conclusion. The former indicates that, all in all, the excess stock returns are indistinguishable from zero. The latter indicates that the excess returns are significantly different from the asset price predictions. Our results, though qualitatively similar to D&T for the overlapping sample, suggest rejection of the asset price theory.

Several checks on the robustness of the stock returns analysis are conducted. First, the event window is narrowed to include only the day of the event (rather than the two-day windows employed previously). Row 3 of Table 6 lists the CARs and *t*-statistics for this analysis. The CAR in SIC 20 still is different from zero and is not different from predicted. Results are substantially different in SIC 29; the CAR no longer is distinguishable from zero. The joint equality of the ten industry CARs to zero is not rejected, even though the joint equality of the CAR and PCARs is rejected strongly (significance level is 0.003). Generally, the results are qualitatively similar for the one-day windows as for the two-day windows.

Another check on robustness involves dropping firms from the industry portfolios that show the presence of confounding events unrelated to tax reform. Two different procedures are used for identifying firms to be dropped. First, the *Wall Street Journal Index* is reviewed for firm-specific news pertinent to the 758 firms in the sample during the ERTA event period. The study by Wright and Groff [27] is used for a guide as to what

constitutes a confounding event. This laborious search leads to the deletion of 53 firms from the sample. Exclusion of these firms in the analysis yields the CARs that are listed in row 4. It is somewhat interesting that none of the CARs are distinguishable from zero. Furthermore, the result still holds that the CARs jointly equal zero, but they are significantly different from PCAR. A second procedure for identifying firms to be dropped is simply the exclusion of any firm that experiences a daily stock return during the sample period that is three percentage points greater or less than the market return. According to this filter, 92 firms are dropped and the CARs listed in row 5 are obtained. The findings are qualitatively similar to the initial ones presented, with the exception that in this case the ten CARs are jointly different from zero, and they also are different from predicted. The asset price theory is not supported in any of these alternative analyses.

A similar analysis of stock returns for the TRA event period is conducted. The excess returns are listed by event in Table 5. Among the ninety excess returns estimated (ten industries, nine events), only seven are significant. The hypothesis that, for any one industry, the nine excess returns equal zero (the analogue to H_0^1) is not rejected in eight of the ten industries. The hypothesis is rejected in SICs 35 and 36 primarily because, in each of these industries, one of the excess returns is highly significant.

Estimating the equation system with a cross-equation constraint on all nine of the dummy slope coefficients (analogous to H_0^2) shows that, for only one event, the restricted coefficient is different from zero. The restricted coefficient on event 5 equals 0.35 percent. Its statistical significance (the 2.9 percent level) is evidence that for these industries predominantly positive excess returns accrue in response to the event. Event 5 is described in the story from the Friday (April 25, 1986) *Wall Street Journal* as "Packwood unveiled new proposals . . . [that] would keep most tax breaks for businesses and cut their top rate to 33%." It is noteworthy that the proposal came as a great surprise. On the previous Monday (April 21), the *Wall Street Journal* wrote, "Packwood's tax overhaul bill is likely to die soon unless his

Senate Panel can agree on ways to boost revenue." On Wednesday (April 23), it was reported, "Packwood said he plans 'to start from square one' on the tax overhaul bill." No story appeared Thursday, and then on Friday the proposal, and the stock market reaction, occurred. A case could be made that this event's significant excess return refutes, as well as supports, the asset price theory, but again the evidence is not definitive either way.

The CARs for the nine TRA events range from −2.93 percent in Primary Metals to 1.65 percent in Food Products. Five are positive and five are negative, and in no industry is the CAR significantly different from zero. The hypothesis that the ten CARs jointly equal zero (the analogue to H_0^4) is not rejected; the significance level is 54 percent. Furthermore, the hypothesis that the ten CARs jointly equal the PCARs is rejected at the .005 percent significance level. Even in SICs 35 and 36, where the CAR is distinguishable from zero, the hypothesis of equality between CAR and PCAR is rejected.

The robustness of the results for TRA to alternative specifications is examined. Row 8 of Table 6 lists the CARs when excess returns are measured for the one- rather than the two-day windows. Row 9 estimates excess returns when firms are excluded from the industry portfolio that have a daily return that is either greater or less than the market daily return by three percentage points. In both cases, the results are qualitatively similar. The joint equality of the ten industry CARs with zero is not rejected, but the equality between CARs and PCARs is rejected. The asset price theory is not supported by the analysis for TRA.

Conclusion

This study provides evidence about the effect of significant tax policy changes on corporate asset values. The analysis focuses on finding evidence supporting the asset price theory of shareholder wealth. In its pure form, this theory holds that the revaluation of existing assets drives the change in stock prices. The asset price theory is operationalized herein, and simulated revaluations of assets are generated for ten industries in response to ERTA and TRA.

Evidence in favor of the asset price theory has been presented previously by D&T [12] in their analysis of three industries. The inferences arrived at by D&T would also be arrived at by the current study if the sample were to include only the same three industries. However, when the analysis is extended to the full ten-industry sample, the support provided to the asset price theory is reversed. The CARs earned on the industry portfolios of common stocks jointly are indistinguishable from zero, indicating the absence of differential stock price movements, whereas the equality of the CARs with the cumulative excess returns predicted by the asset price model is rejected resoundingly. These results stand up to alternative specifications of the event windows and sample set.

The inferences are checked by repeating the analysis for TRA. Shareholder wealth is predicted to rise, but some industries should gain more than others and therefore some positive and some negative cumulative excess returns are predicted. The analysis of actual share price movements leads to the same conclusions as found previously. The actual cumulative excess returns generally are not different from zero, but they are different from predicted.

The analysis of the actual stock returns data does not support the predictions generated by the asset price theory. However, there are three important reasons why it is wrong to conclude that the asset price theory is incorrect. First, perhaps tax reform causes a revaluation of existing assets as predicted by the asset price theory, but there also might be a change in the present value of growth opportunities or other intangibles that just offsets the asset price effect. Under these conditions, there would not be a significant change in shareholder wealth. Second, an implicit assumption in this theory is that financial market values are in continuous equilibrium with fundamental values, whereas several studies (e.g., Shiller [21] or Cutler, Poterba, and Summers [8]) present evidence that share prices respond to nonfundamental factors. Hence, shareholder wealth may not decline, say, five percent even though discounted after-tax cash flow declines five percent. Third, perhaps unknown specification or measurement errors plague the asset price

predictions or excess returns estimation. Nonetheless, the results indicate that the asset price theory as modeled herein does not predict the effect of tax reform on shareholder wealth.

Appendix

This appendix discusses the data used to construct D and I. These two terms are constructed separately for two asset types, structures and equipment, in each of ten industries (SICs 20, 22, 26, 28, 29, 30, 32, 33, 35, and 36) for the beginning of years 1981 and 1986. All discounted sums reported in the text and tables represent the sum across asset types; e.g., in each industry in each year, the D equals the sum of the structures plus equipment D for that year. The I variable is constructed from the intermediate variables c_s and $K_{s,s+t}$, where

$$c_s = \frac{q_s[r - \pi]\,[1 - v - \tau Z_s]}{[1 - H_s]\,[1 - \tau]},$$

and

$$K_{s,s+t} = \sum_{u=t}^{\infty} E_{s+t-u}\left[1 - \sum_{j=1}^{t} d_j\right] \Big/ q_{s+t-u}.$$

The input variables used to construct D and I are q, E, L, r, τ, v, π, and the d_j series ($j = 1, L$) and the $z_{s,t}$ series ($s = 1981, 1986$; $t = 1, L$). There are unique annual observations for each of the input variables and series, except for L and the d_j series. These exceptions vary between asset types and industries, but are the same across years. The input variables τ and π are the same in a given year for all assets and industries. The input variable r is the same in a given year for both assets in an industry, but it varies between industries. The input variable v is the same in a given year for all industry groups, but it varies by asset. The input variables q and E and the variable series z_s vary by asset and by industry. The input variables and variable series are described below.

q, price of new assets - Capital goods price indexes are from the U.S. Bureau of Economic Analysis [24].

E, capital investment - Gross capital expenditures se-

ries are from [24]. Notice that the quotient $(E/q)_t$ equals the real investment in year t.

L, productive service life - Data from the U.S. Bureau of Labor Statistics [25] are relied upon to estimate productive service lives. For structures, L equals 28 years in the ten industries and 30 years in the NFC. For equipment, L ranges from 11 to 16 years.

r, weighted average financing rate - This rate is a weighted average of (after-corporate-tax) debt and equity financing rates [$r = b(1 - \tau)k^d + k^e$], where the weight on debt is the industry debt ratio (b) measured at market. The debt ratio varies by year and by industry. It is constructed according to the procedure described in Von Furstenberg, Malkeil, and Watson [26] and relies on aggregating firm data from the Compustat files up to the industry level. The market value of equity is set equal to the number of common shares outstanding times year-end price per share. Adjustments are made to long-term debt that are based on book-to-market-value ratios obtained by sampling price quotations in *Moody's Bond Record*; short-term debt is valued at par. The same debt financing rate (k^d) is used in all industries, but it varies by year and it equals a high-grade corporate bond yield. The equity financing rate (k^e) varies between industries and between years. It is based on a portfolio equilibrium between the Treasury bill yield (k^{rf}), the expected risk premium on the market portfolio (MP), personal tax rates on equity and interest returns (τ^e and τ^d), and equity betas (β):

$$(1 - \tau^e)k^e = (1 - \tau^d)k^{rf} + \beta\,(1 - \tau^e)\,\mathrm{MP}.$$

The τ^e, k^{rf}, and MP (the first two variables vary by year but not by industry; MP is constant) are obtained from D&T [12]; data on τ^i is from Peek and Wilcox [18]. The equity betas vary by year and by industry and equal the slope coefficient from the regression of the industry portfolio common stock return on the market return index.

τ, *corporate tax rate* - This tax rate is set equal to the maximum statutory corporate rate and equals 0.46 in both 1981 and 1986.

v, investment tax credit - The rate of the investment tax credit is zero for all structures. For equipment before 1981, the rate obtained from SSRC-MIT-PENN [23] is

used in all industries. In and after 1981, the rate for equipment is 0.0910.

π, *expected inflation rate* - The annual expected inflation rates for 1981 and 1986 are updated estimates from Hendershott and Hu [14] that were obtained from Sheng Cheng Hu.

d_j, *capacity depreciation schedules* - The proportion of an asset's original productive capacity that is lost during its jth period of use equals d_j. Thus, the d_j series, for $j = 1, \ldots, L$, represents the capacity depreciation schedule. Productive capacity depreciation schedules are modeled along straight-line patterns and the half-life convention is used. Thus, $d_j = 0.5/[L - 0.5]$ for $j = 1$; $d_j = 1/[L - 0.5]$ for $j = 2, \ldots, L - 1$; and $d_j = 0$ for $j \geq L$. The rental price includes a variable H_s, which is constructed by discounting the capacity depreciation schedule with the real financing rate, as in

$$H_s = \sum_{t=1}^{\infty} (1 + r - \pi)^{-t} d_t.$$

$z_{s,j}$, *tax depreciation* - The series of weights $z_{s,j}$ ($j = 1, \ldots, L$) sum to unity and are recomputed annually for each year $s = 1981 - L, \ldots, 1985$. The weights represent a combination of accelerated and straight-line procedures. For all industries, the proportion of new investments (structures or equipment) depreciated by accelerated methods is taken from [23]. Structures tax lives also are from [23] and are the same across industries. Equipment tax lives vary by industry and are based on Coen [6]. Before 1981, half of all investments depreciated by accelerated methods are depreciated by sum-of-year's digits and half by 200 percent declining balance (150 percent for structures investments after 1969) with an optimal switch to straight-line at mid-life. Investments not depreciated by accelerated methods are depreciated by straight-line. In and after 1981, 20 percent of equipment investments are depreciated in the three-year ACRS class and qualify for a 6 percent investment tax credit. Eighty percent are depreciated in the five-year class and qualify for a 10 percent tax credit. Structures investments are depreciated in the fifteen-year class prior to the 1984 Deficit Reduction Act and in the eighteen-year class thereafter. In all cases, the depreciable basis

for ACRS schedules is reduced by one-half the allowable investment tax credit. The rental price, c_s, includes a variable Z_s, which is constructed by discounting the tax depreciation schedule for the reference year by the weighted average financing rate, as in

$$Z_s = \sum_{t=1}^{\infty} (1 + r)^{-t} z_{s,t}.$$

References

[1] Abel, Andrew B. "Dynamic Effects of Permanent and Temporary Tax Policies in a Q Model of Investment." *Journal of Monetary Economics* 9(May 1982):353–373.

[2] Auerbach, Alan J. "The Tax Return Act of 1986 and the Cost of Capital." *Journal of Economic Perspectives* 1(Summer 1987):73–86.

[3] Auerbach, Alan J., and Laurence J. Kotlikoff. "Investment versus Savings Incentives: The Size of the Bang for the Buck and the Potential for Self-Financing Business Tax Cuts." In *The Effects of Taxation on Capital Accumulation*, ed. L. Meyer. Chicago: The University of Chicago Press, 1983.

[4] Bolster, Paul, Lawrence Lindsey, and Andrew Mitrusi. "Tax-Induced Trading: The Effect of the 1986 Tax Reform Act on Stock Market Activity." *Journal of Finance* 44(June 1989):327–344.

[5] Chiang, Raymond, and Dennis Lasser. "Tax Timing Options on Futures Contracts and the 1981 Economic Recovery Act." *The Financial Review* 24(February 1989):75–92.

[6] Coen, Robert. "Investment Behavior: The Measurement of Depreciation, and Tax Policy." *American Economic Review* 65(March 1975):59–74.

[7] Cutler, David M. "Tax Reform and the Stock Market: An Asset Price Approach." *American Economic Review* 78(December 1988):1107–1117.

[8] Cutler, David M., James Poterba, and Lawrence Summers. "What Moves Stock Prices." *Journal of Portfolio Management* 15(Spring 1989):4–12.

[9] Downs, Thomas. "An Alternative Approach to Fundamental Analysis: The Asset Side of the Equation." *Journal of Portfolio Management* 17(Winter 1991):6–17.

[10] Downs, Thomas. "Q and the Tax Bias Theory: The Role of Depreciation Tax Shields." *Journal of Public Economics* 47(1992):59–84.

[11] Downs, Thomas, and Patric Hendershott. "Tax Policy and Stock Prices." *National Tax Journal* 40(June 1987):183–190.

[12] Downs, Thomas, and Hassan Tehranian. "Predicting Stock Price Responses to Tax Policy Changes." *American Economic Review* 78(December 1988):1118–1130.

[13] Hendershott, Patric. "Tax Reform in Financial Markets." In *Economic Consequences of Tax Simplification*. Federal Reserve Bank of Boston Conference Series No. 29, 1985.

[14] Hendershott, Patric, and Sheng Cheng Hu. "Government-Induced Biases in the Allocation of the Stock of Fixed Capital in the United States." In *Capital, Efficiency, and Growth*, ed. George M. von Furstenberg. Cambridge: Ballinger Publishing Co., 1980.

[15] Jorgenson, Dale. "Capital Theory and Investment Behavior." *American Economic Review* 53(May 1963):247–259.

[16] Lyon, Andrew. "The Effect of the Investment Tax Credit on the Value of the Firm." *Journal of Public Economics* 38(March 1989):227–247.

[17] Lyon, Andrew. "Did ACRS Really Cause Stock Prices to Fall?" National Bureau of Economic Research Working Paper No. 2990, Cambridge, 1989.

[18] Peek, Joe, and James Wilcox. "The Postwar Stability of the Fisher Effect." *Journal of Finance* 38(September 1983):1111–1124.

[19] Poterba, James. "Tax Reform and the Market for Tax-Exempt Debt." *Regional Science and Urban Economics* 19(August 1989):537–562.

[20] Scholes, Myron, and Mark Wolfson. "The Effects of Changes in Tax Laws on Corporate Reorganization Activity." National Bureau of Economic Research Working Paper No. 3095, Cambridge, 1990.

[21] Shiller, Robert. "Do Stock Prices Move Too Much to be Justified by Subsequent Dividends?" *American Economic Review* 71(June 1981):421–436.

[22] Summers, Lawrence. "Taxation and Corporate Investment: A Q-Theory Approach." *Brookings Papers on Economic Activity*, (1981):67–127.

[23] SSRC-MIT-PENN Quarterly Econometric Model of the U.S. Federal Reserve Board. Washington: USGPO, 1984.

[24] U.S. Bureau of Economic Analysis. *Fixed Reproducible Tangible Wealth in the United States*, 1925–85. Washington: USGPO, June 1987.

[25] U.S. Bureau of Labor Statistics. *Capital stock estimates for input-output industries: methods and data*. Bulletin 2034. Washington: USGPO, 1979.

[26] von Furstenberg, George, Burton Malkeil, and Harry Watson. "The Distribution of Investment between Industries." In *Capital, Efficiency, and Growth*, ed. George M. von Furstenberg. Cambridge: Ballinger Publishing Co., 1980.

[27] Wright, Charlotte J., and James E. Groff. "Uses of Indexes and Data Bases for Information Release Analysis." *The Accounting Review* 61(January 1986):91–100.