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Dividend Tax Relief: Effects on Economic Recovery, Long-Term Growth, and the Stock Market

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Summary

Several objectives were advanced for the President's proposal for dividend relief to eliminate double taxation of corporate source income including "creating jobs" (suggestive of a short-run stimulative effect), enhancing long- term growth and efficiency, "fairness," and increasing the value of the stock market. (Dividend relief was enacted on a temporary basis in H.R. 2.)

Short-run stimulus objectives often conflict with long-run growth because an increase in spending is needed to stimulate an underemployed economy in the short run while an increase in saving (or labor supply) is needed to increase long-run growth. The dividend relief proposal is less likely to be successful in stimulating short-run demand than a spending increase or some other tax cuts because it accrues to higher income individuals who may save a larger fraction of the cut. It is also unlikely that this saving effect will be quickly translated into investment spending; indeed the proposal could decrease spending by shifting assets out of direct investment in unincorporated business assets and housing and into financial assets.

The longer-run growth effects of the dividend proposal (financed by debt and measured as changes in standard of living) are likely to be negative. Although the effects are quite small early on (due to the small size of the cut and the slowness with which the capital stock changes), they would become quite large over time if debt financed. This analysis finds that reductions of -0.16% to -0.10% would occur after 10 years, with -0.39% to -0.22% after 20 years. Only very large savings elasticities well out of the range of empirical evidence could induce even short-run growth that offsets deficit effects. Positive growth effects may occur if the tax cut is offset by spending cuts elsewhere and the savings elasticity is positive, but such effects are small and require a quick offsetting spending decrease. In one simulation, a tax cut which increased the deficit for 10 years induced negative output effects for over 30 years. These small, likely negative effects were obtained for a variety of assumptions regarding labor supply and the ability to substitute labor and capital.

Economic analysis would reject a "fairness" argument across investors because of reallocation of capital. However, reallocation is the key to achieving efficiency gains that are the main benefit of the dividend relief proposal. The increase in efficiency is estimated at 0.1% to 0.6% in the long run, although this amount could be reduced by the limit on preference passthrough.

The effects on the stock market are likely to be small, with an upper limit of 5% to 6%, but probably much less due to changes in interest rates and expectations of adjustment. Changes on the order of 2% to 3% may be more likely. Any stock market effects represent temporary windfalls to holders of current stocks and are simply a manifestation of the income effects of the tax cut; these wealth effects should not be considered as an additional stimulus. There is little evidence of general effects on spending through consumer confidence and the effect is quite small to function as a signal. This report describes basic economic relationships and will not be updated.

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Several objectives have been advanced for the President's proposal for dividend relief to eliminate double taxation of corporate source income, including "creating jobs" (which is suggestive of a short-run stimulative effect), enhancing long-term growth and efficiency, "fairness," and increasing the value of the stock market. This report discusses these effects. After providing a general analysis of the effects of tax cuts on short- and long- run growth, the paper discusses three additional aspects of the proposed dividend revision: reallocation of capital (and its implications for fairness and efficiency), preference passthrough restrictions, and the role of the stock market. (Dividend relief was enacted in 2003 on a temporary basis, in H.R. 2).

Short-Run Stimulus and Long-Term Growth

One of the confusing aspects of economic policy is that policies that are effective for short-term stimulus purposes tend to reduce long-term growth. Spending promotes short-run growth; saving promotes long-term growth. It is particularly hard to devise an individual tax cut that can accomplish its short-run purpose effectively without undermining long-term growth, absent some other future policy. And, while there may be circumstances where fiscal stimulus is desirable (i.e., when interest rates are extremely low initially or a contraction is severe), many economists feel that the primary tool of economic stabilization should be monetary policy. This view is reinforced by the leakage of fiscal stimulus (but not monetary stimulus) that occurs in an open economy.

Short Run

In the short run, to stimulate the economy through fiscal policy requires an increase in spending — on consumption, on investment, or on government purchases. The most direct way to accomplish this effect is through spending by the government. Spending increases add to the deficit and reduce the capital stock which can be harmful to long-run growth, but if the spending increase is temporary, this effect will be small. The major problem with spending is that spending programs are often difficult to agree upon and put into place in a timely fashion (although if cutbacks are already planned, a delay of the cutbacks would be relatively easy). Emergency spending can also be wasteful, and it may be difficult to reverse the spending increase in the future once groups have a stake in it.

Nevertheless, stimulating the economy through increasing private incomes (through transfers or tax cuts) is likely to be less effective and more problematic than

spending increases for two reasons. First, there is at least some reason to believe that much of a temporary tax cut will not be spent initially, but rather will be spread over a long period of time. Permanent tax cuts or transfers, which may be more successful in inducing spending, add to the deficit every year, and so reduce the long-run accumulation of capital. Reversing purportedly permanent tax cuts after granting them undermines the belief that tax cuts will be permanent and interferes with their future effectiveness. Secondly, individuals are likely to save some fraction of income (even permanent income) and saving does not increase aggregate demand. This effect is, however, probably not very important. Both of these problems are likely to be less serious with transfers or with tax cuts directed at lower income individuals, who are more likely to be liquidity constrained in their spending (and thus would spend all the tax cut) and who tend to have lower savings rates. In these cases tax cuts, particularly temporary ones, are likely to be more effective if directed at lower income individuals.

One of the potential ways to provide tax cuts that are effective stimulants without undermining long-run growth through deficit financing is to provide investment incentives to firms. If firms directly increase their investment in response to a tax cut, the induced private investment expands demand in the short run and also offsets the reduction in the capital stock. Tax subsidies for investment may not, however, work very well if firms with excess capacity (typical in a sluggish economy) cannot be easily encouraged to spend. In this case, however, a temporary tax cut is actually more effective than a permanent one because it encourages firms to accelerate their capital investment program. Such a temporary tax cut (bonus depreciation) was enacted in 2002.

How does dividend tax relief — and specifically a provision that provides a dividend exclusion and future capital gains exclusion for earnings retained — fit into this standard analysis? As a permanent provision, it is more likely to result in a stimulus. Dividend relief tends to be directed at relatively high income individuals who are less likely to spend, so it might be somewhat less effective than tax cuts aimed at lower income individuals. If the tax cut induces an increase in the savings rate, the stimulative effect would be smaller (although the effect on the savings rate could go either way, as discussed below). Nor is the tax cut likely to be very effective at inducing investment spending by a firm for several reasons. First, the incentive is provided to the individual who receives the benefit rather than the firm; this approach results in a more indirect route to investment stimulus. Second, even if the firm responds quickly on behalf of its shareholders, this type of tax cut largely benefits earnings from existing capital and is one of the least effective tax cuts for encouraging investment spending.[1] Finally, as discussed below in the section on portfolio shifts, the reallocation effects of the relief could actually contract investment spending in the short run.

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[1] A permanent investment stimulus (e.g., accelerated depreciation) would be more effective than a rate cut per dollar of revenue loss because a rate reduction provides more of its benefits for returns to the existing capital stock. A temporary investment stimulus would be more effective still, but a temporary rate cut could have perverse effects because it could actually increase effective tax burdens on new investment by reducing the value of accelerated depreciation. See CRS Report RL31124, *Using Business Tax Cuts to Stimulate the Economy*, by Jane G. Gravelle.

Long-Run Growth

In the long run, the dividend relief proposal will succeed in increasing output and growth (other than the modest effects associated with economic efficiency) only if it increases personal saving by more than the revenue cost and accumulating interest on the debt.[2] It is theoretically possible for this effect to occur initially, but most evidence does not support a large savings response to tax rate changes. Indeed, some evidence suggests that savings can fall as the rate of return rises (due to wealth effects). Even large savings responses would eventually result in a deteriorating capital stock because debt and the interest on debt would compound. Thus, the dividend relief proposal would harm long- run growth as long as it is based on deficit finance.

To demonstrate the magnitude and potential direction of these growth effects, we use a neoclassical growth model with an endogenous savings rate. The details of this model are presented in the Appendix.

Effects of Savings Elasticities. **Table 1** shows the projected effects of the proposal for various savings elasticities, for the first, fifth, tenth, and twentieth year, representing a reasonable span of the empirical evidence on savings elasticities.[3] Small and possibly negative elasticities are also theoretically consistent with offsetting income and substitution effects: greater wealth from higher rates of return increase current consumption but a cheaper price of future consumption reduces current consumption.

The estimates assume a fixed labor supply (also consistent with empirical evidence) and a Cobb-Douglas production function. Rather than considering percentage changes in GDP, a measure reflecting standard of living effects is used: income available for consumption after accounting for steady state investment necessary to sustain the capital stock at its current level. This measure could loosely be interpreted as a change in the sustainable standard of living.[4] The percentage change is similar to the percentage change in output. As **Table 1** suggests, the plan's projected effects would be to reduce output by a growing amount because the effect of the deficit on reducing the capital stock is larger than any induced savings response.

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[2] In an open economy government borrowing may be offset by foreign net capital inflows. However, that additional capital cannot contribute to the future standard of living of Americans other than in a minor way because it and its returns are owned by foreigners. Note also that the dividend exclusion plan does not apply to foreign shareholders and thus provides no incentive for increases in foreign equity investment in the U.S.; however, the provision does provide incentives for equity investment abroad by U.S. firms.

[3] See Eric Engen, Jane G. Gravelle, and Kent Smetters, "Dynamic Tax Models: Why They Do the Things They Do," *National Tax Journal*, vol. 50, Sept. 1997, pp. 657-682.

[4] This measure also prevents misleading representations from arising from a model where capital is imported. Since foreign suppliers own the rights to the capital, decreases or increases in capital stock reflecting foreign imports have limited effects on standards of living because foreigners have the claim to earnings.

In none of these cases is the effect on private saving large enough to offset the contraction in capital. The effects are actually quite small, an outcome that is not surprising because the dividend relief proposal is relatively small. The negative effects continue to grow over time as deficits accumulate, and, eventually, the model "explodes" as deficits displace the entire capital stock.

Table 1. Percentage Increase in Income Available for Consumption from Dividend Relief, Depending on the Size of the Savings Elasticity (E), Growth Model

	E = -0.4	E = -0.2	E = 0.0	E = 0.2	E = 0.4
Year					
1	-0.01	-0.01	-0.01	-0.01	-0.01
5	-0.08	-0.07	-0.06	-0.05	-0.05
10	-0.16	-0.15	-0.13	-0.11	-0.10
20	-0.39	-0.34	-0.30	-0.26	-0.22

Source: CRS calculations, see Appendix. Calculations assume fixed labor supply and factor substitution elasticity of 1.0.

Effects of Labor Supply and Factor Substitution Elasticities. **Table 2** provides for sensitivity analysis, and shows the effects of allowing labor supply to respond positively to a higher wage and allowing a smaller factor substitution elasticity (and the combination). A positive labor supply elasticity magnifies a negative effect (because as the capital stock falls, the wage rate falls), while a lower factor substitution elasticity has a very small effect (although its effect increases with a positive labor supply response).

Table 2. Percentage Increase in Income Available for Consumption: Sensitivity to Labor Supply (λ) and Factor Substitution (S) Elasticities

	λ = 0.2	S = 0.5	λ = 0.2, S = 0.5
Year			
1	-0.01	-0.01	-0.01
5	-0.07	-0.05	-0.08
10	-0.14	-0.11	-0.17
20	-0.34	-0.25	-0.40

Source: CRS calculations, see Appendix. Calculations assume E = 0.2 and, unless otherwise noted, $\lambda = 0$, S = 1.

Conditions Favorable to Positive Effects. Are there circumstances where the dividend relief plan can induce an increase in output? This effect is more likely to occur when elasticities are positive and large, although even with very large elasticities eventually the effect on output becomes negative. Another way to produce a positive effect is to offset the relief plan with some offsetting spending reduction. **Table 3** explores these effects, with some very high savings elasticities and assumptions that either offset the deficit immediately, or offset the deficit after 10 years.

Higher elasticities can reduce the negative output effects, but only very large elasticities (clearly far out of the range of empirical estimates) produce short-run positive effects (and these would also produce contractionary effects for short-run stimulative purposes). Eventually the effects would turn negative (even the elasticity of 3 has an effect that peaks at only 7/100 of 1% after about 20 years and becomes negative after 50 years).

Table 3 also examines assumptions that the deficit will be offset by spending decreases, in one case immediately and in the other after 10 years. Eliminating the deficit through a spending offset would increase output, although the amount is likely to be small for reasonable elasticities. Eliminating the deficit after ten years with an elasticity of 0.2, however, produces contractions in output for 36 years.

Table 3. Percentage Increase in Income Available for Consumption, Effects of Large Savings Elasticities (E) and Deficit Offsets via Spending Cuts

	E = 1	E = 2	E = 3	No Deficit	No Deficit After 10 Years
Year					
1	-0.00	0.00	0.01	0.00	-0.01
5	-0.03	0.01	0.04	0.00	-0.05
10	-0.05	0.01	0.06	0.03	-0.11
20	-0.13	-0.01	0.07	0.05	-0.06

Source: CRS calculations, see Appendix. Calculations assume fixed labor supply and factor substitution elasticity of 1.0. Deficit offset simulations assume E = 0.2.

International Capital Inflows. The negative effects on output could be offset if assumptions were made that foreign capital inflows would finance the deficit in excess of private saving. Although imported capital can prevent a decline in productivity, the returns to that investment are not available for domestic use. The effects are also sensitive to the level of tax on the earnings of foreign capital. **Table 4** provides estimates of the effect on standard of living (where foreigners have the claim to earnings) in one case where no taxes apply to capital income from abroad

and in the other case when full taxes apply. The results are the same in direction and similar in magnitude to those without capital imports.

Table 4. Percentage Increase in Income Available for Consumption, Effects of International Capital Flows

Year	No Capital Inflow	Full Capital Inflow, Return Taxed	Full Capital Income, Return Not Taxed
1	-0.01	-0.01	-0.01
5	-0.05	-0.05	-0.05
10	-0.11	-0.10	-0.10
20	-0.26	-0.21	-0.26

Source: CRS calculations, see Appendix.

Neoclassical Growth Versus Life Cycle Model. The model used in this analysis is a simplified Solow growth model with an endogenous savings rate which relies on reduced form empirical elasticities and assume myopia.[5] There are also models that are built up from consumers who maximize utility, and are forward looking; a model that is currently in use is a life cycle model.[6] Forward looking models cannot be solved at all (even for the initial years) without taking some measures to address the budget deficit.[7] Although behavioral responses are derived from econometric studies, these models rely on many arbitrary assumptions that could greatly alter the outcome (in particular, they tend to have large income effects) and have generally not been empirically tested for reduced form effects.

Overall Effects on Growth. The estimates from these modeling simulations show that capital income tax cuts, financed by government deficits, induce negative effects on output in a full employment model, and that these negative effects get larger over time. The initial effects in either direction are quite small, reflecting the small size of the tax cuts and the slow adjustment of the capital stock. However, even if the deficit effects are offset, under reasonable elasticities, these negative

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[5] Reduced form estimates are derived from regressions of savings rates on observed returns (and other variables) — a reduced and simplified form of supply relationships that might be derived from an approach that begins with a utility function for choosing between consumption across periods.

[6] A related model is an infinite horizon model which treats the economy as a representative, infinitely lived individual. This model would produce positive growth effects because it forces an infinite savings elasticity, but requires many restrictive assumptions.

[7] See CRS Report RL32517, *Distributional Effects of Taxes on Corporate Profits, Investment Income, and Estates*, by Jane G. Gravelle for a more detailed discussion of the issues surrounding savings responses.

growth effects appear for many years. When gains to future well-being are appropriately measured, such negative effects cannot be avoided with foreign capital inflows. Nor is the negative effect an artifact of the type of model: such effects would also occur with more sophisticated life cycle models as well. Thus economic benefits of a debt-financed dividend relief proposal must be sought elsewhere. The next section turns to the classic argument for corporate tax integration.

Reallocation of Capital (Portfolio Effects)

Dividend relief might or might not increase private savings, and it will contract the capital stock if it is financed by debt, but it should also alter the allocation of savings from other uses into the stock market. Capital may be withdrawn from debt (including tax exempt debt), investment in unincorporated business, or in owner occupied housing. This induced allocation of savings has certain effects, in the short run as well as the long run, that might be considered.

In the short run, the reallocation of assets could undermine the effects of the dividend relief provision as a stimulus, if assets are moved from actual physical investment (such as investments in housing, consumer durables, and unincorporated business assets). The reallocation of capital out of debt and into equity, which would have the effect of raising interest rates, depressing bond and housing prices, and increasing stock market values, could also undermine the stimulus effect if firms are more sensitive to the effects of interest rates on their investment plans than they are to stock prices.

In the long run, the reallocation of assets has important implications for two issues closely associated with corporate tax relief: fairness and economic efficiency.

Although references have been made to the unfairness of the double tax, this argument is not generally made by economists. A heavier tax on one type of investment leads to changes in investor behavior (investors withdraw from the heavily taxed sector and invest in the more lightly taxed sector). The result of this process is that after-tax returns (net of risk) are equated. Since investors are free to invest in any type of asset, there is no inequity across taxpayers based merely on where they invest. There is, however, inefficiency because heavily taxed assets must earn a higher return before tax than lightly taxed investments.

The tax relief may be considered unfair by some from a vertical equity standpoint, because higher income individuals receive more of the benefits from the tax cut.[8] Moreover, merely changing a tax provision actually induces some unfairness across current investors because it provides the taxpayers holding the assets whose taxes are reduced (in this case, investments in stocks) with windfall gains, and those holding disfavored assets with windfall losses. For dividend relief, these windfall gains are captured in a stock market effect which is a subject for discussion below.

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[8] See CRS Report RL31597, *The Taxation of Dividend Income: An Overview and Economic Analysis of the Issues*, by Gregg A. Esenwein and Jane G. Gravelle.

The classic economic argument for eliminating double taxation (or, more generally, integration of corporate and individual income taxes) has always been efficiency. The current system creates a number of economic distortions, causing too little capital to be allocated to the corporate sector, debt ratios that are too high, and payout ratios that are too low. There is some dispute about the magnitude of efficiency gains but Treasury, using a range of models and assumptions, estimated gains that ranged from 0.11% to 0.53% of consumption, in a study of integration released in 1992.[9] Most of these efficiency effects would not appear in actual output increases, but in a more desirable allocation of consumer goods and a more efficient allocation of risk. However, these improvements in welfare are represented as the equivalents of dollar increases in output and, at 2001 income levels, these amounts are between $8 billion and $37 billion. These projected efficiency gains would take some period of time to occur, as the capital stock shifted between sectors, but would eventually offset some of the negative effects of a diminished capital stock. (They would be permanent effects, however, and would not prevent the eventually explosive effects of continual deficits.)

These effects do not account for a specific aspect of the dividend proposal that decreases its cost and may reduce the associated welfare gain, the limit on preferences discussed in the next section.

Tax Exempt Shareholders and Tax Preference Passthrough Limits

Two provisions limit the benefits — and the revenue loss — of the President's approach to corporate tax integration. First, the benefits are not available to tax-exempt shareholders (e.g., pension funds) or foreign shareholders who do not pay U.S. individual income tax. Over half of stockholders fall into this position.[10] Secondly, there is a restriction on benefits for income that is not subject to tax because of tax preferences, which probably reduces the tax cuts by around a third.[11]

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[9] U.S. Department of the Treasury, *Integration of the Individual and Corporate Income Tax Systems, Taxing Business Income Once,* Jan. 1992. The range represents differences in model assumptions about the substitutability of capital between sectors and how revenue would be made up (through lump sum taxes or an overall increase in all capital gains taxes). These effects would be smaller if a "trapped equity" or "new view" of dividends is assumed, an issue that will be discussed separately.

[10] See CRS Report RL31597, *The Taxation of Dividend Income: An Overview and Economic Analysis of the Issues,* by Gregg A. Esenwein and Jane G. Gravelle.

[11] Tax expenditures are special deductions, exclusions and credits that are considered to department from a normal income tax. In 2003, tax expenditures were about 65% of tax liability, implying about a 40% reduction in cost. However, because of the stacking of dividend relief first, which is subject to higher taxes, the reduction in revenue cost would be smaller (by as much as a half). Tax expenditures are a little higher than average currently because of temporary expensing; however, the tax expenditure list may not include all subsidies.

These aspects introduce some uncertainty in general into the analysis of effects. For example, to the extent that tax-exempt holdings are not marginal, the effect on savings would be larger because the marginal effect would be larger than the average. It is unlikely however, that this effect would reverse the conclusions that the proposal will be contractionary for growth. For modeling purposes, if a term were added for an additional marginal tax rate effect that doubles its size and a substitution elasticity of 1 plus the base elasticity were used in the growth model discussed above (see discussion in **Appendix**), the effects, even for the highest value in **Table 1**, would be negligible in the first few years and still eventually turn negative, reducing output by 0.02% in year 10, and by 0.21% in year 20.

Since tax exempt funds can make portfolio choices, there is less reason to adjust efficiency effects discussed in the previous section or stock market effects to consider them infra-marginal.

The second provision restricts tax benefits for income that is preferentially treated.[12] These provisions are designed to disallow dividend exclusions and increases in basis for income that has not been subject to a tax. There are many implications of these provisions. While these provisions would not drive a potential wedge between average and marginal tax rates as in the case of the tax exempt investors, they make the interpretation of welfare gains more problematic. To the extent that they preserve differential treatment between corporate and non-corporate investment, debt and equity, and payout functions compared to a provision that did not limit tax benefits, they lower the welfare gains of corporate tax integration. If they discourage activities that were desirable to encourage, the effect would also be to lower welfare gains; however, if they discourage activities that were not desirable to encourage, the effect would be to raise welfare gains. Whatever the net effect of the preference passthrough provision, a better approach if preferences were viewed as undesirable would be to repeal them outright, as this provision preserves the benefits for unincorporated business investment and debt finance, but not for corporate equity investment.

These two aspects of the proposal also may interact. There are incentives for tax exempt investors to shift to firms that have a lot of preferences and taxable investors to shift to firms with few preferences, which could result in a larger tax cut and larger cost.

The Stock Market

There has been considerable discussion of the effect of the dividend proposal on the stock market. Certainly the decline in the stock market has caused losses to the financial assets of many individuals, although many observers believed that stock values were overpriced and that the market would eventually have to decline. Some

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[12] For an analysis of this provision see CRS Report RL31782, *The Effect of the President's Dividend Relief Proposal on Corporate Tax Subsidies*, by Gregg A. Esenwein and Jane G. Gravelle.

arguments incorporate increasing investor or consumer confidence, which suggests a short-run stimulus objective.

An Overview of Economic Issues

The stock market is subject to fluctuations, but its value is also an important price signal mediating between investors and firms. To undertake a permanent tax change for the purpose of influencing the stock market price is an objective not easy to justify — particularly since it cannot be done a second time. The principal justification for focusing on this value is an expectation that the rise in the stock market would spur spending in the short run.

Increases in stock market values are thought to increase spending through a wealth effect, although both theory and empirical evidence suggest the wealth effect on consumption is small.[13] In theory, however, a rise in the stock market *induced by tax cuts* reflects the windfall gains that accrue to investors who already hold an asset, and arise from the need for time to adjust portfolios and capital stocks in response to the tax change. The rise is simply a manifestation of part of the income effect that should already be considered in evaluating any economic stimulus and therefore should not be considered as having a separate stimulative effect on the economy (unless investors are not rational). If adjustment were instantaneous, the stock market's value would never change, at least under traditional views of dividends. The larger the stock market price effect, the smaller the economic efficiency benefits to reallocating capital that are the principal justification for corporate tax integration.

Moreover, the rise in the stock market does not simply appear by magic — it arises out of shifts in supply and demand as do any other prices in the economy. If savings and portfolio allocations were fixed, no changes in the value of the stock market would occur, and stockholders would simply earn a higher rate of return. If the stock market does rise, it is also important to recognize the processes that lead to that increase and their consequences for short-run effects on demand. Individuals may be saving more (which is contractionary) or they may be shifting out of other assets (which can be contractionary if coming from physical investment and raise interest rates if coming from bonds). The rise in interest rates will contract investment spending financed from debt. If corporate firms are to increase their equity investment, they must either retain more earnings (which reduces dividends available for other spending) or they must increase the supply of stock shares (by issuing stock or reducing repurchases). This increase in stock shares will push stock prices back down somewhat and the increase in investment will ultimately drive down returns per share.

It is possible that a rise in the stock market could result in an increase in business or consumer confidence that could separately produce an economic stimulus. Some research in this area has suggested that such an effect on consumers is not very likely, since the run up in the stock market in the 1990s seemed to

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[13] See James M. Poterba, "Stock Market Wealth and Consumption," *The Journal of Economic Perspectives*, vol. 14, spring 2000, pp. 99-118 for a review of the literature, which suggests a dollar of wealth increases consumption by about 3 cents.

primarily manifest itself in the increased spending of higher income individuals who own stock.[14] Moreover, businesses, particularly sophisticated firms, would likely be aware of the link between tax cuts and wealth. But, in any case, if there is a relationship it presumably would depend on the magnitude of expected effects — they should be large enough to at least attract attention. The remainder of this section attempts to quantify the expected effect on the stock market to determine whether it might be large enough to gain notice.

Perhaps the simplest way to explore this issue of the stock market effect is to discuss the magnitude of potential effects that have been in the news and whether those effects are reasonable and significant. This analysis will be followed by a brief explanation and discussion of the implications of an alternative economic theory about the effect on stock market prices — the trapped equity view.

Estimated Stock Market Effects: A Standard Analysis

When the dividend proposal was initially introduced, potential effects on the stock market of up to 20%, which would be significant, were mentioned.[15] Two other estimates of the effect: one provided by the administration at 10%, and one estimated by MIT economist James Poterba, of 5% to 6%, were reported in a Wall Street Journal article[16]. (The proposal also includes reductions in capital gains taxes on income retained in the firm). This section examines the value of 5%-6% proposed by Poterba (where underlying data are presented to support the calculation). The analysis suggests that this value is probably an upper limit to the effect, and the likely effect would be much less, perhaps no more than 1% or 2%. Certainly, the effect is likely to be small compared to normal fluctuations in market values.

There are no explanations of the source of the 10% estimate, but Poterba provides the basics for his calculation, which is a very straightforward estimate of the present value of the tax cut divided by the value of the stock market. His calculation appears to be of the form:

$$\% \text{ Change in Stock Value} = \frac{\dfrac{\text{Tax Cut}}{\text{Discount}}}{\text{Stock Value}}$$

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[14] A recent study by Karen Dynan and Dean Maki, "Does Stock Market Wealth Matter for Consumption?" as well as a study by Dean Maki and Michael Palumbo, "Distentangling the Wealth Effect: A Cohort Analysis of Household Savings in the 1990s," both in *Finance and Economics Discussion Papers*, Board of Governors of the Federal Reserve, 2001-23, and 2001-21 respectively, found little or no relationship between stock market wealth and consumption by those who did not own stock.

[15] See "Can a Dividend Tax Cut Juice Growth," *Business Week Online*, Jan. 3, 2003. The 20% number is attributed to Glenn Hubbard, then Chairman of the Council of Economic Advisors, but that number probably reflects an analysis in an academic research article reflecting the trapped equity, or "new view," discussed in the next section. An estimate of 6% to 9% was also mentioned in the Jan. 3 article.

[16] Bob Davis and Greg Ip, "The If Factor: Bush Stimulus Package Needs Many Assumptions to Pan Out," *Wall Street Journal*, Jan. 8, 2003, p.1.

There are four issues that affect this percentage: the size of the tax cut, the discount factor, the current value of the stock market, and whether the formula itself, which reflects a full and permanent expected capitalization effect, is complete. We consider each factor in turn.

Cost of the Tax Cut. Poterba reports the first year tax cut as $26 billion. The Treasury estimate of the dividend tax proposal is $20 billion for 2003, according to an Administration document issued on January 7, 2003. This number is, however, somewhat understated for capitalizing over time because the proposal includes not only dividend relief but also a basis adjustment that will reduce tax revenue later; only a small share of this basis adjustment is included in the first year cost. There may also be some slight difference because of accruals versus collections. To correct for the first, the estimated costs would increase to about $25 billion were the full effects of basis adjustment to be taken into account.[17] Given there is some slight discrepancy between accrual and collection basis that would also make the Treasury number slightly too small, along with a small offsetting effect from the fact that the first few years do not actually include the full effects of basis adjustment, Poterba's $26 billion number is a reasonable one.

Discount Factor. The annual revenue cost must be summed over all future years and then discounted at some rate of return in order to create a present value. Poterba estimates the present value of the stream of tax cuts to be $500 billion to $650 billion. In a growing economy, one would normally think that dividends and tax payments would grow at the growth rate of the economy as well as being discounted at some after-tax equity return. Thus we can think of the discount factor as being R - g, where R is the after tax required rate of return of the investor and g is the growth rate. The difference between the two should also reflect the current after tax earnings as a percentage of asset value. By working backward, we can determine this discount factor to be 0.04 (26/650) and 0.052 (26/500). This range of values is reasonable.[18]

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[17] Based on an average five-year holding period, the current year cost for the basis adjustment's effect on capital gains will be about a fifth of the long-run effect. However, the capital gains tax is much lower than the dividend tax, so its importance is somewhat diminished. Capital gains tax rates are around 18%. (Gains for those in the 15% bracket are taxed at 10% if held for one year and 8% if held for five years; otherwise gains are taxed at 20% if held for one year and 18% if held for 10 years.) If we cut the 18% rate in half to account for the fact that about half of gains are never realized, and assume that the average marginal tax rate on ordinary income is around 30%, the capital gains tax rate is about 30% of the individual rate. With about half of earnings paid out as dividends, based on data for the last few years, the permanent cost will bear the ratio of (0.5X0.3+0.5)/(0.5X0.2X0.3+0.5), or 1.23. This ratio suggests a cost of $24.6 billion. (Note: When calculating dividend payout shares from the National Income and Product Accounts, it is important to subtract out from earnings and from dividends the significant amount of dividends paid by Subchapter S corporations that do not pay the corporate tax.) There may also be some slight difference because of accruals versus collections.

[18] One can use either real or nominal values. With a 2.5% real growth rate, the 4% value implies a real return of 6.5% and a nominal return of 8% with 2.5% inflation. The 5.2% value implies a return of 7.7% real and 10.2% nominal return with 2.5% inflation.

Stock Market Value. Estimates are sensitive to stock market value, which, of course, fluctuates considerably. At close of business on January 15, the value was estimated at $12.2 trillion,[19] which leads to a range of percentage appreciation derived from the tax cut of about 4.1% to 5.3% using Poterba's method. Slightly over a week later on January 24, it had fallen to about $11.6 trillion. Poterba appears to be using a value of around $10 trillion to $11 trillion which is lower than these values but reasonable given the market's volatility.

In any case, a 5% to 6% stock market gain from the tax proposal is a relatively small effect. For example, for the slightly over three-month period from the end of September 2002 to mid-January 2003, the market rose by 12%, an effect over twice the size of the estimated stock market effect of the dividend tax proposal. The market fell by 5% from January 15 to January 24, a period of slightly over a week. This effect is about the same size as Poterba's estimated stock market effect and it suggests that if Poterba's calculation is correct, the increased value is unlikely to have much effect on consumer or investor confidence.

Method of Calculation. The calculated effect is the equivalent of permanently capitalizing the value of the tax cut in the market. But there are two important reasons that this value is an *upper* limit.[20]

The first, and perhaps most important, is that the higher returns in the stock market will attract money out of the bond market, and raise interest rates. (The economic stimulus itself also increases interest rates by increasing the demand for money.) This increase in interest rates will have two effects that tend to lower the effect on the stock market. The most important is that the expected after tax return that forms part of the discount factor is tied to interest rates and will rise. Even very small increases could eliminate most of the expected rise in stock prices. For example, a 10 basis point change in the interest rate, that increases it by 0.1%, would reduce market values by 2 to 2.5%, and would offset about half the estimated rise in value.[21] A change of slightly over 20 basis points would eliminate the effect completely even if this effect occurred only through the discount factor. The higher

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[19] This value is based on market value at the end of the 3rd quarter 2002 for the Nasdaq, New York Stock Exchange and Amex: $1.717 trillion, $9.041 trillion and $0.094 trillion respectively, or $10.8 trillion (see [http://marketdata.nasdaq.com/asp/sec1summary.asp]). These values were updated for close of business January 15 using the Nasdaq, S&P 500 and the AMEX composite (factors of 1.215, 1.122 and 1 respectively, see [http://finance.yahoo.com/m1?u]; note that the NYSE composite was not used because it has been recentered).

[20] Under one theory about markets, mainly that dividend taxes in excess of capital gains taxes, are capitalized into asset values, there is a permanent rise in the stock market from repealing the dividend tax. This view, referred to as the "trapped equity view" and also the "new view,' (as opposed to the traditional view) suggests that dividend taxes do not matter to investment behavior and will be discussed below.

[21] The ratio of new to old market value is (R-g)(R-g+0.1), where R-g is the discount factor. Thus the price falls by 2.5 % at 4% (1-.04/.041) and by 1.9% at 5.2% (1-.052/.053). This calculation assumes an additive risk premium.

interest rates will also, however, increase the cost of borrowing for firms and reduce cash flow which would also act to reduce stock market values.

If the supply of savings is fixed (e.g. increased private savings does no more than offset government borrowing to finance the tax cut), there is no new wealth in the economy. In that case, asset prices in the economy will quickly return to their equilibrium values. As soon as individuals make their portfolio shifts (out of bonds and into stocks), which would presumably happen very quickly, the interest rate would rise. Moreover, some effect on corporate cash flow would occur as borrowing costs rose. The offsetting of the price effect would appear more quickly if individuals are forward-looking and expect interest rates to rise. That is, if individuals have foresight and expect interest rates to rise, they will take this expectation into account and alter their own discount rate for valuing stock immediately even before portfolio shifts are complete or all debt has turned over.

If the savings rate increases, there could be a longer adjustment period but the rise in prices would be temporary. That is because added investment would ultimately drive down the marginal return on capital. If individuals are myopic, there could be a rise that will simply decline over time. But if investors are rational and forward looking, the expected change itself would moderate the initial rise. The Appendix shows how this adjustment process might occur when we hold the interest rate fixed. If h is the fraction of the remaining difference between the new and old values of the marginal product of capital that is made in each period, then the ratio of the actual percentage change assuming forward looking investors to the change as calculated above is discount/(discount+h) (as shown in the Appendix). In the case, for example, where the dividend rate equals .04 and the fully capitalized effect is 5.3%, if h = 0.10, the actual effect will be only 1.5%. Since the effect of this change on the desired capital stock and the desired marginal product of capital is only about 4 or 5%, this change is a small one that could be expected to be adjusted to quickly.

There is one offsetting factor that could lead to a small share of the market rise being permanent: the possibility of permanent excess profits from market power. If a firm is earning excess profits because it has market (or monopoly) power, that effect would have been capitalized into a higher market value for stocks. To use an extreme case, if every firm were a pure monopoly with demand characterized by a linear demand curve, only half of a change in tax is passed on in price. Therefore, one would expect that if the only adjustment that occurred was a change in the marginal product of capital, half the rise in the stock market would be permanent and, using the example in the previous paragraph, the initial effect might be a 3% increase rather than a 1.5% increase. This effect is much too large, however. Some of the adjustment is likely to take place in the discount rate in the denominator, which exerts the same proportional effect regardless of market value. Pure (unregulated) monopolies largely don't exist in the United States, and the passthrough becomes larger as the number of firms increase. Moreover, in oligopoly models of any size, price competition (known as Bertrand competition) can lead to the same effects as perfect competition. Thus, while the effects of market power are likely to slightly increase the initial price effect because some effects are permanent, this effect is probably quite small.

The Trapped Equity or "New" View of Dividends

There is a theory, referred to as the "trapped equity" or "new" view (although it is 25 years old) that suggests dividend taxes (in excess of capital gains taxes) are irrelevant to investment behavior. The entire stream of dividend taxes in excess of capital gains taxes under the proposal would show up as a windfall to current stockholders. If one holds this view, the effects on the stock market should be larger. However, there would be little efficiency gain from the reallocation of capital for eliminating these taxes. Again, a belief in a large permanent effect on the stock market is only consistent with a belief that there is little to gain in efficiency effects from dividend tax relief. As this section suggests, however, even this analysis suggests a stock market increase of only 3%.

For a tax that reduces both dividends and capital gains taxes, the portion that reflects the excess of dividends over capital gains would be permanently capitalized. Assuming a tax rate of 30% on dividends and 10% on capital gains, and about half of income paid in each form, about half the tax cut would be permanently capitalized. To understand how this theory developed and what it means, it helps to contrast it with the traditional view, which underlies the analysis in the previous section.

In the traditional view of dividends the cost of capital is affected by both the dividend and capital gains tax rates. The double tax on dividends causes inefficiencies and misallocation of capital away from corporate equity investment. In the new view, the dividend tax has no effect on investment (see Appendix for a mathematical derivation of this effect).

In the traditional view, with perfect competition and without other tax subsidies, the value of a dollar of equity owned capital is equal to a dollar of value in the stock market. While stock market prices may rise initially, they will eventually return to this equilibrium value as discussed above and expectations will limit the initial rise. In the trapped equity view, dividend taxes (in excess of capital gains taxes), which do not influence investment, are windfall losses to the individuals who own stock when the dividend tax is imposed and are expressed in a permanent reduction in stock price. Removal of those taxes would be a windfall loss to current owners. (The actual supply and demand processes that accompany this effect are not clear.)

One of the issues that spurred the development of the trapped equity theory was the fact that firms pay dividends, even though they are more heavily taxed than capital gains. To explain why firms pay dividends, the traditional view of dividends requires that dividends have some value or be differentiated in some way from capital gains; otherwise firms would never pay dividends and would distribute excess earnings by repurchasing stock. Several economic theories could motivate the payment of dividends. The simplest is that dividend and capital gains income differ in important ways (earnings from sales of assets fluctuate more and involve greater transactions costs than the receipt of dividends). Economists have also advanced notions dealing with imperfect information (dividends are a signal that the firm is doing well) and principal agent problems (dividends keep managers from diverting or wasting too much of the earnings).

The original form of the trapped equity view was essentially an alternative way of explaining why firms pay dividends. It is based on the notion that dividends are trapped in the firm and that earnings cannot be paid out to the shareholder in any other form, i.e. no share repurchases. The dividend tax must be paid now, or later with interest, but cannot be avoided. The idea is much like an that associated with an individual retirement account. The problem of double taxation is much less severe because the cost of capital is affected only by the accrual equivalent capital gains tax rate which tends to be small because of lower rates, deferral of tax, and avoidance of tax if held until death.

Assuming financing via retained earnings, in the new view a dollar of equity capital has a value (referred to as q) of $(1-\theta)/(1-c)$, where θ is the dividend tax rate and c is the capital gain tax rate. This ratio occurs because the shareholder is indifferent between receiving a dollar of dividends net of tax (that is the cost of retaining earnings is $(1-\theta)$) and retaining it in the firm where its value is the increase in value, or q, times (1-c), where c is the capital gains tax rate.

This formula may explain how some of the larger effects that might be expected on stock market values might have been calculated if dividend relief was provided. For example, if the dividend rate is 30% and the accrual equivalent capital gains tax is 10% (an estimate that is consistent with evidence suggesting that close to half of capital gains are never taxed), the value of the stock market is (1-0.3)/(1-0.1), or $0.78 for each dollar of capital. Eliminating both taxes (or reducing the dividend tax to 0.2) would permanently increase the value to $1 or almost 30% and thus it may not be surprising if the finding of evidence for the new view in academic research might have lead to the conclusion of a 20% stock market effect.

These estimates are, however, likely to be overstated, because a large fraction of taxpayers (more than half) are not subject to taxes on dividends. If a weighted average is used, the tax rates would be only about 40% as large, so the effect on the stock market would be closer to 9% (rising from (1-0.4X0.3)/(1-0.4X0.1) or $0.917 to $1). In the actual proposal, of course, dividend taxes would not be eliminated but would remain to the extent of preferences. If preferences reduce the tax cut by a third, the new value would be (1-0.4X0.3X0.67)/(1-0.4X0.1X0.67) or $0.945, implying only a 3% increase.

The trapped equity view, at least in its pure original form, has fallen out of favor somewhat for theoretical reasons. One of the requirements for this pure form is that firms not be able to repurchase their own shares, an option that has always been available in the United States, and in fact has increasingly been used by firms. Another is that firms do not issue shares and pay dividends simultaneously. The traditional view can easily accommodate the repurchase of shares along with payment of dividends, while modifications to the new view to make it consistent with observed share repurchases may succeed in maintaining the view that dividends are irrelevant to investment but tend to reduce the magnitude of the stock market effects. One such approach is to make the dividend tax rate in the valuation formula a weighted average of the dividend tax and the capital gains tax based on the ratios of dividends paid to share repurchases although even this view requires a quite restrictive assumption of a fixed proportion of repurchases and dividends. There are

some other conceptual problems that arise with the trapped equity view as well as a number of attempts to address the issue through empirical studies.[22]

Conclusion

None of the effects of the dividend tax relief proposal is likely to be large, mainly because the tax cut itself, since it is restricted to individual taxes, does not include tax exempt investors, and restricts benefits for preferentially treated income, is not really that large. It amounts on average to about a one percentage point reduction in the overall tax rate on capital income and about two percentage points in reduction of the tax on corporate equity. As a short-term stimulus, either directly or via stock market effects (which are themselves quite small), it is not clear that the dividend relief is superior to other alternatives, while its long-run growth effects are negative if it is deficit financed (and may be negative even if it is not). The principal economic justification for the proposal is the economic efficiency gains from more efficient allocation of capital.

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[22] For an earlier and non-mathematical survey of this issue, see George Zodrow, "On the "Traditional" and "New" Views of Dividend Taxation, *National Tax Journal*, vol. 44, part 2, Dec. 1991, pp. 497. This paper suggests that the empirical work has not supported the new view. Three recent papers are Trevor S. Harris, R. Glenn Hubbard, and Dean Kemsley, "The Share Price Effects of Dividend Taxes and Tax Imputation Credits," NBER Working Paper 7445, Dec. 1999; Alan J. Auerbach and Kevin Hassett, "On the Marginal Source of Investment Funds," *Journal of Public Economics*, v. 87, Jan. 2003, pp. 205-232; and Michelle Hanlon, James N. Myers, and Terry Shevlon, "Dividend Taxes and Firm Valuation," Working Paper, University of Washington, July 11, 2002. The first two of these three more recent papers are new empirical studies, both providing some support for the new view. The latter is essentially a criticism of the methods used in the first of the three papers, but also contains a general review of the literature.

Appendix

Growth Model

The growth model used to calculate the effect of dividend relief on future output and the standard of living is composed of the following equations. The first is a production function:

(1) $Q_t = A[aK_t^{(1-1/S)}+(1-a)L_t^{(1-1/S)}]^{(1/(1-1/S))}$

where Q_t is output at time t, K_t is the capital stock at time t, L_t is the labor supply at time t, S is the factor substitution elasticity, and A and a are constants.

The second is the equation for change in the capital stock letting all variables be expressed in period 1 income levels:

(2) $K_{t+1} - K_t = s_t[(Q_t-\delta K_t - t_k R_t K_t - t(Q_t -\delta K_t - R_t K_t)) - nK_t - D_t]/(1+n)$

where s is the savings rate out of disposable income, δ is the economic depreciation rate, t_k is the tax rate on capital income, R is the pretax rate of return to capital, t is the tax rate on labor income, n is the growth rate of the economy, and D is the deficit which is the sum of tax change and interest on the accumulated debt (pre-existing debt and deficit are set to zero). Interest on the debt is the pretax return less a fixed 4% risk premiums, all multiplied by $(1-t_g)$ where t is the tax rate on government interest payments.

The third is the equation for the savings rate:

(3) $s_t = b(R_t(1-t_k))^E$

where E is the savings elasticity and b is a constant.

Maximizing (1), subject to $Q_t = (R_t+\delta)K_t + W_t L_t$ results in the first order condition:

(4) $R_t = a(Q_t/K_t)^{(1/S)}A^{(1-1/S)} - \delta$

The model is calibrated to resemble the U.S. economy, with initial W and Q normalized to 1, K set at 3.5, δ set at 0.03, R set at .07, all initial tax rates set at 0.3, and n set at 0.025. The budget constraint is used to calibrate labor supply, which is thereafter set as a fixed amount (not sensitive to changes in the wage, which is a reasonable representation of the labor supply literature).[23] We do, however, explore the effects of a labor supply response, using the additional labor supply formula:

(5) $L_t = h(W_t(1-t))^{\gamma}$

where h is a constant and γ is the labor supply elasticity.

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[23] Most evidence shows little or no response of labor supply to changes in the wage rate.

We simulate the effects for a change similar in size to the proposed dividend relief plan (determined by dividing initial revenue loss by output), reducing the tax rate on capital by one percentage point.

For the discussion of using a larger versus marginal tax rate when considering tax exempt investors, the savings equation in (2) above would be multiplied by a term that is $[(1-t_a)/(1-t_m)]^{E^*}$, where a and m refer to average and marginal tax rates, and E* to the substitution elasticity. The substitution elasticity would be the observed elasticity plus the income elasticity.

In the case of international capital flows, the capital stock and output are fixed. The deficit still accumulates and the effects on the standard of living are reflecting in a reduction of income available to Americans because a share of the capital stock is owned by foreigners. Where this return is subject to tax, some portion is available because it is collected by the Treasury.

Adjustment and the Stock Market Value

This section discusses an approximation of the calculation of the effects if expected adjustment in the stock market by forward looking investors. The effects do not account for the possible speedup in capital gains taxes due to the rise and then fall of the price, but this effect is likely to be small.

For investment purposes, one can solve for the marginal product of capital through an equation for the present value of earnings on a dollar of investment:

$$(6) \quad 1 = \int_0^{\infty} \{[MPK(1-\mu)-(g+\delta)+\mu z(g+\delta)](1-\theta) - cg\}e^{-(R-g)t}dt + \mu z(1-\theta)$$

where MPK is the marginal product of capital, μ is the corporate tax rate, δ is the economic depreciation rate, g is the growth rate, θ is the dividend tax rate, R is the *after-tax* discount rate, and c is the capital gains tax rate. Solving for MPK, and assuming that economic depreciation is allowed, so that $z = \delta/(R+\delta)$

$$(7) \quad MPK = \frac{R - g(\theta-c))}{(1-\theta)\ 1-\mu)} + \delta$$

To solve for the value of the firm per dollar of capital stock:

$$(8) \quad V = \int_0^{\infty} \{[MPK(1-\mu)-(g+\delta)+\mu D](1-\theta) - cg\}e^{-(R-g)t}dt$$

where V is the value of the firm and is the annual depreciation deduction. The solution to the integral is $\{MPK(1-\mu)-(g+\delta)+\mu D](1-\theta) - cg\}/(R-g)$. Note, as

discussed above, that an increase in R will reduce the value. In the steady state, and assuming economic depreciation (D = δ) then, by substituting (7) into (8), obtain V =1.

Eliminating the capital gains tax and the dividend tax, the value of the firm is:

$$(9) \qquad V = \int_0^{\infty} [MPK(1-\mu)-(g+\delta) +\mu D]e^{-(R-g)t}dt$$

If the marginal product of capital never changes (permanent capitalization), then substituting (7) into (9):

$$(10) \quad V = 1 + \frac{\frac{(\theta(R-g) +cg)}{(1-\theta)}}{(R-g)}$$

Allowing the marginal product to gradually fall to its new level:

$$(11) \quad MPK^* = \frac{(R- g)}{(1-\mu)} +\delta$$

Suppose the gap between old and new marginal product is expected to change at the rate h. Then write the value as:

$$(12) \qquad V = \int_0^{\infty} [(MPK^* +(MPK-MPK^*)e^{-ht}(1-\mu)-(g+\delta) +\mu D]e^{-(R-g)t}dt$$

When t is zero, the marginal product is equal to MPK; as t goes to infinity, the marginal product is equal to MPK*.

$$(13) \quad V = 1 + \frac{\frac{(\theta(R-g) +cg)}{(1-\theta)}}{(R+h-g)}$$

Thus the ratio of change with the expectation of adjustment to the permanent capitalization effect is (R-g)/(R+h-g). Note that we do not use (10) and (13) directly to determine stock values for two reasons. First, we don't have enough information about the effective tax rate given that only part of dividends will be excluded because of preference allocation and only part of dividends are now subject to tax. Second, these formulas for stock market effects would be true only if the market is currently experiencing an equilibrium long-run price level under current tax rules, an assumption that cannot be made. By using ratios, the estimate can be made with direct estimates of the value of taxes and the stock market.

The Trapped Equity or New View of Dividends

Assuming financing via retained earnings, a dollar of equity capital has a value of (1-θ)/(1-c). This occurs because the shareholder is indifferent between receiving a dollar of dividends net of tax (that is the cost of retaining earnings is (1-θ)) and retaining it in the firm where its value is the increase in value, or q, times (1-c), where c is the capital gains tax rate. That is, in equilibrium

(14) $(1-\theta) = q(1-c)$, and therefore $q = (1-\theta)/(1-c)$

The present value of earnings on a dollar of capital must equal q. Therefore:

$$(15)\quad q = \int_0^{\infty} \{[MPK(1-\mu)-(g+\delta)+\mu z(g+\delta)](1-\theta) - qcg\}e^{-(R-g)t}dt \quad + \mu z(1-\theta)$$

and substituting in for the equilibrium value of q:

$$(16)\quad MPK = \frac{R}{(1-c)(1-\mu)} + \delta$$

Only the capital gains tax rate appears in the marginal product of capital term.

Note that this model (as shown in equation (14)) implies perfect substitutability between receiving earnings as a dividend and as a capital gain and dividends are paid out only as a residual after all investment needs are satisfied. Note also that the model no longer works if share repurchase is allowed as an alternative, which would imply that the earnings of share repurchase,(1-c), equals the benefits of reinvestment, q(1-c). In this case, q would have to equal 1. Moreover, no dividends would be paid. To allow for simultaneous investment, share repurchase, and dividends a model that provides imperfect substitutions between these choices or some additional benefit of dividends or cost of share repurchases. One such theory consistent with a traditional view is that dividends are differentiated from capital gains so that for the marginal dollar the dividend (and its benefit) or the capital gains (and its cost) are equated. Other theories have presupposed that there is a fixed share of dividends and retained earnings (with all marginal adjustments made through share issues) which is consistent with a traditional view, while another is that share repurchases and dividends are made in fixed proportion (a theory consistent with a modified new view where dividend taxes do not matter in the cost of capital and the value of θ is a weighted average of the dividend and capital gains tax). Why such choices should be completely imperfect substitutes is not clear, however. Theories also suppose that repurchasing shares is costly relative to paying dividends because of information asymmetries which again would permit a modified new view.