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4 Implications of Government Deficits for Interest Rates, Equity Returns, and Corporate Financing

Benjamin M. Friedman

Corporate financial officers in the United States have traditionally regarded choices affecting their companies' debt-equity structures as central to the management of the modern business enterprise, and they have also recognized the critical importance for these choices of the market environment. The decision to issue new debt securities or new equity, and indeed the decision to raise external funds at all or to rely on internal equity additions, are key ways in which individual business corporations respond to the incentives and signals provided by the financial markets. These incentives, and the responses they call forth, are basic aspects of how the financial markets steer the allocation of the economy's scarce saving. In a fundamental sense, this process is a large part of why an economy like that of the United States has such highly developed capital markets in the first place.

A major new factor affecting the U.S. financial environment in the 1980s is the need to finance federal government budget deficits far in excess of any prior U.S. peacetime experience. Federal expenditures exceeded federal revenues by more than $100 billion for the first time during the recession year 1982, and the budget gap widened to nearly $200 billion, or 6% of the nation's gross national product, as the business expansion be-

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gan in 1983. The limited narrowing of the deficit to about $170 billion in 1984, despite the continuing vigorous economic expansion, first represented the emergence of unprecedentedly large deficits on a high-employment basis as well. Prospects for the remainder of the 1980s depend both on the economy's further expansion and on future legislative action, of course, but a significant shrinking of the federal deficit before the end of the decade is problematic at best.[1]

Because of the central role of the market environment in affecting corporate financial decisions, this dramatic change in the stance of U.S. fiscal policy bears potentially significant implications not only for market interest rates but also for corporate financing, and hence for the quantity and allocation of physical capital formation undertaken by the U.S. business sector overall. In assessing these impacts, it is essential at the outset to judge the effects of continuing large government deficits on the structure of interest rates and equity returns confronting individual business corporations. That structure of asset returns depends, in turn, on the portfolio behavior of investors who collectively must hold whatever securities corporations, the government, and other borrowers may issue.

When investors are averse to bearing risk, as most investors plausibly are, their willingness to hold different kinds of securities depends on their assessments of the respective risks to which holding these securities exposes them. Investors typically prefer assets that they expect to bear higher returns when the associated risks are equivalent, but excessive risk can lead investors to shun even assets that they expect to bear very large returns. Similarly, investors' willingness to treat some kinds of securities as substitutes for others in their portfolios depends on the relationships that investors perceive among the associated risks to holding these securities as well as others. If two assets expose holders to essentially the same set of risks—to inflation, for example, or to the price of some raw commodity like oil or copper—investors typically treat the two as close substitutes and allocate their portfolios accordingly.

The object of the research summarized in this paper is to determine, on the basis of the plausible behavior of investors in the U.S. financial markets, how the emergence of continuing large federal government deficits at high employment is likely to affect the market environment for corporate financing. In particular, the specific question addressed here is how issues of either short- or long-term debt, to finance the government deficit, affect the structure of market returns on both debt and equity securities. Because investors' perceptions of risks on these various assets are unobserv-

1. Successive budget projections issued by the Office of Management and Budget and by the Congressional Budget Office differ; but most show that, in the absence of significant legislative action, the deficit will remain about 5% of gross national product.

able, and hence must be indirectly inferred from data describing information that investors presumably have, the approach taken here is to examine the answers to this question generated by several different ways of representing the all-important risk perceptions.

Section 4.1 briefly reviews the relationship between investors' demands for various assets and the respective risks that they associate with these assets. An aspect of this relationship that is of crucial importance in the context of the question addressed here is that not just the magnitude but even the direction of the effect of government bond issues on debt and equity returns is an empirical question, not answerable on the basis of theory alone. Sections 4.2, 4.3, and 4.4 present evidence on this question based on three different methods of inferring investors' risk perceptions from available data. Section 4.5 summarizes the conclusions implied by these three forms of evidence and calls attention to several important caveats.

To anticipate, the evidence presented here consistently indicates that financing government deficits by issuing short-term debt lowers the return on long-term debt, and lowers the return on equity by even more, in relation to the benchmark of the return on short-term debt; and that issuing long-term debt raises the return on long-term debt, and lowers the return on equity, again in relation to the benchmark of the return on short-term debt. Hence either form of deficit financing alters the structure of returns so as to render equity a more attractive form of finance from the issuer's perspective. This conclusion emerges from all three ways of inferring investors' risk perceptions considered here.

4.1 Government Debt Issues and Debt and Equity Returns

In light of the radical change in U.S. fiscal policy that occurred at the outset of the 1980s, it is important to know what effects the financing of government budget deficits has on the structure of asset returns. The U.S. government's budget deficit has become unprecedentedly large—even on a high-employment basis—in comparison to the economy's gross national product, to its supply of private saving, and to the ordinary financing requirements of business corporations and households. In the absence of a change from current tax and spending policies, this trend appears likely to continue. In addition, for the first time ever in U.S. peacetime experience, the federal government's outstanding debt is rising, steadily and rapidly, in comparison to gross national product. This trend too appears likely to continue for some time.

If these trends do continue, then the amount, and probably also the composition, of both business and household financing will be different in the 1980s than in previous cyclically comparable periods. From the perspective of the balance of saving and investment, only a half-again in-

crease in the economy's net private saving rate would be sufficient to accommodate government deficits of the current magnitude plus the usual amount of private sector investment.[2] Similarly, because the economy's total of government plus private sector debt outstanding has typically been a stable multiple of gross national product, a rising government debt ratio suggests that private sector borrowers will not be able to increase their outstanding debt in pace with economic growth.[3]

To what extent—indeed, whether—government deficit financing "crowds out" private financing, and hence private capital formation, depends in the first instance on how deficit financing affects the market returns on private securities.[4] Neither corporations nor individuals voluntarily borrow less, or issue fewer equities (or retain less earnings), out of any innate desire to make the national accounts balance. Instead, private financing decisions depend on incentives and disincentives provided by market returns. Lower required rates of return (higher securities prices) presumably encourage borrowers and equity issuers, but higher required returns (lower securities prices) discourage private financing. Changes in the structure of relative returns—for example, between debt and equity— provide incentives to issue more of one kind of security and less of another.

How market returns respond to such developments as issues of government debt depends, in turn, on how investors perceive the risks associated with different kinds of securities. For any given set of risk assessments that market participants hold—including not just the riskiness of each asset individually but, importantly, the set of relationships connecting the risk on any one asset to that on any other—investors choose what assets to hold on the basis of the respective returns they expect various assets to bear. One pattern of expected returns will lead investors to allocate their portfolios in one way, while an alternative pattern of expected returns will lead them to choose a different allocation. No one investor ever holds all of the various assets available in the market, of course, but collectively all investors together must allocate their aggregate portfolio in just the composition corresponding to the assets outstanding in the market as a whole.

2. The U.S. economy's net private saving rate has been roughly steady at about 7% of gross national product for decades. (Thus far during the 1980s it has averaged less than 6%, but this decline was probably a result of the 1981–82 business recession.) The federal government deficit averaged less than 1% of gross national product in the 1950s and 1960s and less than 2% in the 1970s.

3. See Friedman (1982) for a discussion of the long-run behavior of the U.S. economy's debt-income ratio. The typical value for this ratio is about 1.45. The ratio normally rises modestly during recession, but the increase during 1981–82 was larger than usual. What has been even more unusual about the most recent business cycle is that the ratio did not promptly decline toward 1.45 during the recovery, and the ratio still remained above 1.60 at midyear 1985. As of the time of writing, it is too soon to determine whether this atypical debt issuing behavior represents a lasting break from prior experience.

4. For a formal presentation of the ideas at issue here, see Friedman (1978). The discussion both there and here is much in the spirit of Tobin (1961, 1969).

Under most circumstances, only one unique pattern of expected returns will lead all investors collectively to choose exactly that allocation of their aggregate portfolio.

When the composition of the assets outstanding in the market changes, therefore, the pattern of expected asset returns must change also, shifting to whatever configuration will induce investors collectively to hold exactly this new composition of assets. In this way, changes in the composition of assets outstanding—for example, as a result of government deficit financing—bring about changes in the market-clearing structure of expected asset returns. Moreover, because the economic function of these changes in expected returns is to induce investors to change their portfolio allocations, and because investors' demands for different assets depend on their perception of the associated risks, what changes in expected returns follow from any specific change in the composition of outstanding assets also depends on investors' risk perceptions.

Under most circumstances, increasing the market supply of any specific asset raises that asset's market-clearing expected return.[5] If expected returns did not change at all, investors would have to hold "too much" of the asset with increased supply. Their efforts to "trade out of" that asset depress its price and raise its subsequent expected return.

By contrast, an increase in the supply of any one asset may either raise or lower the expected return on any other asset. As that one asset's expected return rises, the expected returns on assets that investors regard as close substitutes for it—for example, government debt and high-grade corporate debt of comparable maturity—will rise in step. If investors are trying to trade out of the asset with increased supply, however, they must be trying to trade into something else, presumably assets that they do not regard as close substitutes for the asset with increased supply. Investors' efforts to trade into such other assets bid up their respective prices, so that their respective expected returns fall rather than rise.

This distinction, based on whether investors regard different securities as close or distant substitutes, and hence based on the risks that investors associate with holding different assets, is crucial to the question whether government deficit financing "crowds out" private capital formation. Forcing investors collectively to absorb into their aggregate portfolio an increased supply of government debt presumably raises the market-clearing expected return on government debt and on closely similar corporate debt instruments. Whether it raises or lowers the expected return on equity, or the expected return on dissimilar debt instruments, depends on the relative substitutabilities among debt, equity, and other classes of assets in investors' portfolios.

5. It necessarily does so when all assets are (imperfect) substitutes in investors' portfolios, and for plausible values of the relevant parameters it may do so even when some assets are complements.

If government deficit financing raises the expected returns on both debt and equity, its economic effect is to reduce incentives for corporate financing in any form (unless, of course, the additional government spending or reduced taxes increase expected profits, as would be expected when the economy's resources are less than fully employed). In this case deficit financing would indeed crowd out corporate capital formation and would have uncertain effects on the composition of the remaining (smaller) amount of corporate financing.

Alternatively, if government deficit financing raises the expected return on debt but lowers the expected return on equity, it changes the incentives for corporate financing in importantly different ways. In this case, the deficit financing would give corporations a clear incentive to substitute equity financing (including retentions) for debt financing. Whether it would crowd out or "crowd in" overall corporate financing, and hence overall corporate capital formation, depends on the relative magnitudes of the induced movements in debt and equity returns, as well as on the relative shares of debt and equity in the resulting overall corporate financing package.

The evidence examined here, based on the relative substitutabilities among short-term debt, long-term debt, and equity that follow from these three assets' respective risk properties, cannot by itself answer the question to what extent do the returns on all assets together rise in response to government deficit financing. Such movements of the overall return structure depend not only on relative asset substitutabilities but also on monetary policy, which lies beyond the scope of this paper.

The evidence examined here does show how the returns on specific assets move in relation to one another, however. In particular, the evidence presented in sections 4.2, 4.3, and 4.4 below consistently indicates that government deficit financing lowers the expected return on equity in comparison to the expected return on either short- or long-term debt. Moreover, this relative reduction of the equity return consistently emerges regardless of whether the government finances its deficit by issuing short- or long-term debt.

4.2 Evidence Based on Simple Inspection of Returns[6]

Individual investors, either on their own or through intermediaries, are the ultimate holders of the great majority of all corporate and government securities issued in the United States. Table 4.1 indicates the composition of the aggregate portfolio of financial assets held directly by U.S. households, as of year-end 1980, arranged according to three major asset classes

6. See Friedman (1985) for the details of the specific procedures underlying the results summarized in this section.

Table 4.1 Three-Class Disaggregation of Household Sector Financial Assets

Asset Class		1980:IV Value
Short-term debt (S):		$1,777.0
Money	268.0	
Regulated-return time and saving deposits	624.7	
Competitive-return time deposits	669.7	
Money market fund shares	74.4	
U.S. government securities	102.0	
Open market paper	38.2	
Long-term debt (L):		464.3
U.S. government securities	180.2	
State and local government obligations	74.2	
Corporate and foreign bonds	86.9	
Mortgages	122.5	
Equity (E):		1,215.6
Mutual fund shares	63.7	
Directly held equity shares	1,151.8	
Total		$3,456.9

Notes: Values in billions of dollars.
Detail may not add to total because of rounding.
Source: Board of Governors of the Federal Reserve System.

that differ from one another according to the risks associated with holding them. *Short-term debt* includes all assets bearing real returns that are risky, over a single year or calendar quarter, only because of uncertainty about inflation. By contrast, *long-term debt* is risky because of uncertainty not only about inflation but also about changes in asset prices directly reflecting changes in market interest rates. Similarly, *equity* is risky because of uncertainty about inflation and about changes in stock prices.

The first column of table 4.2 shows the per annum mean nominal return borne by each of these three classes of assets during 1960–80, including percentage capital gains or losses on both long-term debt and equity.[7] After allowance for what proved to be capital losses on average, over two decades in which interest rate levels typically were rising, the return on long-term debt differed only trivially from that on short-term debt despite a typically upward-sloping yield curve. As is familiar, the return on equity was substantially greater than on either maturity of debt.

The returns that investors ultimately care about, however, are not these observed nominal returns but the corresponding returns after both infla-

7. The nominal returns associated with these real returns are zero for money; a weighted average yield for time and savings deposits; the 4–6-month prime commercial paper yield for other short-term debt; the Moody's Baa corporate bond yield, plus annualized percentage capital gains or losses inferred by applying the consol pricing formula to changes in the Baa yield, for long-term debt; and the dividend-price yield, plus annualized percentage capital gains or losses on the Standard & Poor's 500 index, for equity.

Table 4.2 **Mean Returns on Financial Assets, 1960–80**

	Historical Means			Forecast Mean
	Nominal Before-Tax Return (%)	Real Before-Tax Return (%)	Real After-Tax Return (%)	Real After-Tax Return (%)
Short-term debt (r_S)	3.81	−1.62	−2.80	−2.40
Long-term debt (r_L)	3.83	−1.60	−3.83	−4.40
Equity (r_E)	10.64	5.21	3.13	3.73

Note: Values in percent per annum.

tion and taxes. The second column of table 4.2 shows the mean real returns on these three assets, calculated in each case by simply subtracting the per annum change in the consumer price index. Only equity bore a positive real return on average during these years. The third column of the table shows the corresponding mean after-tax real return on each asset, calculated by applying the household sector's average effective marginal tax rates in each year for interest, dividends, and capital gains to the respective nominal components of the before-tax returns.[8] Only equity bore a positive real after-tax return on average during this period. Moreover, because of the differential tax rates applicable to interest payments and capital gains (which, for bonds, were capital losses on average), the mean after-tax real return on long-term debt was about 1% per annum more negative than that on short-term debt.

The crucial aspect of these returns that determines the effect of government deficit financing is the set of risks investors associate with holding various assets. These perceptions presumably bear at least some relationship to the actual experience of asset returns over time. The heavy solid lines in the three panels of figure 4.1 plot the quarter-by-quarter experience of the annualized after-tax real returns on these three broad classes of assets during 1960–80. Because of the greater volatility of long-term debt and especially equity returns, the three panels are drawn with different scales.

The return on short-term debt, plotted in the top panel of the figure, experienced some volatility over this period, but its chief characteristic was a general downward trend after the mid-1960s due to the taxation of nominal rather than real interest payments. The return on long-term debt, plotted in the middle panel, experienced much more volatility, together with a modest overall downward trend. The major bond market swings during

8. The marginal tax rates applied to interest and dividends are values estimated by Estrella and Fuhrer (1983), on the basis of Internal Revenue Service data, to reflect the marginal tax bracket of the average recipient of these two respective kinds of income in each year. The marginal tax rate applied to capital gains is an analogous estimate, including allowances for deferral and loss offset features, due to Feldstein et al. (1983).

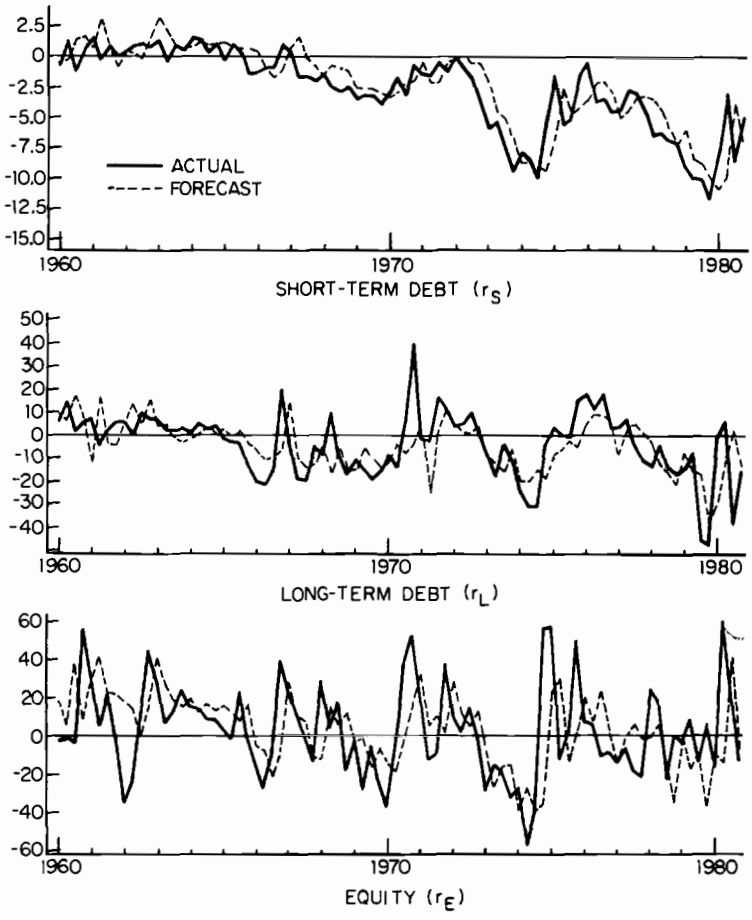

Fig. 4.1 Actual returns and regression-based forecasts, 1960–80

this period, including the "credit crunches" and subsequent rallies in 1966, 1970, and 1974, the reaction to the Federal Reserve System's new monetary policy procedures in 1979, and the imposition of credit controls in 1980, are readily visible. The return on equity, plotted in the bottom panel, experienced still more volatility and again a modest downward trend. The period's major stock market swings are also readily visible, including the crash in 1962, the response to the 1966 and 1970 "credit crunches," and especially the response to the combination of credit crunch and OPEC in 1974.

Even a casual inspection of figure 4.1 indicates that the returns on these three broad classes of assets tend to move together over time, and it is plausible that investors are aware of these comovements in at least some respects. The upper panel of table 4.3 shows the actual variances and co-

Table 4.3 **Implications of Simple Inspection of Returns**

Variance-Covariance Matrix

	r_S	r_L	r_E
r_S	11.18		
r_L	29.91	209.35	
r_E	30.24	161.77	597.86

Effects of Government Deficit Financing (per $100 Billion)

	Short-Term Debt (%)	Long-Term Debt (%)
Effect on $(r_L - r_S)$	−.17	.22
Effect on $(r_E - r_S)$	−.63	−.35
Effect on $(r_E - r_L)$	−.46	−.57

variances among these three returns, on the same quarter-by-quarter basis plotted in figure 4.1. The variance of 11.18 shown for the return on short-term debt, for example, means that approximately two-thirds of the time this return was within ±3.34% (the square root of 11.18) of the −2.80% mean shown in table 4.2. The corresponding two-thirds probability ranges for the more volatile returns on long-term debt and equity are −3.18% ±14.47% and 3.13% ±24.45%, respectively. The three off-diagonal elements in this panel of the table give the analogous pairwise covariances among the three assets.

For a given structure of variances and covariances describing investors' perceptions of asset return risks, it is straightforward to derive from the standard theory of risk-averse portfolio selection how investors' asset demands respond to movements in expected asset returns, and therefore how the pattern of expected returns must change in response to a change in the market composition of assets that investors collectively must hold.[9] The lower panel of table 4.3 summarizes the effects of government deficit financing, on the specific assumption that the variances and covariances reported above, simply calculated from the observed experience of asset returns during 1960–80, describe investors' risk perceptions. Because the effects of government deficit financing depend on what kind of securities the Treasury issues,[10] the table reports separate sets of effects following from changes in the respective supplies of short- and long-term debt.

9. The specific assumption made throughout this paper is that investors' behavior exhibits constant relative risk aversion, with value equal to four. Bodie et al. (1985) also assumed constant relative risk aversion equal to four. This value is about in the middle of the range of available empirical estimates. (Friend and Blume [1975] suggested a value in excess of two, Grossman and Shiller [1981] suggested four, and Friend and Hasbrouck [1982] suggested six.) See Friedman (1985) for details of the calculations.

10. More precisely, the effects depend on issues by the Treasury less net purchases by the Federal Reserve System.

If the Treasury finances a deficit by issuing short-term debt, the expected return on short-term debt presumably rises in comparison to the expected returns on other assets.[11] Put the other way around, in this case the expected returns on other assets fall in comparison to that on short-term debt. Which other assets' returns fall by more and which by less depends on the relative asset substitutabilities that depend, in turn, on investors' risk perceptions. The results shown in table 4.3 indicate that the expected differential between the returns on long- and short-term debt (which is presumably positive on the basis of past experience) narrows by .17%, while the expected differential between the returns on equity and short-term debt (also presumably positive) narrows by .63%, in response to each $100 billion additional supply of short-term government debt to be held in investors' aggregate portfolio. In other words, if the short-term debt return is held fixed by monetary policy, the expected returns on long-term debt and equity *fall* by .17% and .63%, respectively. The expected differential between the returns on equity and long-term debt (also presumably positive) therefore narrows by .46%. For a $200 billion deficit, the effects are exactly double these magnitudes.

Similarly, if the Treasury finances a deficit by issuing long-term debt, the expected return on long-term debt presumably rises in comparison to the expected returns on other assets. If the short-term debt return is fixed, the long-term debt return then rises absolutely and the returns on other assets may either rise or fall. Which other assets' returns rise and which fall again depends on relative asset substitutabilities, and hence on investors' perceptions of risk. The results shown in table 4.3 indicate that the differential between the returns on long- and short-term debt widens by .22%, while the expected differential between the returns on equity and short-term debt narrows by .35%, in response to each $100 billion additional supply of long-term debt. In other words, if the return on short-term debt is fixed, the expected return on long-term debt *rises* by .22% and the expected return on equity *falls* by .35%. The expected differential between the returns on equity and long-term debt therefore again narrows, in this case by .57%. Once again, for a $200 billion deficit the effects would be twice as large.

The finding that financing the government deficit by either short- or long-term debt lowers the expected return on equity, in comparison to the expected returns on both classes of debt instruments, bears potentially important implications for corporate financing. Nevertheless, these estimated effects directly depend on the assumed underlying variance-covariance structure, and simply using the observed historical pattern of asset return movements to represent investors' perceptions presumably overstates the amount of uncertainty investors actually attach to their expectations of

11. See again the discussion in sec. 4.1, esp. n. 5.

uncertain asset returns. Although the emphasis here is on the direction rather than the magnitude of the effects of government deficit financing, incorrectly represented risk perceptions may lead not just to incorrect estimated magnitudes but to incorrect inferences about direction as well. Some more satisfactory representation of investors' risk perceptions is clearly needed.

4.3 Evidence Based on Continually Updated Forecasting Regressions[12]

The simple procedure used in section 4.2 to represent investors' risk perceptions suffers from attributing to investors both too little information and, for some applications, too much. As long as the object of the analysis is to describe investors' behavior at any time after year-end 1980, it is satisfactory to assume that investors know the actual experience of asset return means, variances, and covariances during 1960–80. By contrast, if the goal is to describe investors' behavior on average during this period, then the procedure used in section 4.2 attributes to investors information which they did not have at the outset but gradually acquired as time passed.

This procedure also attributes too little information to investors by disregarding their knowledge, at each point in time, of the most recent realizations of security returns and the principal determinants of these returns. During the 1960–80 period the after-tax real returns on all three classes of assets considered here exhibited substantial serial correlation because the underlying movements of inflation, interest rates, and stock prices were themselves serially correlated.[13] When returns are serially correlated over time, information about the most recent actual values is a useful ingredient in forming expectations about returns in the immediate future. Ignoring that information can lead to excessively large estimates of the uncertainty surrounding these expectations, as is apparently the problem with the results presented in table 4.3. Table 4.4 presents a set of analogous results based on a procedure that takes much more careful account of what information investors did and did not have at any particular time.

As of the beginning of each calendar quarter, investors presumably know the stated interest rates on short-term debt instruments, the current prices and the coupon rates on long-term debt instruments, the current prices and (approximately) the dividends on equities, and the relevant tax rates. The three uncertain elements that they must forecast over the com-

12. See Friedman (1984) for the details of the specific procedures underlying the results summarized in this section.

13. The first-order serial correlation coefficients are .86 for the short-term debt return, .51 for the long-term debt return, and .33 for the equity return. Corresponding coefficients for inflation, bond capital gains, and equity capital gains are .90, .44, and .31, respectively.

Table 4.4 **Implications of Continually Updated Forecasting Regressions**

Variance-Covariance Matrix

	r_S	r_L	r_E
r_S	1.25		
r_L	3.62	76.61	
r_E	6.45	48.09	317.27

Effects of Government Deficit Financing (per $100 Billion)

	Short-Term Debt (%)	Long-Term Debt (%)
Effect on $(r_L - r_S)$	−.06	.10
Effect on $(r_E - r_S)$	−.33	−.24
Effect on $(r_E - r_L)$	−.27	−.34

ing quarter, in order to form expectations of the after-tax real returns on the three broad classes of assets considered here, are inflation, the capital gain or loss due to changing bond prices, and the capital gain or loss due to changing stock prices.

The procedure underlying the results reported in table 4.4 represents investors as forming expectations of these three uncertain return elements, at each point in time, by estimating a linear regression model relating each element to past values of itself and the other two, using all data observed through the immediately preceding period. In addition to providing forecast values of the three uncertain elements for the period ahead, the linear regression model at each point in time also directly indicates the variances and covariances associated with the forecasts derived in this way. After each period elapses, investors can then repeat the same procedure, incorporating the one new observation on inflation and on long-term debt and equity capital gains into the data used to reestimate the linear regression model to make forecasts for the next period.

Given the simple arithmetic connection between asset returns and these underlying uncertain elements, and given investors' presumed knowledge of the other elements comprising returns, these 1-period-ahead forecasts of inflation and the respective capital gains on long-term debt and equity directly imply 1-period-ahead forecasts of the after-tax real returns on all three classes of assets at each point in time. Similarly, the variances and covariances associated with the forecasts of inflation and the two capital gains directly imply the variances and covariances associated with the corresponding forecasts of the three asset returns. The key advantage of representing investors' expectations in this way, in contrast to the simple procedure used in section 4.2, lies in focusing strictly on information that investors actually had at each point in time and in making a not implausible assumption about how they might have used it.

The heavy solid lines in the three panels of figure 4.2 show the quarter-by-quarter movements, during 1960–80, of the per annum rates of inflation, capital gains on long-term debt, and capital gains on equity. (As in fig. 4.1, the scales differ.) The corresponding broken lines plot the successive 1-period-ahead forecasts generated by this continually updated linear regression procedure, for each quarter during this 21-year period. For 1960:I the three forecasts are based on the linear regression model relating each uncertain element to a constant term, four lagged values of itself, and four lagged values of each of the other two uncertain elements, estimated using data for 1953:II–1959:IV. For 1960:II the procedure is the same except that the data used to estimate the linear regression model cover

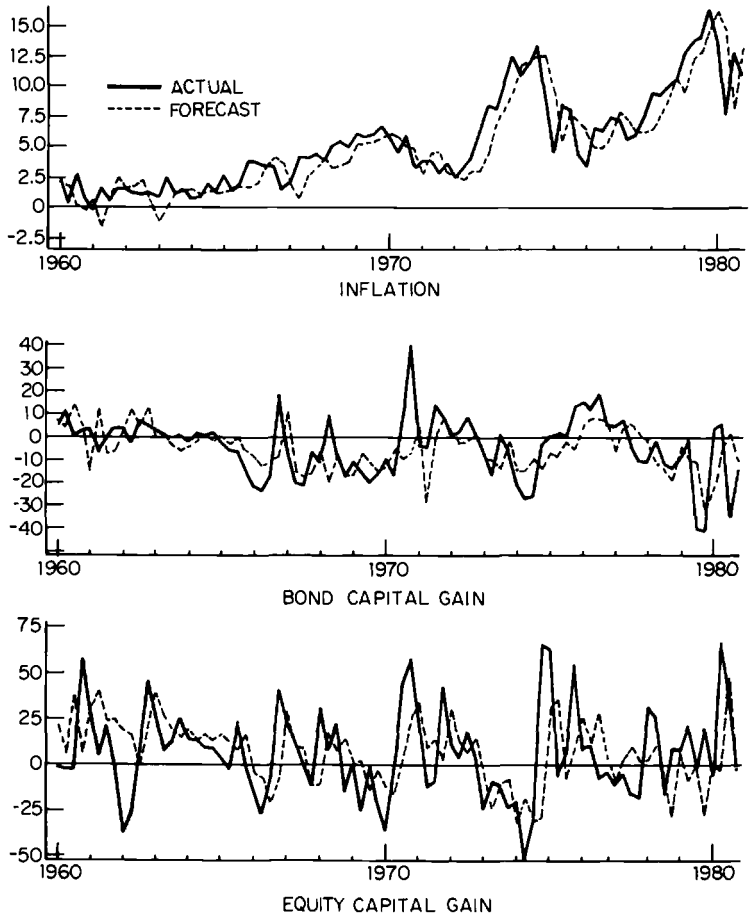

Fig. 4.2 Actual elements of returns and regression-based forecasts, 1960–80

1953:II–1960:I. The procedure is analogous for subsequent periods, ending with the use of data for 1953:II–1980:III to generate the 1-period-ahead forecasts for 1980:IV.

The degree of success achieved by these 1-period-ahead forecasts naturally varies according to the extent of the serial correlation in the series being forecast. The simple correlation between the actual outcomes and the corresponding forecasts derived in this way is .88 for inflation, .42 for long-term debt capital gains, and .23 for equity capital gains. As is clear from the figure, this inherently backward-looking forecast procedure enjoys the advantages, and suffers the shortcomings, of expecting the immediate future to be like the immediate past.

The broken lines in the three panels of figure 4.1 plot the successive 1-period-ahead forecasts of the three after-tax real returns corresponding to these forecasts of the underlying uncertain elements. Here, too, the backward-looking procedure represents the immediate future as resembling the immediate past, so that the success achieved by the forecasts varies according to the serial correlation in the different asset returns. The simple correlation between the actual returns and the corresponding forecasts is .83 for short-term debt, .51 for long-term debt, and .30 for equities. The final column of table 4.2 shows the 1960–80 means of these 1-period-ahead forecasts of the three after-tax real returns. Comparison with the actual means shown in the immediately preceding column indicates that, on average, these forecasts were somewhat too optimistic about the returns on short-term debt and equity and somewhat too pessimistic about the return on long-term debt.

The upper panel of table 4.4 shows the variances and covariances associated with these three asset return forecasts, on average for 1960–80.[14] These values are much smaller than those shown in table 4.3, indicating the importance of investors' having (and using) information about recent actual returns. The two-thirds probability ranges for the three after-tax real returns are $\pm 1.12\%$ for short-term debt, $\pm 8.75\%$ for long-term debt, and $\pm 17.81\%$ for equity.

The lower panel of table 4.4 shows the implied effects of government deficit financing that follow from assuming that the variances and covariances shown above represent investors' perceptions of the risks associated with the respective returns on these three broad classes of assets. As is to be expected, the smaller uncertainty than in table 4.3 makes investors more readily willing to reallocate their portfolios in response to any given movement of expected asset returns, and therefore reduces (in absolute value) the movement of returns needed to induce investors collectively to accommodate a given change in the composition of assets to be held. Even

14. The values shown are the simple means of the variances and covariances for each of the 84 quarters.

so, the estimated effects are hardly negligible. For example, for the expected differential between the returns on equity and long-term debt, the difference between a $200 billion deficit and a balanced budget is .54% under short-term financing and .68% under long-term financing.

In each case the direction of the implied effect shown in table 4.4 is identical to that shown in table 4.3. Financing government deficits by issuing short-term debt lowers the return on long-term debt, and lowers the return on equity by even more, in comparison to the return on short-term debt. Financing deficits by issuing long-term debt raises the return on long-term debt and lowers the return on equity, again in comparison to the return on short-term debt. Under either form of deficit financing, therefore, the return on equity falls in comparison to the return on debt securities of either maturity.

4.4 Implications of Survey Expectations

Because the risk perceptions that determine the effects of government deficit financing are inherently unobservable, so that any procedure for representing them is necessarily only tentative, it makes sense to examine the implications of several different representations rather than rely on only one. Opinion surveys provide a further source of information about what investors thought at specific times in the past. Although the available surveys typically just ask respondents to forecast specific economic variables, without also asking for them to state the uncertainty that they associate with their forecasts, it is nevertheless possible to use survey expectations to infer perceptions of uncertainty in a variety of ways.

The upper panel of table 4.5 summarizes the forecasting performance of the Livingston survey of inflation and stock price expectations, and the Goldsmith-Nagan survey of long-term interest rate expectations, by

Table 4.5 **Mean Survey Expectations, 1969:IV–1980:IV**

Expected Asset Return Components		
	Historical Mean (%)	Survey Mean (%)
Inflation	7.94	5.87
Aaa bond yield	8.95	8.74
S&P stock price index	98.77	108.14
Implied Expected Real After-Tax Returns		
	Historical Mean (%)	Survey Mean (%)
Short-term debt (r_S)	−4.86	−2.78
Long-term debt (r_L)	−1.97	4.03
Equity (r_E)	.44	28.36

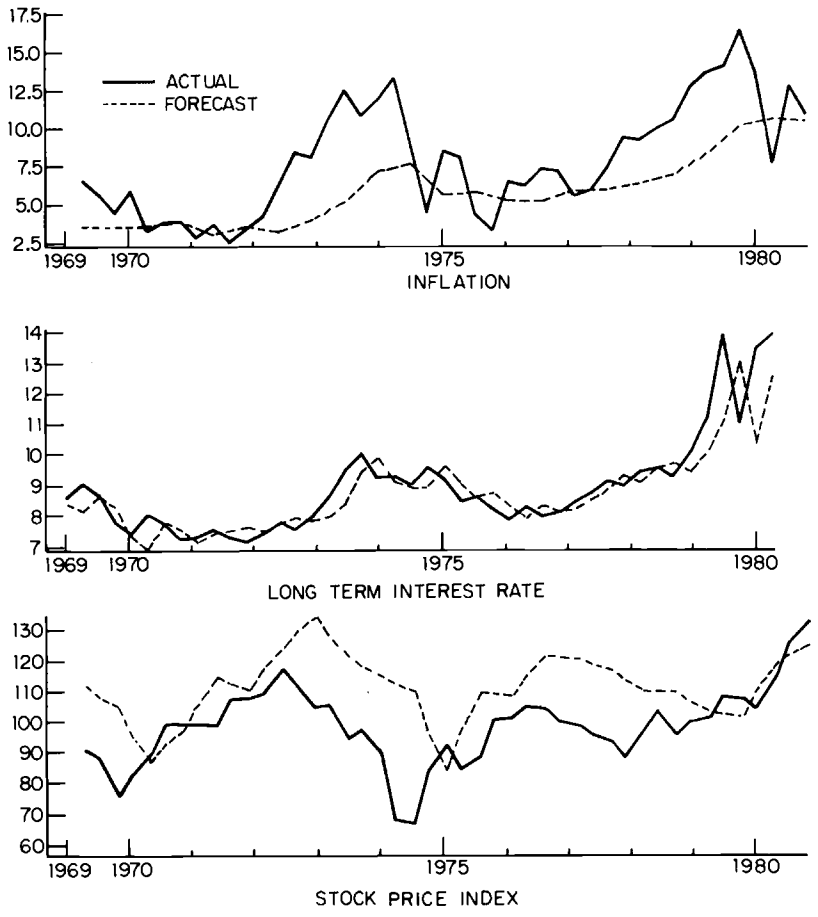

Fig. 4.3 Actual elements of returns and survey-based forecasts, 1969–80

showing the survey means and the corresponding actual means for 1969:IV–1980:IV.[15] On average, the Livingston respondents underpredicted inflation and overpredicted stock prices by substantial margins, while the Goldsmith-Nagan respondents only modestly underpredicted the long-term interest rate. Figure 4.3 shows these actual outcomes (heavy solid lines) and the corresponding survey expectations (broken lines) for each quarter during this period. Especially for the long-term interest rate, but to some extent for inflation and stock prices as well, survey respondents typically did forecast the immediate future as if it would resemble

15. The first Goldsmith-Nagan survey took place in September 1969. The Livingston data are available for a much longer period. I am grateful to Peter Nagan for providing his unpublished data for use in this and other research.

the immediate past. The resulting simple correlation between the actual values and the corresponding survey expectations is .74 for inflation, .84 for the long-term interest rate, and .50 for stock prices.

The lower panel of table 4.5 shows the 1969:IV–1980:IV means of the actual after-tax real returns on the three classes of assets considered here, and the means of the corresponding expected returns calculated on the basis of the Livingston survey expectation of inflation, the long-term debt capital gain or loss implied by the Goldsmith-Nagan survey expectation of the long-term interest rate, and the equity capital gain (never a loss) implied by the Livingston survey expectation of stock prices.[16] The average underprediction of inflation implies too optimistic an average expectation of the return to short-term debt. The average underprediction of both inflation and the long-term interest rate implies an average expectation of the long-term debt return that is too optimistic by a wider margin. The average underprediction of inflation and especially the average overprediction of stock prices implies an average expectation of the equity return that is too optimistic by a still wider margin.

Figure 4.4 shows the actual outcomes (heavy solid lines) and corresponding survey-based expectations (broken lines) of these three after-tax real returns, for each quarter during 1969:IV–1980:IV.[17] Here it is interesting that, for each return, the survey-based expectation is a less successful predictor than the regression-based forecasts examined in section 4.3. The simple correlation between the actual values and the corresponding survey-based expectations is .62 for the short-term debt return, .26 for the long-term debt return, and -.13 (that is, an inverse relationship) for the equity return.

The upper panel of table 4.6 shows the variances and covariances of the errors associated with these survey-based expectations over 1969:IV–1980:IV. As comparison to tables 4.3 and 4.4 shows, the variance associated with the return on short-term debt here is smaller than that implied by the simple inspection procedure used in section 4.2, but larger than that implied by the regression procedure in section 4.3. The two-thirds probability range for the short-term debt return is $\pm 2.49\%$. By contrast, the respective variances associated with the returns on long-term debt and equity are larger than the corresponding variances implied by either the simple inspection procedure or the regression procedure. The two-thirds

16. Once again, as of the beginning of each period investors presumably know the stated interest rates on short-term debt instruments, the current prices and coupons on long-term debt instruments, and the current prices and dividends on equity. For short-term debt and equity, the actual returns here are the same as those analyzed in secs. 4.2 and 4.3. For long-term debt the return is based on the Aaa utility rate used in the Goldsmith-Nagan survey, rather than on the Baa corporate rate as in secs. 4.2 and 4.3.

17. It is necessary to interpolate quarterly values of the inflation and stock price expectations because the Livingston survey asks for 6-month-ahead expectations twice per year. (The Goldsmith-Nagan survey asks for 3-month-ahead expectations four times per year.)

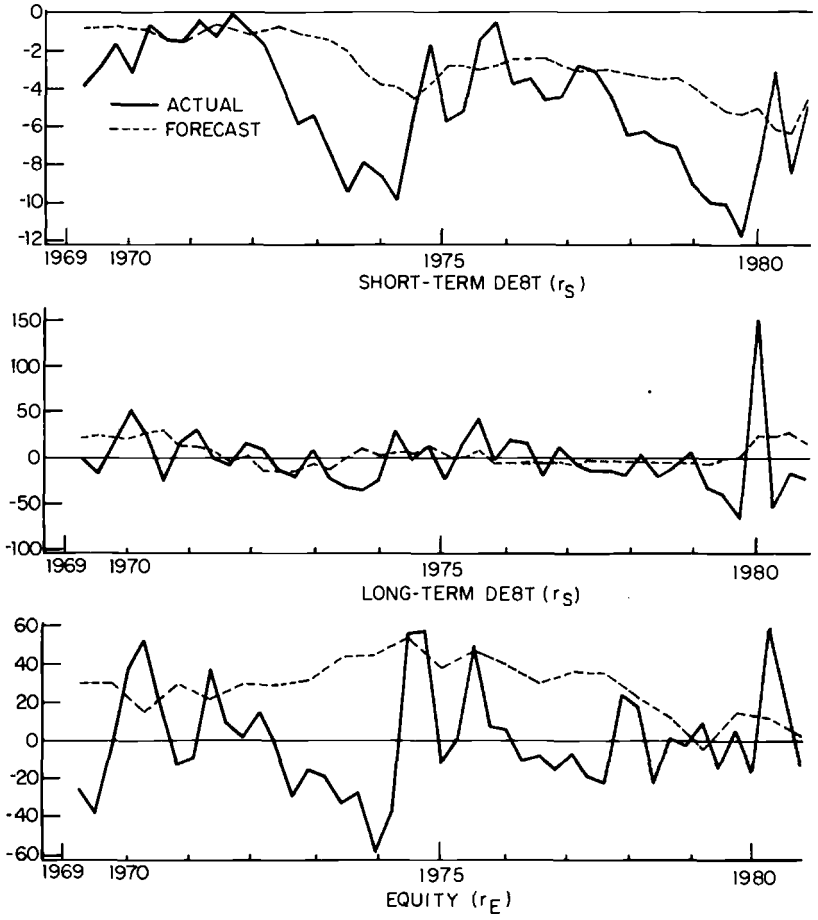

Fig. 4.4 Actual returns and survey-based forecasts, 1969–80

probability ranges are ±32.80% and ±36.50% for the long-term debt return and the equity return, respectively.[18] Asset returns were more volatile on average during the 1970s than they were during the 1960s (and hence, on average, during 1960–80), but the major part of the explanation for the larger variances shown in table 4.6 is the weaker correlations between the survey expectations and the corresponding actual outcomes.[19]

18. The error variance for the return on long-term debt is dominated by the sharp drop in the Aaa (new issue) rate when credit controls were imposed in 1980:II. (The Baa seasoned rate, used in secs. 4.2 and 4.3, fell only slightly in 1980:II.) For the 1969:IV–1980:IV period omitting this one quarter, the corresponding error variance is 687.52.

19. The variances for 1969:IV–1980:IV, computed as in table 4.3, are (from upper left to lower right) 9.82, 293.90, and 763.33. The corresponding variances computed as in table 4.4 are 1.54, 89.97, and 353.64.

Table 4.6 **Implications of Survey Expectations**

Variance-Covariance Matrix

	r_S	r_L	r_E
r_S	6.22		
r_L	7.09	1075.86	
r_E	32.50	207.23	1332.35

Effects of Government Deficit Financing (per $100 billion)

	Short-Term Debt (%)	Long-Term Debt (%)
Effect on $(r_L - r_S)$	−.40	1.62
Effect on $(r_E - r_S)$	−.56	−.63
Effect on $(r_E - r_L)$	−.16	−2.25

The lower panel of table 4.6 shows the implied effects of government deficit financing that follow from assuming that the error variances and covariances of the survey-based expectations represent investors' perceptions of the risks associated with the respective returns on these three classes of assets.[20] These large variances and covariances imply effects on expected returns that are much larger (in absolute value) than those reported in tables 4.3 and 4.4—indeed, perhaps too large to be entirely credible. Once again, however, the implied direction of these effects is in each case identical to that reported in tables 4.3 and 4.4. Financing government deficits by issuing short-term debt lowers the return on long-term debt, and lowers the return on equity by even more, in comparison to the return on short-term debt. Financing deficits by issuing long-term debt raises the return on long-term debt, and lowers the return on equity, again in comparison to the return on short-term debt. In both cases the return on equity falls in comparison to the return on either maturity of debt.

4.5 Conclusions and Caveats

How the financing of government budget deficits affects the structure of expected asset returns depends on assets' relative substitutabilities in investors' aggregate portfolio, and these substitutabilities in turn depend on how investors perceive the risks associated with the respective asset returns. Increasing the supply that investors collectively must hold of any asset raises that asset's market-clearing expected return. By contrast, an

20. An alternative use of these survey data in this context would be to use each period's dispersion of individual survey responses to proxy that period's uncertainty. The potential shortcomings of assuming a relationship between dispersion among different individuals' point estimates and the uncertainty perceived by the representative individual are well known, however.

increase in the supply of any one asset may either raise or lower the expected return on any other asset.

The empirical results reported in this paper, based on three different ways of representing investors' risk perceptions, consistently indicate that government deficit financing raises expected debt returns relative to expected equity returns, regardless of the maturity of the government's financing. More specifically, financing government deficits by issuing short-term debt lowers the return on long-term debt, and lowers the return on equity by even more, relative to the return on short-term debt. Financing deficits by issuing long-term debt raises the return on long-term debt, but lowers the return on equity, again in comparison to the return on short-term debt. The indicated magnitudes of these effects differ according to the method used to represent investors' risk perceptions, but the qualitative results are consistent throughout. Moreover, many of the indicated magnitudes are large enough to matter economically.[21]

These results imply that continuing large government deficits at full employment lead to market incentives for individual business corporations to emphasize reliance on equity (including retentions), and reduce reliance on debt, in comparison with the composition of corporate financing that would prevail in the absence of the need to finance the government budget deficit. Because these results describe effects only on relative returns, rather than effects on absolute levels of returns, they answer questions about the composition of corporate financing but not about its total. Nevertheless, in conjunction with some further assumption to anchor the overall return structure—for example, that monetary policy accommodates the deficit so as to keep expected short-term real returns unchanged, or, alternatively, that monetary policy is not accommodative and hence lets expected short-term real returns rise if the deficit is large enough—these results also bear straightforward implications for the volume of corporate financing and, in turn, for corporate capital formation.

Finally, at least three caveats are potentially important in evaluating these results. First, as the discussion throughout this paper has repeatedly emphasized, investors' perceptions of asset risk are not directly observable. It is therefore necessary to use some operational procedure to represent them. It is significant that qualitatively identical results follow from each of the three quite different procedures used for this purpose here. Even so, no data-based procedure can ever represent investors' perceptions perfectly, and each of the three procedures used here may go astray in some way that matters importantly for the consequent results.

21. The magnitudes reported here are larger than those found by Frankel (forthcoming) in a study that in some respects parallels the work described here. One source of this difference is that Frankel assumed a risk aVersion Value of two, instead of four as assumed here. Another is that Frankel included tangible assets in household wealth (while still excluding all liabilities), instead of focusing only on financial assets as here.

The second caveat, also noted in the discussion above, is that the analysis in this paper focuses only on the financing effects associated with government deficits. The deficit is just the difference between government expenditures and tax revenues, however, and each has effects on nonfinancial economic activity. When the economy's resources are less then fully employed, greater expenditures and/or lower taxes stimulate real spending, incomes, and output. At full employment the chief result is inflation. In either case the associated nonfinancial effects of government deficits typically create indirect financial pressures that interact with the direct financing effects studied here.

The third caveat is that the analysis in this paper focuses only on financial assets and, since some 90% of all borrowing by U.S. households takes place to finance purchases of nonfinancial assets, ignores households' liabilities. Not taking household liabilities into account is probably not a major concern in the context of this paper's focus (it could be in other contexts), but the omission of nonfinancial assets potentially is. Whether two assets are close or distant substitutes can depend importantly on what other assets are also in the investor's portfolio, or at least available for purchase. Moreover, nonfinancial assets bulk large in households' aggregate portfolio. As of year-end 1980, U.S. households owned $2.8 trillion of residential real estate and $1.0 trillion of consumer durables—together more than the $3.5 trillion of financial assets shown in table 4.1. Including these nonfinancial assets and their returns in an analysis like that undertaken here is an important subject for further research.

References

Bodie, Z., Kane, A., and McDonald, R. 1985. Inflation and the role of bonds in investor portfolios. In Friedman, Benjamin M., ed., *Corporate capital structures in the United States.* Chicago: University of Chicago Press.

Estrella, A., and Fuhrer, J. 1983. Average effective marginal rates on interest and dividend income in the United States, 1960–1979. National Bureau of Economic Research. Mimeographed.

Feldstein, M., Poterba, J., and Dicks-Mireau, L. 1983. The effective tax rate and the pretax rate of return. *Journal of Public Economics* 21:129–58.

Frankel, J. A. Forthcoming. A test of portfolio crowding-out and other issues in finance. *Quarterly Journal of Economics.*

Friedman, B. M. 1978. Crowding out or crowding in? Economic consequences of financing government deficits. *Brookings Papers on Economic Activity:*593–641.

_____.1982. Debt and economic activity in the United States. In Friedman, B. M., ed., *The changing roles of debt and equity in financing U.S. capital formation.* Chicago: University of Chicago Press.

_____.1984. Crowding out or crowding in? Evidence on debt-equity substitutability. National Bureau of Economic Research. Mimeographed.

_____. 1985. The substitutability of debt and equity securities. In Friedman, Benjamin M., ed., *Corporate capital structures in the United States.* Chicago: University of Chicago Press.

Friend, I., and Blume, M. E. 1975. The demand for risky assets. *American Economic Review* 65:900–923.

Friend, I., and Hasbrouck, J. 1982. Effect of inflation on the profitability and valuation of U.S. corporations. In M. Sarnat and G. Szego, eds., *Savings, investment and capital markets in an inflationary economy.* Cambridge, Mass.: Ballinger.

Grossman, S. J., and Shiller, R. J. 1981. The determinants of the variability of stock market prices. *American Economic Review* 71:222–27.

Tobin, J. 1961. Money, capital and other stores of value. *American Economic Review* 51:26–37.

_____. 1969. A general equilibrium approach to monetary theory. *Journal of Money, Credit and Banking* 1:354–71.

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