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# 2 Debt and Equity Returns Revisited

Patric H. Hendershott

## 2.1 Introduction

In April 1981, near the beginning of the NBER project on corporate capital structures, I reported on the behavior of debt and equity returns over the last half-century. Resource utilization and inflation varied widely over that period, as did real and nominal ex post returns on debt and equity claims. My analysis of the factors affecting returns was based largely on a relatively crude examination of the data. I return three and a half years later (September 1984) with a shorter (quarter-century) perspective and with the benefit of extensive econometric testing.

Some of the findings discussed in this chapter are the same as those emphasized in my earlier paper. For example, a strong systematic relationship between ex post equity returns and business cycle turning points seemed to exist in my earlier analysis, with returns being extraordinarily large around cycle troughs and small around cycle peaks. This relationship is easily verifiable econometrically and is even stronger after 1980 than before. On the other hand, data from the 1951–80 period were largely consistent with Treasury bill rates moving one-for-one with expected inflation and being independent of everything else, a view obviously inconsistent with the high real short-term rates that have prevailed since 1980.

This chapter is divided into three broad parts and a short summary. I begin with an analysis of ex post returns on corporate bonds and equities, then turn to an examination of real after-tax 6-month bill rates, and conclude with an explanation of new issue coupons on 6-month and 20-year Treasury securities. Econometric results on the determinants of ex post re-

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turns and new issue coupons are summarized. The general procedure is to establish relationships on semiannual data from the 1950s, 1960s, and 1970s and then to deduce their applicability to the early 1980s.

## 2.2 The Business Cycle and Ex Post Equity and Bond Returns

My earlier study contained evidence that corporate equities systematically outperformed corporate bonds near business cycle troughs and underperformed them near business cycle peaks. The evidence was obtained by dividing the months between January 1926 and December 1978 into three types of periods: those around peaks, those around troughs, and the remainder. The peak periods were defined as the last 6 months of every expansion and the first half (dropping fractions) or first 6 months, whichever was less, of every contraction. The trough periods were defined as the last half (dropping fractions) or last 6 months, whichever was less, of every contraction and the first 6 months of every expansion. I then divided the total 1926–78 period into 10 overlapping intervals that contained single adjoining peaks and troughs and all the surrounding months that did not overlap with adjacent peak and trough periods. That is, the intervals extended from 6 months after a trough to 6 months before the second following peak.

These 10 overlapping intervals are listed at the left in table 2.1. Also reproduced are the arithmetic means (annualized) during the trough periods within the interval, the peak periods within the interval, the normal

**Table 2.1** **Annualized Difference between Returns on Equities and Bonds Near Troughs, Near Peaks, and in Other Periods (Percent)**

| | Near Troughs | Near Peaks | Other Months | Excess Near Troughs | Excess Near Peaks |
|---|---|---|---|---|---|
| Jan 26–Feb 29 | 35 | 20 | 21 | 14 | −1 |
| June 28–Nov 36 | 30 | −4 | 1 | 29 | −5 |
| Oct 33–Aug 44 | 34 | −32 | 8 | 26 | −40 |
| Jan 39–May 48 | 31 | 21 | 4 | 27 | 17 |
| May 46–Jan 53 | 36 | −9 | 13 | 23 | −22 |
| May 50–Feb 57 | 43 | −5 | 21 | 22 | −26 |
| Dec 54–Oct 59 | 45 | −11 | 18 | 27 | −29 |
| Nov 58–June 69 | 31 | −12 | 8 | 23 | −20 |
| Sept 61–May 73 | 23 | −13 | 5 | 18 | −18 |
| June 71–Dec 78 | 23 | −9 | −4 | 27 | −5 |
| Mean | 33 | −5 | 10 | 24 | −15 |
| Std. Dev. | 7 | 16 | 9 | 5 | 17 |

*Sources:* Hendershott (1982, table 1.5, p. 25) months (months not classified as either peak or trough months), and the differences in average returns between the peak and normal months and between the trough and normal months. The latter were labeled the excess net returns near peaks and troughs, respectively. As noted, the data were striking. The excess net returns on equities around troughs averaged 24%, and no net return was less than 14%. In contrast, the excess net returns on equities were negative around all peaks, except that at the end of World War II, and averaged −15%. When the analysis was restricted to the six cycles between 1946 and 1978, the average excess net return on equities around peaks was −20% and no return exceeded −5%.

These data raise three questions. First, are equity returns, bond returns, or both sensitive to the business cycle? Second, can a significant proportion of the variation in equity and/or bond returns during the 1953–79 period be explained by the business cycle turning points? Third, has the importance of the turning points continued in the 1980s? To answer these questions, I begin with a regression of ex post 6-month returns (times 2 to annualize them) on equities and bonds on constant terms and two turning-point variables. The variables assume values equal to the fraction of the half-year that consists of, respectively, peak or trough months as defined in the previous paragraph.[1] (Given that the average cycle is just under 5 years, the economy is near a peak about one-fifth of the time and near a trough another one-fifth.) The results are for the 54 semiannual observations in the 1953–79 period. As can be seen from the first equation summarized in table 2.2, all three variables are statistically significant in the equity equation (T-statistics are in parentheses under the coefficients), and 36% of the variation in 6-month returns is explained. Further, the second equation shows that while the trough variable is marginally significant in the bond returns equation, the peak variable adds no explanatory power and only 10% of the variation in bond returns is explained. Thus, the answers to the first and second questions are that the business cycle largely affects equity, not bond, returns and that the impact is large. In roughly the year surrounding business cycle troughs, the return on equities is 32 percentage points greater than the normal 9%. In roughly the year around peaks, the return is 20 percentage points less than the 9% norm.

This conclusion is supported by two additional tests reported in table 2.2.[2] In the first, I examine the excess of equity and bond returns over the 6-month bill rate at the beginning of the half-year. The results are changed little from the straight returns equations. Second, I add the unexpected

1. Cycle turning points through the January 1980 peak are listed in Hendershott (1982, table 1.3, p. 21). Since then the U.S. economy has experienced a trough in July 1980, a peak in July 1981, and a trough in November 1982.

2. See Hendershott and Huang (1985) for a wide variety of estimates.

**Table 2.2** **Response of Ex Post Corporate Equity and Bond Returns to the Business Cycle, 1953–79**

| Dependent Variable (Annual Rate) | Constant Term | Response to: Cycle Trough | Response to: Cycle Peak | Response to: Unanticipated Capital Gain | $R^2$ | SEE | D-W |
|---|---|---|---|---|---|---|---|
| Equity return | .090 (2.6) | .320 (3.9) | −.206 (−2.6) | | .36 | .198 | 2.52 |
| Bond return | .027 (1.6) | .077 (2.0) | −.032 (−0.9) | | .10 | .095 | 1.97 |
| Equity return less 6-month bill rate | .039 (1.1) | .339 (4.1) | −.214 (−2.7) | | .37 | .202 | 2.43 |
| Bond return less 6-month bill rate | −.032 (1.4) | .114 (2.3) | −.039 (−0.8) | | .11 | .135 | 1.99 |
| Bond return less 6-month bill rate | .004 (0.4) | −.003 (−0.1) | −.022 (−1.2) | 1.107 (13.3) | .81 | .045 | 2.03 |

*Note:* t-ratios are in parentheses beneath the estimated responses (coefficients).

capital gain on 20-year Treasury bonds during the 6-month period, *UNCG,* as a regressor, where

$$UNCG = \frac{UN\Delta R20}{R20} \; \frac{(1 + R20)^{20} - 1}{(1 + R20)^{20}}$$

and the calculation of unexpected change in the 20-year rate, $UN\Delta R20$, is described in Hendershott and Huang (1985, app. B). Forces causing unexpected capital gains (and thus large returns) on one asset will also induce large returns on assets that are close substitutes. The unexpected-gains variable has a negligible effect on equity returns but an enormous positive effect on corporate bond returns, as indicated by the last equation in table 2.2. Clearly corporate and Treasury bonds are very close substitutes, and thus unexpected Treasury rate changes explain most of the movement in ex post corporate bond returns. Also, the slight impact the trough cycle variable seems to have on corporate bond returns is due to a correlation between this variable and unexpected changes in the Treasury rate, not to the independent effect of the trough variable.[3]

3. While a number of proxies for unexpected capital gains on equities (or changes in its required rate of return) were tested in the equities equation, none significantly diluted the estimated impact of the turning-point variables.

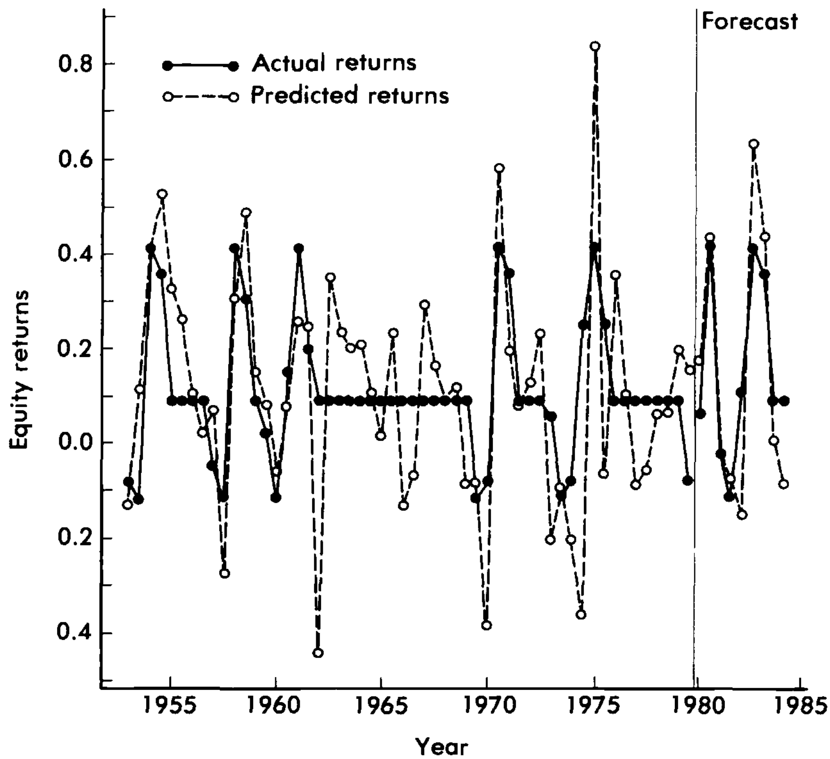


**Fig. 2.1** Annualized 6-month equity returns, actual (A), predicted (P), and forecast, 1953–84

The actual and predicted (by the first equation in table 2.2) equity returns are plotted in figure 2.1. The 54 points to the left of the vertical line are in sample; the 9 points to the right are forecasts for the 1980–mid-1984 period. In sample the equation misses the entire early 1962 stock market plunge, much of the early 1970 (Cambodian incursion) crash, and more than the entire late 1974 decline. Of course, each of these market sell-offs, and the corresponding equation error, was largely reversed in the subsequent 6 months. (The general negative correlation of errors was indicated by the 2.52 Durbin-Watson ratio.)

The estimated equation is considerably more successful in explaining equity returns the 1980s than during the estimation period itself. Most of the large gains in 1980 and the mid-1982–mid-1983 period occurred in near-trough periods and thus are picked up by the equation. The root mean square error is 0.190, about the same as during the estimation period, but the volatility of returns so far in the 1980s has been far greater than in the previous quarter-century. The cycle dummies explain 72% of the variation of equity returns in the first half of the 1980s, about double the percentage explained during the estimation period.

As another measure of the forecasting ability of this equation, I computed the cumulative percentage forecast error over the nine semiannual periods as

$$CUMERR = \prod_{i=1}^{9} \left(1 + \frac{ERR_i}{2}\right) - 1,$$

where $ERR_i$ is the error from the estimated equation in the $i$th period. The result is a negligible 0.003. That is, the 4½-year forecast of the stock market plus cumulative dividends is within a half percent of the actual. So our third question—Does the estimated cyclical influence on equities hold up in the 1980s?—is answered strongly in the affirmative.[4]

While the cycle dummy variables explain over a third of the variation in equity returns over the 1953–79 period, the variables obviously cannot explain extended market booms or busts, and there was, of course, a major market collapse between 1968 and 1978, with most of the decline coming after 1972. To illustrate the failure of our equation to capture this decline, unity plus the cumulative error over the 1953–79 period is plotted in figure 2.2. Along with it is Tobin's average q, the ratio of the market value (debt plus equity) of firms to the replacement cost of assets, as presented in the 1983 *Economic Report of the President* (table B-88, p. 263). The general correlation between the series, especially after 1962, is obvious. The existence of the 1969–78 decline and the failure of the regression equation to capture it explains the low (0.36) explanatory power in the 1953–79 period relative to the first half of the 1980s, when no prolonged decline (or increase) occurred.

Many explanations have been advanced for the 1969–78 stock market decline (see Hendershott [1981] for a summary and critique of most of them). That which I find most appealing, however, is the "relative factor price hypothesis," according to which unanticipated relative factor price changes caused previously optimal outstanding capital to become suboptimal. Given a putty-clay technology, the profitability of existing capital, and thus the value of ownership claims to this capital, declined in response to sharp revisions in expectations regarding factor prices. Most of the roughly one-third decline in q after 1972 can, in fact, be explained by unexpected factor price changes (Elmer and Hendershott 1984).

## 2.3 Nominal and Real Short-Term Interest Rates and Inflation

When I examined interest rates and inflation in early 1981, financial economists were still in the "Fama era" of constant real interest rates.

4. While hardly surprising, I note that ex post bond returns have continued in the 1980s to be largely explained by unanticipated changes in new issue coupon rates on 20-year Treasuries.

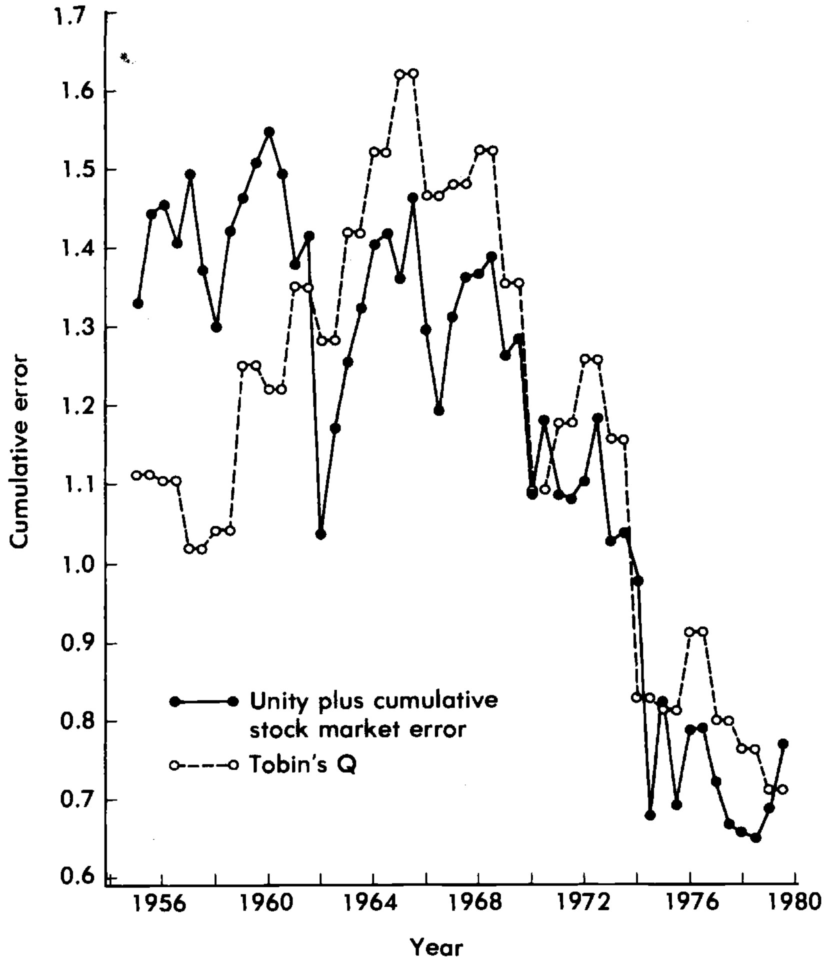


**Fig. 2.2** Unity plus the cumulative stock market error since 1953 (E) and Tobin's q (Q), 1955–79

Study after study of data from the 1950s, 1960s, and 1970s documented the roughly one-for-one response of interest rates to changes in inflation. Between 1952 and 1980, the real 1-month bill rate averaged 0.5% with a standard deviation of only 1.5%. I noted, however, that the real bill rate was not constant prior to 1951. Most important, the real rate exceeded 4% in each year in the 1926–30 period.[5]

5. Between 1931 and 1951 the nominal bill rate was near zero, and thus the real rate was roughly the negative of the inflation rate and ranged between 10% in 1931 and −17% in 1946.

Interest rates have become a far more interesting topic in recent years. No longer is every little squiggle in nominal rates attributed to a change in expected inflation (although the St. Louis Fed seemed rather reluctant to give up this view), and numerous papers have recently been written on why interest rates are too high relative to inflation. And high they are. Since late 1980, real 6-month Treasury bill rates have averaged around 5.5%. Very likely, the real 6-month bill rate will exceed 4% in each year in the 1981–84 period, strikingly similar to the late 1920s.

Figure 2.3 contains plots of the real 6-month bill rate before and after tax. The bill rate is the average of daily figures (of beginning- and end-of-month data before 1960), on a bond-equivalent basis, for June and December of the years 1954–84, and the expected inflation rate is the corre-

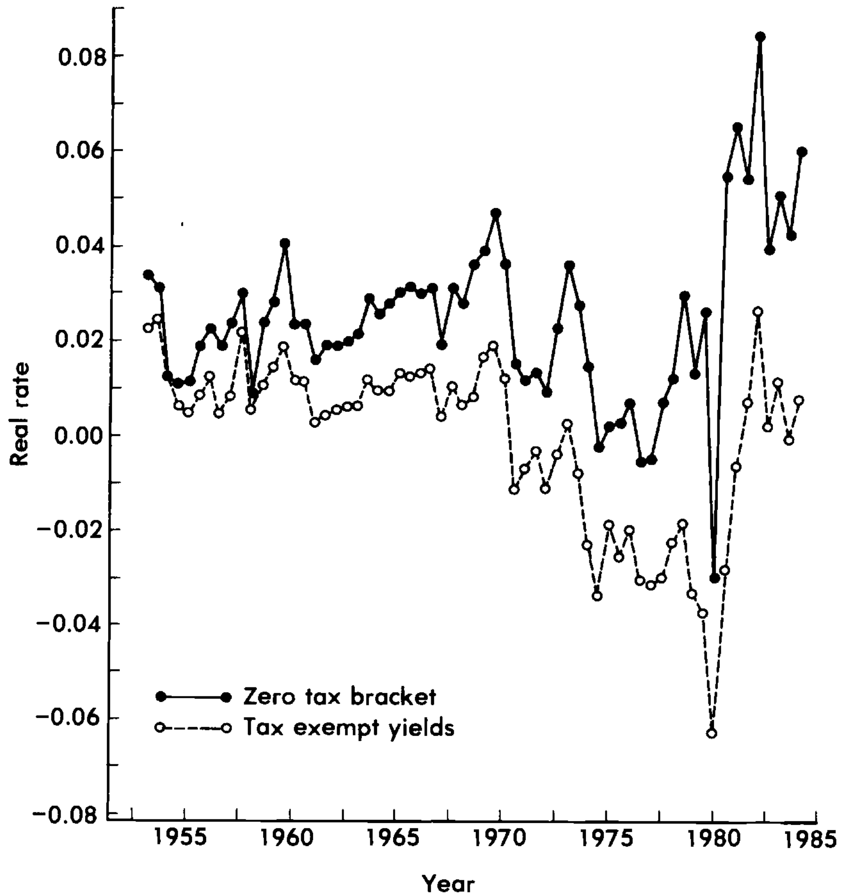


Fig. 2.3 After-tax 6-month bill rates for marginal investors in the zero tax bracket (Z) and in that bracket implied by tax-exempt yields (E), 1953–84

**Table 2.3** **Real After-Tax Treasury Bill Rates**

| | Nominal 6-Month Bill Rate | Expected 6-Month Inflation | Real After-Tax Rate Tax-Rate 0 | Real After-Tax Rate Tax-Rate 0.423* | Unanticipated Inflation |
|---|---|---|---|---|---|
| 1954–73 | 4.15 | 1.72 | 2.43 (0.93)† | 0.74 (0.78)† | 1.06 |
| 1974–mid-80 | 7.58 | 7.02 | .85 (1.13)† | −2.70 (0.66)† | 1.95 |
| mid-80–mid-84 | 12.08 | 6.42 | 5.66 (1.40)† | .25 (1.58)† | −1.31 |

*This is unity less the average ratio of the yields on 12-year tax-exempt (prime grade) taxable (Treasury) securities over the 1954–84 period. The actual ratio for each period is employed in the calculations.

†The standard deviations of the real after-tax rates are reported in parentheses underneath the mean values.

*Sources:* The text and Hendershott (1984).

sponding number for 6-month inflation from the Livingston survey. The extraordinarily high level of real bill rates in the 1980s is obvious. In the eight observations from December 1980 to June 1984, the real bill rate averaged over 5.5%. This is 4 percentage points higher than the average of the 1960s and 1970s.

The appropriate tax rate to employ in a study of real after-tax bill rates is uncertain, and it would probably not be difficult to find economists who would advocate rates as low as zero and as high as the corporate tax rate. One possible way of determining the relevant tax rate is to compare the yields on high-quality tax-exempt securities with those on bills.[6] The real after-tax bill rate, according to this scheme, is then the tax-exempt rate less the expected inflation rate. This representation of the after-tax real bill rate, indicated by the dashed line in figure 3.3, tells a far different story than the before-tax real rate. In only one observation in the 1980s (June 1982) is the real after-tax rate out of line relative to the 1960s. The rate is high in the 1980s only relative to the extraordinarily low rates in the 1970s.[7]

The data in table 2.3 highlight the instability of real interest rates, whether the marginal tax rate of investors is as low as zero or as high as 0.4, during the last decade relative to the preceding two decades. The real

6. Unity less the ratio of prime grade 1-year municipal rates to 1-year Treasuries, both from Salomon Brothers and Hutzler, is utilized.

7. One extreme outlier in both rate series in recent years is worthy of note. The −3% real bill rate in June 1980 was 2.5% below any other observed bill rate in the entire period, and the −6.3% after-tax real rate was also 2.5% below any other. The record declines to unprecedented lows and the even sharper immediate reversals cry out for an extraordinary explanation. Fortunately, one is available. In March 1980, the Federal Reserve implemented a credit

rate based on a zero tax investor averaged 2.43% in the 1954–73 period with a standard deviation (listed in parentheses beneath the mean) of only 0.93%. For the remainder of the 1970s, the rate fell to 0.85%, and it then jumped to 5.66% during the last 4 years. In spite of the subdivision of the last decade into two parts, the standard deviation of the real rate within the last subperiod was 50% higher than during the entire earlier two decades. The increase in the standard deviation is an even greater 100% if the tax bracket implied by the ratio of exempt to taxable rates is utilized. Note that real after-tax rates based on this tax bracket are extraordinarily low in the 1974–mid-1980 period and are not higher in the 1980s than they were in the 1954–73 period.

The last column in table 2.3 contains the average difference between the rate of change in the consumer price index net of the shelter component (to exclude the impact of changes in home mortgage rates) for each 6-month period less that forecast by Livingston interviewees at the beginning of the period. Unanticipated inflation so measured averaged 1% in the 1954–73 period, 2% in the 1974–mid-1980 span (which included half of the first oil price shock and all of the second), and −1.33% since then. For those who might think that actual inflation is a better measure of expected inflation than is the Livingston forecast, this unexpected inflation series should be subtracted from the real interest rates in table 2.3 to obtain preferred measures of real rates. This adjustment would increase the already enormous rise in real rates between the 1970s and 1980s by 3.25 percentage points.

Given that economists are unsure of even what the interest rate puzzle is—high real rates in the 1980s, low rates in most of the 1970s, or both—it should not be surprising that there is little agreement on the determinants of rates. Wilcox (1983) attributes the low real rates in the mid-1970s to supply shocks (to the increase in real import prices). Many, most notably Clarida and Friedman (1984), cite tight money for the higher rates in the 1980s until late 1982, and Hendershott and Shilling (1982) and deLeeuw and Holloway (1983) point to the business tax cuts and easy fiscal policy generally as the source of high rates. Others cite deregulation, volatile money growth, volatile interest rates, and so on.

## 2.4 An Explanation of Changes in New Issue Yields

Changes in new issue yields are of paramount importance to ex post bond returns. These changes are also important to ex post equity returns

controls program that included a non-interest-bearing reserve requirement of 15% on increses in credit. Apparently as a result, consumer installment credit outstanding contracted at an annual rate of 10.5% in the April-May period, the first decline since May 1975 and the largest reduction since World War II. The controls program was eased in late May and terminated on July 24, 1980.

insofar as real interest rates influence the business cycle. And while I would not overemphasize the importance of real rates—who would dare in light of the 1983–84 economic expansion?—there is no doubt that real rates matter. Thus I conclude this chapter with an examination of the determinants of changes in new issue rates.

Given the diverse views held by financial economists on the determinants of interest rates, a consensus interpretation of their views cannot be presented. I will simply summarize the findings of my research. My framework draws together two views of interest rate determination: the expectations theory, whereby expected changes in rates can be inferred from forward rates, and structural models of rates, in which unexpected changes in rates can be attributed to unanticipated changes in expected inflation, economic activity, monetary growth, and possibly other factors. The variables explained are the changes, over semiannual periods, in the 6-month and 20-year Treasury rates described earlier. For unanticipated changes in expected inflation and economic activity, I utilize the difference between actual data and Livingston Survey expectations of inflation 6 and 12 months in the future and of industrial production 6 months out; for monetary growth I use the difference between the current growth rate and that during the previous 2 years (no survey data are available). The data are described in Hendershott (1984). While the inflation expectations data are appropriate for the 6-month bill rate, they are obviously an extremely rough approximation to the expectations relevant to a long-term interest rate.

The results of this estimation are summarized in table 2.4, in which only coefficients on the key variables are reported. The bill rate equation is estimated on data beginning in 1960 when data for 12-month bills first became available; the estimation ends in 1979 in order to determine the ability of rate relations estimated prior to the 1980s to explain the movement of rates in the early 1980s. The equations explain about one-third of the changes in rates.

To no one's surprise, I trust, expected inflation matters. The 0.738 coefficient in the bill rate equation (with a standard error of 0.24) is consistent with the results of a large number of previous studies. The low (0.18) coefficient in the bond rate equation probably reflects a general tendency for long-run expected inflation to move by much smaller amounts than short-run expected inflation.

Possibly to the surprise of some, real activity also matters to debt yields.[8] These estimates suggest that, other things being equal, the 6-month bill rate will be about 2 percentage points higher when the economy is operating at 90% capacity than when it is at 70% capacity, and the 20-

8. Clarida and Friedman (1984) and Makin and Tanzi (1983) also report large real income effects.

**Table 2.4** **Responses of the Treasury Bill and Bond Rates to Inflation and Industrial Production Surprises and to Expected Interest Rate Changes**

| | | Responses to | | |
|---|---|---|---|---|
| Dependent Variable | Period of Estimation | Unexpected Change in Expected 6-Month Inflation | Unexpected Change in Industrial Production | Expected Change in the Rate |
| Change in 6-month bill rate | 1960–79 (semiannual) | .738 (2.8) | .0746 (2.2) | .720 (1.9) |
| Change in 20-year Treasury bond rate | 1953–79 (semiannual) | .180 (2.4) | .0307 (3.3) | .943 (1.6) |

*Note:* The numbers in parentheses are t-ratios.

*Sources:* The first equation is described in Hendershott (1984). The second equation is entirely analogous, employing the same variables except for the 20-year Treasury bond rate and the expected change in it. These two variables are described in Hendershott and Huang (1984, app B).

year bond rate will be about three-quarters of a point higher. The cyclical movement of the real bill rate is obvious from figure 2.1, where high values occur around all business cycle peaks (1953, 1957, 1959, 1969, 1973, and 1979). Moreover, analysis, in a somewhat different framework, of the 1-month bill rate is fully consistent with this result. Hendershott and Huang (1984) conclude that the 1-month rate would be a full 2½ points higher.

Most surprising, at least to some academics, is the role of expected interest rate changes. Recent research has attacked the expectations theory of the term structure of interest rates; expected changes in rates implied by forward rates are said to have negative value in explaining ex post rate changes.[9] In contrast, the estimated coefficients reported in table 2.4 are close to the expected value of unity and are significantly positive at the 95% and 90% confidence levels, respectively.

The estimated (through December 1979) equations have been used to interpret the rise and fall in the rates between June 1978 and December 1982. Table 2.5 contains the results. Eighty percent (6.70 percentage points) of the 8.42 increase in the bill rate to December 1980 is explained

9. See Shiller et al. (1983) and Mankiw and Summers (1984). However, Fama (1983) finds a modest value in forecasts, and Brennan and Schwartz (1982) and Buser and Hendershott (1984) report evidence of short rates reverting toward long rates.

**Table 2.5 The 1978–82 Interest Rate Cycle**

| | June 78 – Dec. 80/ June 81 | | Dec. 80/June 81 – Dec. 82 | |
|---|---|---|---|---|
| | 6-Month Bill | 20-Year Bond | 6-Month Bill | 20-Year Bond |
| Change in Rate | 8.42 | 4.80 | −7.40 | −2.26 |
| Due to: | | | | |
| Unexpected Change in Expected Inflation | 5.16 | 1.14 | −3.54 | −.74 |
| Unexpected Change in Industrial Production | .66 | .39 | −1.48 | −.73 |
| Change in Inflation Uncertainty | .53 | .16 | −.55 | −.17 |
| Other (largely expected change in the rate) | .35 | −.42 | −1.20 | −.06 |
| Total | 6.70 | 1.27 | −6.99 | −1.70 |
| Unexplained Change | 1.72 | 3.53 | −.41 | −.56 |

December 1980 is considered the peak for the bill rate; June 1981 for the bond rate.

by the equation. Over 5 points is due to unexpected increases in anticipated inflation, two-thirds of a point to unexpected increases in output, one-half point to the increase in inflation uncertainty, and one-third point to other factors. Because the expected inflation rate rose by only 4.1 percentage points, the real interest rate increased by 4.3 percentage points. Of this rise, the estimated equation explains 2.6 (6.7 − 4.1) points, or 60%. The estimated relationship also explains 60% of the extraordinarily high average real bill rates in the early 1980s.

One and a half percentage points of the 2.6-percentage point explained increase in the real bill rate can be attributed to the unanticipated increases in industrial production, inflation uncertainty, and other factors noted above. However, the primary single factor contributing to the rise was unexpected increases in inflation far in excess of the actual 4.1-percentage-point increase. From mid-1978 to mid-1979, no increase was expected, but a 2-point rise occurred. From late 1979 to late 1980 half-point increases were anticipated, while the actual expected rate rose by another 2 points. In total, the cumulated unexpected increase in anticipated inflation over this span was a full 7 percentage points. Even though the estimated coefficient on expected inflation increases is only 0.74, implying that the nominal bill rate rises by only three-quarters of a point for every point of unanticipated increase in inflation, the forecasted nominal bill rate rises by 5.2 points because of this 7-point increase, and thus the real bill rate rises by over a full point.

Between the end of 1980 and the end of 1982, the bill rate declined by nearly 7.5 percentage points. Nearly 95% of this decline is explained by the estimation equation. All the factors that contributed to the early increase in the bill rate reversed themselves, inducing the decline. Unexpected declines in industrial protection, inflation uncertainty, and the catch-all "other" tended to lower the real rate by 3 percentage points, but a smaller decline in unexpected than in actual inflation, along with the only partial (0.74) response of nominal rates to unexpected changes in inflation, partially offset the decrease in the real rate.

This explanation of the bill rate cycle is remarkably good, in my less than humble opinion, because most of the unprecedented increase in rates and all of the decrease came after the estimation period. Two problems of the forecast should be noted, however. First, the equation does not pick up the interyear oscillations in either 1980 (due to the credit controls, see n. 7) or 1982. Second, the forecasted 6-month rate is 1⅓ percentage points above the actual value at the end of 1982 (the 1.72-point underestimate of the increase less the 0.41-point underestimate of the decrease). That is, the real rate is 1⅓ points too high (relative to 1978), possibly due to some of the factors discussed earlier but not captured in our equation.

A similar, but far less satisfactory, explanation of the bond rate cycle is also summarized in table 2.5. The inability to explain much more than a quarter of the rise in this rate almost certainly follows from the inadequacy of the 6-month expected inflation rate as a proxy for long-run expected inflation. Long-run expected inflation likely rose by about as much as short-run expected inflation did in the 1978–80 period, but the 0.18 coefficient on the unexpected change in expected inflation translates the increase in expected inflation into an impact on the bond rate that is only one-quarter as large as that on the bill rate. The ability of the equation to explain three-quarters of the decline in the bond rate suggests that long-run expected inflation has not fallen nearly as much as short-run expected inflation, which seems quite plausible in light of the large outyear structural deficits.

## 2.5 Summary

A strong relationship has existed between ex post equity returns and business cycle turning points since at least 1926. Somewhere around business cycle peaks—during the last half-year of the expansion or the first half of the contraction—investors sharply reduce their expectations regarding future returns on equities, and the reverse occurs around business cycle troughs—during the last half of recessions and the first 6 months of upswings. As a result, stock prices rise near troughs and fall near peaks. During the 1953–79 period, ex post equity returns were 32% greater than the 9% norm in the year (roughly) surrounding troughs, and 21% less than the norm in the year surrounding peaks. This cyclical phenomenon alone explains over a third of the movement in returns. In the first nine semiannual periods in the 1980s, forecasts of returns based on the 1953–79 relationship explain over 70% of the movement in returns, and the cumulative error of a forecast of the stock market and cumulative dividends is less than 1%. Stock market performance so far in the 1980s has not been at all unusual.

In contrast, the level of real interest rates so far in the 1980s differs markedly from the prior quarter (nearly half) century. Nominal Treasury bill rates moved one-for-one, or slightly less, with changes in expected inflation during the 1951–79 period, resulting in relatively constant real bill rates which averaged 2%. In the 1980s, real rates have averaged over 5½%, duplicating the experience of the late 1920s. The source of the present high real rates is unclear, with various authors citing tight money (at least until late 1982), increased volatility of interest rates and monetary growth, easy fiscal policy, business tax incentives, and deregulation, among other reasons. More important, on an after-tax basis real rates are no higher now than in the 1950s and 1960s. What was unusual were the low real after-tax rates in the 1970s.

My own research on new issue Treasury coupon rates draws on two views of interest rate determination: the expectations theory, whereby expected changes in rates can be inferred from forward rates, and structural models of rates in which unexpected changes in rates can be attributed to unanticipated changes in expected inflation, economic activity, monetary growth, and possibly other factors. The first important result is the consistency of the data with the expectations theory. While expected rate changes explain little of observed changes in new issue rates, the data are consistent with the expectations theory. A second result is a strong positive relationship between Treasury rates and economic activity. As operation of the economy increases from 70% of capacity to 90%, real Treasury rates rise by 2½ percentage points at the short (1-month) end of the term structure to three-quarters of a point at the long (20-year) end.

In spite of the "success" of this research, the difficulties of forecasting interest rates should be obvious. Expected changes in rates explain a minuscule of 2% of actual changes because surprises are so prevalent. Moreover, "knowing" inflation, real activity, and money surprises increases the ex post explanatory power only to one-third. My sympathy goes to those forecasting interest rates for a living.

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