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Default Risk, Interest Differentials and Fiscal Policy: A New Look at Crowding Out

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INTRODUCTION

Early Keynesian models emphasized the direct effects of fiscal and monetary policies on real income through increased aggregate demand. Interest rate effects were soon added in the familiar IS-LM model. Keynesians argued that the primary (if weak) effectiveness of monetary policy lay in some possible effect on investment demand through interest rates. Adding interest rates has a less benign effect on fiscal policy, which suffers an attenuation of its impact in both directions. Private investment is crowded-out by interest-raising expansionary policy, and encouraged by falling interest rates when fiscal policy is contractionary.

From this latter point there developed an extensive literature on crowding out. Empirical evidence in recent years on the existence of crowding out remains mixed. Hoelscher (1986) and Cebula, Carlos and Koch (1981), for example, find evidence that crowding out occurs, while Eisner (1986), Evans (1985), and Dalemas (1987) find little support for crowding out. Makin (1983) and Dewald (1983) find weak crowding out effects. Results are highly sensitive to variable definitions (particularly the interest rate chosen and the deficit measures used) and, to a lesser extent, the time period.

Little (if any) attention, however, has been given in that literature to the indirect effects of expansionary monetary and/or fiscal policy on private investment through changes in perceived risk. We make the traditional assumption that changes in risk leads directly to compensating adjustments in interest rates.[1] Thus, even if fiscal policy does tend to raise the level of interest rates, it may raise private interest rates less than rates on Treasury issues by improving the general business climate. It is even possible that the risk-reducing effects of expansionary fiscal policy could more than offset crowding out and actually lower private interest rates. It is these effects that are explored in this paper.

The economic climate might be expected to affect both the level and structure of interest rates (as well as the availability of credit), especially during periods of recession. A high bankruptcy rate and tenuous economic conditions make suppliers of funds hesitant to lend to all but the most secure private firms, unless they can charge higher interest rates to compensate for the increased risk of either default or delay in payments of interest and/or principal. Adverse economic conditions might, in fact, not only raise the average level of interest rates but also widen the spread between default riskless (i.e., Federal government) bonds and higher risk bonds.

The effect of the state of the economy on risk premiums of corporate bonds has been addressed in several studies (Jaffe 1975, Melton 1977, Benson and Rogowski 1978). Jaffe verifies the expected countercyclical behavior of the spread between Aaa and Baa bonds that is also assumed to be the case in the model developed in this paper, except that we use Treasury bonds in place of Aaa bonds. That is, the real or nominal yields differ among categories only by the expected risk.[2]

One simple way to measure the cyclical behavior of risk premiums is to examine the relationship between the corporate-government bond interest differential and the change in real output, using the

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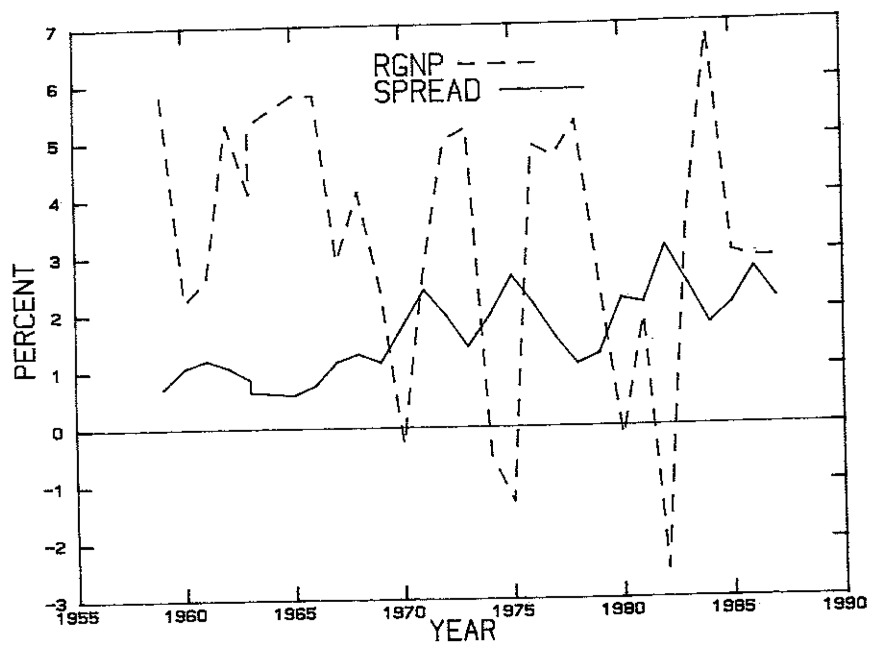

Figure 1

latter as a measure of economic conditions. Using yearly data for 1959 to 1987, we calculated the interest rate differential between the average yield on long-term Baa corporate bonds (lowest investment grade) and the yield on long-term U.S. Treasury securities. We denote this difference as SPREAD. Figure 1 plots the relationship between SPREAD and the percentage change in real GNP (RGNP). From the diagram, it is evident that, as real GNP growth slows down (or becomes negative), the interest rate differential between Baa and Treasury bonds tends to increase.[3]

This result is further confirmed by regressing SPREAD on RGNP, as indicated in Table 1. Regression 1 clearly indicates that the yield differential between Baa and Treasury bonds is sensitive to

TABLE 1
Dependent Variable: SPREAD[1] (1961–1985),

Regression	1	2
Constant	2.09	2.01
	(7.02)***	(5.79)***
PGNP	−0.11	
	(3.72)***	
XPGNP		−0.093
		(1.88)*
rho (initial)	0.72	0.69
D.W.	1.57	1.57
Adjusted R^2	0.70	0.55

[1]Corrected for autocorrelation (Cochrane-Orcutt).
***Significant at 0.01 level.
**Significant at 0.05 level.
*Significant at 0.10 level.

changes in real income with the expected negative sign. Of course, causality can also run from lower risk premiums to higher real GNP, so these results must be considered only suggestive. But they are consistent with other findings cited, in that the risk premium required by lenders varies inversely with underlying economic conditions.[4]

The results from Regression 1 in Table 1 suggest that the standard argument for crowding out may need to be reexamined. The traditional crowding out argument holds that expansionary fiscal policy will raise the overall level of interest rates through increased demand for funds to finance larger deficits and expanding GNP. Interest rate changes will in turn affect real demand, particularly in interest-sensitive sectors (business plant and equipment, state and local government capital expenditures, consumer durables, housing, and inventories).

However, it is the interest rate paid by private borrowers that should be central to the crowding out argument. Private rates rise relative to Treasury rates during recessions, discouraging private borrowing. If expansionary fiscal policy causes increases in real GNP and consequently reduces the risk premium, private interest rates could conceivably fall, or at least rise less than Treasury rates. Such an outcome would constitute an attenuation or negation of the crowding out effect of expansionary fiscal policy.

In the next section of the paper, a macroeconomic model that includes the effects of changes in risk on private sector interest rates is developed. Section III tests the effects of monetary and fiscal variables on interest rate spreads. Concluding comments and suggestions for future research constitute the final section of the paper.

THE MODEL

A general equilibrium model consisting of a commodity market, a money market, and two bond markets—a market for (default riskless) government bonds and a market for (default risky) corporate bonds is the framework for the analysis that follows. It is assumed that corporate and government securities are perfect substitutes for each other, except for the extra premium, θ, added to corporate bonds to compensate bond holders for default risk. This default risk decreases as real income rises and rises as real income falls, i.e., $\theta = \theta(Y)$, and $d\theta/dY < 0$, where Y is real income. Thus, the relationship between the interest rate on government and private securities is

$$(1) \qquad i = r - \theta(Y)$$

where i is the government bond rate and r is the corporate rate.

Equation (2) is the standard equilibrium condition for the commodity market:

$$(2) \qquad Y = C(Y) + I(r) + G: dC/dY > 0, dI/dr < 0$$

where C = consumption spending, I = investment spending, and G = government spending. Note that investment is a function of the corporate interest rate and not the default-risk-free government rate.

The money market equilibrium condition is

$$(3) \qquad M^S = L(Y, i, r)$$

where M^S = money supply and L( ) = money demand. Money demand is assumed to be a function of real income and yields on both government and corporate bonds. Making use of (1), the money market equilibrium condition can be rewritten as

$$(4) \qquad M^S = L[Y, r, \theta(Y)], L_Y > 0, L_r < 0, L_\theta > 0.$$

The partial derivative L_Y corresponds to the transactions demand for money, assuming that $\theta(Y)$ is held constant. L_r corresponds to the opportunity cost of holding money, again assuming constant default risk.

L_θ relates to the speculative demand for money and the opportunity cost in the following way. An increase in the perceived risk associated with private securities decreases the demand for these securities, ceteris paribus. As bondholders move out of corporate bonds and into government bonds, the yield on government bonds (i) falls, while the yield on corporate bonds (r) rises. Equilibrium in the bond market will be re-established when the risk-adjusted corporate rate (r minus a now larger θ) is again equal to the government rate. The now lower yields on both government bonds and on corporate bonds net of risk adjustment, however, also cause a portfolio shift out of bonds in general and into money. For this reason, $L_\theta > 0$.

The bond market consists of corporate bonds, B_1, and government bonds, B_2, which are perfect substitutes except for the adjustment for default risk, θ. The bond market equilibrium condition is

(5) $$B_S = B_1 + B_2 = B(Y, r - \theta)$$

where B_S = total bond supply, and B( ) = bond demand. The perfect substitutability between risk-adjusted corporate bonds and government bonds allow us to reduce a four market model (commodities, money, and two types of bonds) to three markets (commodities, money and risk-adjusted bonds). Moreover, by invoking Walras' law, equilibrium in two markets guarantees equilibrium in the third. To allow comparison of our results with those of the standard textbook IS-LM model, we use Walras' law to eliminate the bond market and focus on the money and product markets.

Totally differentiating equations (2) and (4), we obtain

(6) $$\begin{bmatrix} 1 - dC/dY & -dI/dr \\ L_Y + L_\theta\theta_Y & L_r \end{bmatrix} \cdot \begin{bmatrix} dY \\ dr \end{bmatrix} = \begin{bmatrix} dG \\ dM_S \end{bmatrix}$$

The determinant of the coefficient matrix in (6) is given by

(7) $$(1 - dC/dY)L_r + dI/dr(L_y + L_\theta\theta_Y)$$

which we define as Δ.

The first term is obviously negative. The second term may be either positive or negative, depending upon the relative magnitudes of L_Y and $L_\theta\theta_Y$, because L_Y is positive while $L_\theta\theta_Y$ is less than zero. Stability, by assumption, requires that $\Delta < 0$. The conditions under which this assumption is valid are examined later.

Assuming $\Delta < 0$, it follows that

(8) $$dY/dG = L_r/\Delta > 0$$

(9) $$dY/dM = dI/d_r/\Delta > 0$$

(10) $$dr/dM = (1 - dC/dY)/\Delta < 0$$

(11) $$dr/dG = -(L_Y + L_\theta\theta_Y)/\Delta \gtreqless 0.$$

Thus expansionary monetary and fiscal policy raise the level of income and expansionary monetary policy lowers the corporate rate of interest. All of these results are standard in IS-LM models. However, expansionary fiscal policy has an indeterminate effect on the corporate interest rate, a non-standard result.

To understand this latter result, consider the slope of the LM curve:

(12) $$-(L_y + L_\theta\theta_Y)/L_r = dr/dY.$$

As usual, an increase in income raises the transactions demand for money. However, a rise in income reduces the default risk on corporate securities, and consequently could reduce the demand for money as money holders adjust their portfolios. Theoretically, $L_\theta\theta_Y$ could dominate L_Y.

Figure 2 illustrates this argument. If LM_1 is the conventional LM curve, a shift in the LS curve from IS_0 to IS_1 raises income less and the interest rate more than along LM_2, where LM_2 takes into account the reduction in corporate default risk due to rising income. LM_3 is a more extreme case where the change in default risk dominates the increase in transactions demand. Along LM_3, a rightward shift in IS causes income to rise and the interest rate to fall.

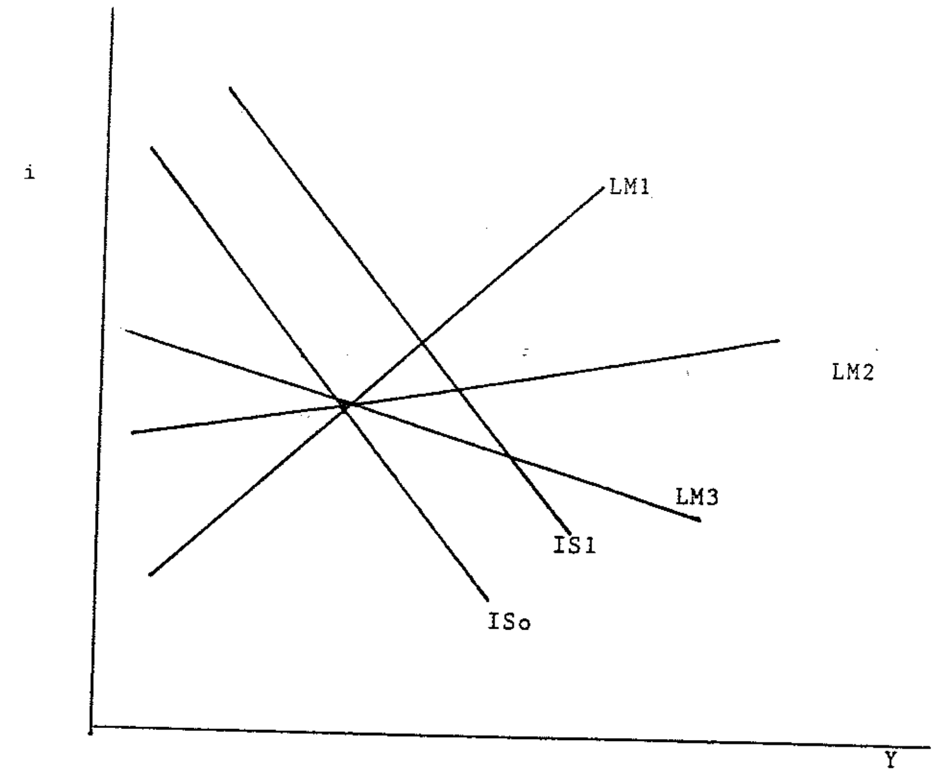

Figure 2

If LM_3 has a negative slope that is steeper than that of the IS curves, an expansion from IS_0 to IS_1 along LM_3 would cause the interest rate to rise and income to fall. The determinant of the coefficient matrix of equation 6, Δ, can be rearranged into an inequality based on the slopes of the IS and LM curves. It can be shown that, even if the LM curve is negatively sloped, as long as the IS curve is steeper than the LM curve, Δ is less than zero and equilibrium is stable. Thus only a highly negatively sloped LM_3, not consistent with stable equilibrium, is inconsistent with $\Delta < 0$.

Our model not only modifies the traditional impact of fiscal policy, but also implies that monetary policy has a larger impact on income than in the conventional IS-LM framework. This follows from the derivation of dY/dM, which is equal to $(dI/d_r)/\Delta$ (equation 9). Since Δ contains the additional positive term $(dI/d_r) \cdot L_\theta\theta_Y$, (equation 7), which is missing from the conventional model, Δ is smaller in absolute value, making dY/dM larger. Intuitively, starting from an initial equilibrium, an increase (decrease) in the money supply can be viewed as a shift down (up) in a conventionally derived LM curve, followed by a clockwise rotation in slope. Changes in the demand for money resulting from changes in default risk cause this rotation in slope, making income rise (fall) more than is conventionally the case.

Even if the LM curve drawn in r, Y space has a negative slope, fiscal policy may still raise the government bond rate, i. Using the definitional identity $i = r - \theta(Y)$ to obtain di/dG

$$di/dG = dr/dG - \theta_Y dY/dG \gtreqless 0$$

Thus di/dG is greater than zero, and since $L_r\theta_Y/\Delta$ is less than zero, di/dG will be larger than dr/dG. What we observe is that a perceived decline in default risk causes a movement from government to corporate bonds. Equilibrium is restored with a lower θ and a higher government bond rate relative to the corporate rate.

Next, consider di/dM. Using the definitional identity $i = r - \theta$,

$$di/dM = dr/dM - \theta_Y dY/dM \gtreqless 0.$$

The first term on the right hand side is negative, but the second term is positive, leaving the overall sign indeterminate. Intuitively, expansionary monetary policy, by reducing risk, increases the relative demand for corporate bonds, causing a movement out of government securities. If this effect is strong enough, it can reverse the downward movement in the government rate due to monetary expansion. Whether this effect dominates or not, expansionary monetary policy causes a larger decline in the corporate rate than the government rate.

It is clear that the basic differences between our model and conventional IS-LM analysis is that the magnitude of crowding out in our model depends primarily on what happens to the corporate rate, not the government rate, and that the difference between these two rates, (θ), is endogenous, depending upon the state of the economy.

There are several approaches that can be used to test this model empirically. The response of both i and r to changes in monetary and fiscal variables needs to be measured. In order to screen out the effects of price level changes, one approach is to measure the effects of policy variables (money supply and fiscal policy) on the spread between the TBond rate and the corporate rate, which we have defined as θ. Since both interest rates should be affected equally by changes in expected inflation, the spread measures the difference in real rates, allowing us to test the propositions derived from our IS-LM model which (like the conventional model) makes no allowances for price level changes.[5]

EMPIRICAL RESULTS

The model was tested with annual (1959 to 1985) rather than quarterly data for two reasons. First, the use of seasonally adjusted series can lead to inconsistent estimates and distort dynamic relationships (Wallis, 1974; Hendry and Mizon, 1978; and Davidson et al., 1978). The choice of yearly data was influenced by the fact that the cyclically adjusted deficit as a measure of discretionary fiscal policy is not available in seasonally unadjusted form on a quarterly basis.[6]

Second, Hoelscher (1986) used yearly data in finding strong evidence that deficits cause higher long-term interest rates. He argued that yearly data may be preferable to quarterly or monthly data in finding evidence of crowding out because "... portfolio adjustment lags may be significant enough to weaken the correlation between annual observations." Furthermore, he argued, "If the quarterly deficit is easily predicted a quarter ahead, then the current quarter's long-term rate would have been led by movements in the next quarter's deficit, but this lead relationship may not be long enough to destroy the correlation between the annual data," (p. 15). Thus, for both these reasons we elected to use yearly rather than quarterly data. The starting year, 1959, was chosen because it is the first year of a consistent M1 series as a measure of monetary policy.

Since default risk should be higher for lower rated bonds, we took the lowest rated aggregate category of corporate securities for which a data series was available, Baa, and calculated the interest rate spread between Baa and government securities. We defined this differential as SPREAD. Its value ranges from a low of 0.59% in 1965 to a high of 3.11% in 1982.

The bond yields used were yearly averages for Moody's corporate Baa bonds. The Treasury yields, also yearly averages, were for issues of ten years' maturity. (The data appendix lists the definitions and sources for all variables.) Since all yields are in nominal terms, subtracting the government rate from the private rate gives the differences in real (as well as nominal) rates as noted in note 5.

SPREAD was regressed on 2 lags each of the ratio of M1 to GNP (M1GNP) and the cyclically adjusted deficit to GNP (DEFGNP). (Deficits were entered as positive numbers.) Because of the money lags, the dependent variable starts in 1961. Since both the traditional IS-LM model and our modified version are in real terms, scaling the monetary and fiscal variables makes a correction for price level changes to generate variables consistent with the model.

The results of this regression are found in Table 2. Expansionary monetary and fiscal policy both cause a statistically significant reduction in SPREAD. These results are consistent with our theory.[7]

TABLE 2
Dependent Variable: SPREAD 1961–1985[1]

Constant	6.61
	(4.08)***
$M1GNP_{t-1}$	−39.35
	(1.50)
$M1GNP_{t-2}$	16.60
	(0.70)
ΣM1GNP	−22.75
	(2.88)***
$DEFGNP_{t-1}$	−18.52
	(1.63)
$DEFGNP_{t-2}$	−22.33
	(1.89)*
ΣDEFGNP	−40.84
	(2.46)**
rho (initial)	0.62
D.W.	1.62
Adjusted R^2	0.63

[1]Corrected for autocorrelation (Cochrane-Orcutt).
***, **, * Same as Table 1.

As a check on our procedure, the process was separated into two stages, regressing the percentage change in real GNP (RGNP) on M1GNP and DEFGNP, and using the resulting predicted real GNP in the SPREAD equation. The results in Table 3 indicate that both monetary and fiscal variables have the right sign (+) and significantly contribute to explaining changes in real GNP.

The coefficients from Table 3 were then used to construct XRGNP; this predicted XPGNP was

TABLE 3
Dependent Variable: PGNP 1961–1985[1]

Constant	−11.88
	(1.81)*
$M1GNP_{t-1}$	365.62
	(2.91)**
$M1GNP_{t-2}$	−294.12
	(2.58)**
ΣM1GNP	71.50
	(2.31)**
$DEFGNP_{t-1}$	160.32
	(3.16)***
$DEFGNP_{t-2}$	−8.80
	(0.16)
ΣDEFGNP	151.52
	(2.08)*
rho (initial)	0.58
D.W.	1.49
Adjusted R^2	0.45

[1]Corrected for autocorrelation (Cochrane-Orcutt).
***, **, * Same as Table 1.

substituted for actual RGNP as the explanatory variable in the SPREAD regression. The coefficient of XGNP in Table 1 (Regression 2) is very similar to the coefficient of PGNP (Regression 1), although it is evident that the relationship is somewhat weaker.

One further test was made to determine whether the variables in the SPREAD regression (Table 2) actually represent monetary and fiscal effects on real GNP and the subsequent effect of real GNP and SPREAD. We tested the restriction that the coefficients in the regression of SPREAD on M1GNP and DEFGNP were consistent with the M1GNP and DEFGNP coefficients in the RGNP regression (Table 3) and the subsequent regression of SPREAD on predicted RGNP (XRGNP) (Table 1, Regression 2). The restriction could not be rejected at the 15% level ($F_{4,19} = 1.76$).[8] This result is consistent with our hypothesis that monetary and fiscal variables lower SPREAD by causing changes in real GNP.

While there is evidence that both expansionary monetary and fiscal policy reduce the Baa-Treasury bond spread, as the model predicts, our findings do not indicate whether the overall effect of fiscal expansion is to raise or lower the absolute level of the riskier Baa bond rate. Our model, indeed, made no firm prediction of that sign. To obtain direct evidence on the relationship between the levels of Baa and Treasury bonds (TBOND) interest rates and monetary and fiscal variables, we regressed actual Baa and TBOND rates (no longer measured as a spread) separately on the same lagged monetary and fiscal variables used in the interest rate spread regressions.

However, the results for the TBOND and Baa regressions were somewhat disappointing. Evidence was found that monetary expansion reduces the individual interest rates, but we were unable to obtain any evidence that fiscal policy has either a direct or an indirect (default-risk) crowding out effect on TBONDs and Baa. This inconclusive result appeared using either lagged deficits or the current deficit as a measure of fiscal policy. (These results are available on request from the authors.)

CONCLUDING REMARKS

This paper has argued that the interest rate spread between corporate and government bonds is sensitive to the state of the economy. A simple theoretical model was developed to demonstrate that countercyclical fiscal and monetary policy can lower this spread. The empirical results indicate that discretionary monetary and fiscal policy do indeed reduce the Baa-TBOND spread as the model predicts.

The positive findings for SPREAD, and the mixed results for absolute interest rate levels, suggest a need for additional research in this fertile and relatively untilled field. Tests using interest rates on bonds rated lower than Baa, yields on short-term issues, consumer borrowing, and credit volume (following the credit rationing literature) rather than TBOND or Baa interest rates as dependent variables are all possibilities for further exploration.

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FOOTNOTES

1. This assumption has been challenged in the credit rationing literature (including Blinder and Stiglitz, 1983; Stiglitz and Weiss, 1981; Bernanke, 1981 and 1983; and Jaffe and Russell, 1976). If credit rationing does indeed play an important role in the adjustment by financial markets to perceived changes in risk, with quantity adjustment substituting at least partly for interest spread changes, then any effects of expansionary fiscal policy on interest rates that we can identify will be even more significant. That is, part of the effect of fiscal policy would be reflected in an increase in the supply of bank loans rather than in adjustment in risk differentials in interest rates.
2. Melton (1977) also examines the cyclical behavior of various grades of bonds and finds that Baa bonds are particularly sensitive to the business cycle. Benson and Rogowski (1978) find a similar behavior of yield spreads over the cycle for various grades of municipals.
3. It might be argued that the percentage spread is a more appropriate measure than the absolute spread. However, this argument overlooks the fact that default risk applies to the principal as well as the interest. Consider two one-year securities, one riskless yielding 10% and a "risky" bond with a risk-adjusted equivalent yield with zero expected inflation. If the probability of default on principal and interest is .1, the "risky rate" (r) will be 22.2%. The spread is 12.2%. If expected inflation increases to 15%, the "risky rate" will increase to 27.7%, and the absolute spread rises only slightly (because of the interaction term) to 12.7%. The percentage spread, however, falls from 1.222 to .847. Thus, the percentage spread is sensitive to inflation even though it affects both yields equally; the absolute spread is almost insensitive to changes in expected inflation.
4. We tested for the possibility that during recessionary periods the coefficient on GNP grows larger, reflecting a more than proportional increase in default risk. However, the slope dummy was statistically insignificant. In another

regression we examined the hypothesis that a rise in the expected rate of inflation might cause anticipations of a future policy induced recession. The coefficient on expected inflation was also statistically insignificant. Of course, we cannot rule out that these effects exist, but are not captured by our use of early data. (These regressions are available on request.)

5. For example, the Fisher equations for interest rates on corporate and government bonds, respectively, are

$$r = r_{real} + p^e$$
$$i = i_{real} + p^e.$$

Without inflation, $i_{real} = r_{real} - \theta$, which, when substituted into the government rate equation above gives

$$i = (r_{real} - \theta) + p^e.$$

Subtracting the result from the corporate rate equation produces

$$r - i = \theta. \text{ (See also Footnote 3, Supra.)}$$

6. There is considerable disagreement over the appropriate measure of the deficit. Eisner (1986) uses the real deficit, which takes into account changes in the real value of the outstanding debt as well as the deflated value of the current deficit. Dalamagas (1987) uses a nominal deficit, while Evans (1985) uses an intermediate concept, which might best be described as a deflated deficit—current deficit adjusted for inflation, but not for changes in the outstanding value of the debt. We use the high employment budget deficit divided by GNP, which corrects for inflation as well as growth trends.
7. Subsequent regressions tested the impact of adding dummy variables representing respectively oil shocks, the move to generalized floating in 1973, the credit crunch of 1966, credit controls of 1980, various bank failures (Franklin National in 1974 and Penn Square in 1982), and the Penn Central Railroad crisis of 1970. None of these dummies (tested individually) were significant. In addition, the ratio of Federal to corporate borrowing was included as a regressor, which would allow for the possibility that these two types of bonds are not perfect substitutes. This variable was also insignificant, while the monetary and fiscal variables remained significant.
8. (1) $XPGNP = a_0 + b_1 M1GNP_{t-1} + b_2 M1GNP_{t-2} + b_3 DEFGNP_{t-1} + b_4 DEFGNP_{t-2} + e_2$ and

(2) $SPREAD = c_1 + d_1 XPGNP + e_1$.

Substituting (1) into (2) we obtain

(3) $SPREAD = (c_1 + d_1 a_0) + d_1 b_1 M1GNP_{t-1} + d_1 b_2 M1GNP_{t-2} + d_1 b_3 DEFGNP_{t-1} + d_1 b_4 DEFGNP_{t-2} + e_1 + d_1 e_2$

Compared to the unrestricted regression of SPREAD on lags of M1GNP and DEFGNP, the implied restrictions on M1GNP and DEFGNP from (3) above could not be rejected.

DATA DESCRIPTION AND SOURCES

1. Treasury and Baa Corporate Bonds: Treasuries adjusted to constant 10 year maturities. For both series, yearly data equals average of monthly data. Source: *Economic Report of the President*, (1986).
2. TBILL: Yearly data equals average of monthly data on new issues of 6 months Treasury Bills. Source: *Economic Report of the President*, (1986).
3. Expected Inflation: Livingston Survey of Year Ahead Forecasts. Source: Federal Reserve Bank of St. Louis.
4. M1 Money Supply: Yearly nominal M1 equals average of quarterly data. Source: Federal Reserve Bank of St. Louis.
5. GNP: Yearly, both nominal and real. Source: *Economic Report of the President*, (1986) and updates from the *Survey of Current Business*.
6. Cyclically Adjusted Deficit: Yearly. Source: *Survey of Current Business*.
7. OIL2: Dummy variable set equal to 1 for 1979 and 1980.
8. PBANK: Dummy variable set equal to 1 for 1982.