Campbell R. Harvey, Sidhartha Kaul and Chris M. Kirby

THE ABILITY OF THE ITALIAN TERM STRUCTURE TO FORECAST REAL ECONOMIC GROWTH

Interest rates contain expectations of future economic growth. This paper proposes a simple model that extracts GDP forecasts from the interest rate structure in Italy. The financial model uses only one variable – the difference between long term and short term interest rates. This type of forecasting model may be particularly valuable given that the major changes in the European economy render the application of traditional structural models questionable.

1. Introduction

Interest represents the rate at which people are willing to trade money today for money tomorrow. As a result, interest rates provide a window to expectations of future economic growth. Consider a simple example. Suppose the economy is presently in a growth stage and the general consensus is that a slowdown or recession will occur next year. Since investors want to insure their economic well being, most prefer to maintain a reasonably stable level of income rather than have very high income in one stage of the business cycle and very low income in another stage. This desire for a stable income stream drives the demand for insurance or hedging.

The desire to hedge will lead consumers to purchase a financial instrument

---

Campbell R. Harvey is an Associate Professor of Finance at Duke University's Fuqua School of Business and Visiting Associate Professor of Finance at the University of Chicago's Graduate School of Business. Sidhartha Kaul and Chris M. Kirby are pursuing graduate degrees at the Fuqua School of Business.

that will deliver payoffs in the slowdown. A one year discount bond is such an instrument. If many people are buying this bond, the price of the one year security will increase and the yield to maturity will decrease. To finance the purchase of the one year bonds, consumers may sell their shorter term assets. This selling pressure will drive down the price of the short term instrument and, as a result, raise its yield. In this example, where a recession is expected, we will see long-term rates decrease and short-term rates increase causing the term structure (difference between long rates and short rates) to become flat or inverted. This illustrates how the shape of the term structure of interest rates today provides a forecast of future economic growth.

From this simple example, it should be clear that the interest rate based model is very straightforward. It contains only two components. The first component is the slope of the term structure (the long term–short term yield spread). The second component is a measure of the average propensity to hedge in the economy. With this measure (which is estimated in this paper), a hand-calculator and a copy of a financial newspaper can be used to obtain interest rate based forecasts of economic growth. Furthermore, more elaborate (and expensive) forecasts from structural econometric models are unlikely to deliver forecasts that are more accurate than the term structure model.

2. An Interest Rate Based Forecasting Model

The idea that interest rates should contain information about future economic growth can be traced back to the American economist Irving Fisher.[1] In his classic, *The Rate of Interest* (1907), Fisher suggested that some people would like to move income from today to tomorrow. Others desire to give up some income in the future to have additional income today. The interest rate equates the demand and supply for this income shifting process.

---

[1] Fisher (1907) originally developed the framework. Formal developments are provided in Merton (1973), Lucas (1978), and Breeden (1979).

The desire to shift income between today and tomorrow is driven by two factors: investors' expectations about their level of consumption next period and their willingness to hedge their income. A person that has a very high risk tolerance (or equivalently, a low risk aversion) will have very little desire to hedge their consumption. This type of person does not care if he or she is very rich one period and very poor the next period. Of course, if everyone had this high level of risk tolerance, interest rates would contain little or no information about the future path of economic growth.

However, evidence indicates most people are risk averse (low risk tolerance) and insurance is routinely purchased. As a result, interest rates today should contain information about the future path of economic growth. Still, there are some complications which must be addressed. Not every investor has the same level of risk aversion. To obtain a forecast of economic growth from the term structure, it is necessary to identify the economy-wide (average) level of risk tolerance.

Harvey (1988, 1989) implements an interest rate based forecasting model that contains a single equation with only one forecasting variable:

$$\text{Growth}_{t+1:t+5} = a + b(\text{TS})_t + u_{t+5}, \tag{1}$$

where:

Growth = Growth in real (annual) GDP from quarter $t + 1$ to quarter $t + 5$,

TS = Term Structure or difference between long-term and short-term annualized yields to maturity observed at time t,

u = an unanticipated forecasting error which can be used to assess the accuracy of the forecasting model

a and b = estimated (intercept and slope) coefficients.

The coefficients of the model can be easily estimated using linear regression.[2] Obtaining the t-ratios of the coefficients is somewhat more complicated because

---

[2] Harvey (1988) tests a model similar to above using the growth in real personal consumption expenditures. The model relates expected real yield spreads to real consumption growth. However, if inflation follows a first order integrated moving average process, the nominal yield spread equals the expected real yield spread. Further, the intercept contains another variable, the expected real short term rate of interest, which Harvey shows does not contribute to the explanatory power of

the variable to be forecasted is overlapping. This difficulty is overcome by using the technique of Newey and West (1987) to get the correct t-ratios.[3]

The coefficients have the following interpretation. The 'b' coefficient represents the average level of risk tolerance in the economy. Equivalently, '1/b' is the average level of risk aversion in the economy. The coefficient 'a' represents the expected level of economic growth in situations when the long term rates and short term rates are equal.

3. Other Financial Forecasts of Growth

Another financial based indicator of economic growth is the stock market. Many researchers have studied the relationship between stock returns and economic growth.[4] However, in recent years, the stock market has proved to be an unreliable indicator of future growth. One stark example is the false signal generated by the world stock market crash of October 1987. On the basis of this event, many forecasters predicted a recession for 1988. Such a recession never materialized.

There are many reasons why stock market based forecasts of economic growth may be less reliable than interest rate based forecasts. Both stock and bond prices are forward looking. Consider the fundamental valuation equation for a stock:

$$P_t = \sum_{t=1}^{\infty} \frac{d_{t+1}}{(1+k)^t}$$

where:

P_t = Price of the stock at time t

---

the model with one to three quarter forecasting horizons. Finally, the yield spread should be between a bond that has five quarters to maturity and a bond that has one quarter to maturity. Since the yield on a bond with five quarters to maturity is not available for the entire sample, a longer term yield is used.

[3] The Newey and West (1987) t-statistics are also robust to conditional heteroskedasticity in the regression residuals.

[4] Fama (1981) examines the relation between stock returns and growth in GNP and industrial production. Harvey (1988) provides evidence on the relation between stock returns and growth real personal consumption expenditures.

d_{t+1} = Expected dividends on the stock in the future (or equivalently the dividends until the stock is sold plus the capital gain realized on selling the stock)

k = Discount rate used to bring the future dividends to present value. This rate is often assumed to be constant.

If business conditions are expected to deteriorate, expectations of future dividends will probably be revised downward. The reduction in expected dividends will cause a decrease in the stock price. Therefore, a negative return today may reflect expectations of economic growth in the future.

If this is the case, then why has the stock market been an unreliable indicator of economic growth? There are three key distinctions between the interest rate and the stock market models: differing time horizons, fixed versus stochastic cash flows, and different levels of risk.

First, consider the time horizon. The price of the stock is determined by the present value of the dividends for the full life of the firm. While nearby cash flows are heavily weighted, the potential dividends span many business cycles. In contrast, bonds exist in fixed maturities.

The second difference concerns the nature of the cash flows that are being valued. Future dividends are random. It is the expected level of dividends that drives the stock price. The path of dividend payments might reflect may factors – not all of which are linked to economic growth. For discount government bonds, the principal value in the future is known today. Similarly, fixed rate coupon bonds have coupons and future principal that are known today.

Finally, consider the difference in the riskiness of the two securities. The discount rate, k, in the valuation equation reflects both the level of risk aversion in the economy and the relative riskiness of the asset. Holding other things constant, if the riskiness of the asset increases, the discount rate will also increase and the price of the stock will decrease. Changes in the riskiness of the stock through time could cause large swings in the price level that have little to do with expectations of economic growth. For example, less than a 100 basis point increase in the discount rate k could cause a drop in stock prices of the magnitude that we saw in

October 1987. Shifts in risk are less important for the bond market. It is widely accepted that the stocks carry a higher level of risk than government fixed income securities.

These three factors suggest that the stock market may deliver unreliable forecasts of economic growth. Nevertheless, we shall empirically assess the reliability of both interest rate and stock market based forecasts of growth in the Italian economy.

4. Traditional Forecasting Methods

There are many organizations, both private and public, that engage in economic forecasting. Corporations demand economic forecasts as an input into their decision-making process for new investment projects. Governments demand economic forecasts in order to help make decisions about future fiscal and monetary policy.

The traditional forecasting models use "structural" methods. The method is called structural because a simplified economic structure is proposed. Although the models are "simple", they typically involve a large number equations to be estimated and numerous identities that link the equations together.

These structural models have many disadvantages. They are massive, difficult to implement and expensive. The models rely upon a complex set of assumptions about how the economy works. They require the user to input 'forecasts' of many variables before the model is run. Perhaps most importantly, the final forecasts are often low quality.

Errors in the structural forecasts can be blamed on data revisions, incorrectly specified input variables, or a mistake in specifying one (or more) of the numerous estimation equations. The most serious difficulty with using structural models occurs if the structure of the economy changes. If such an event occurs, the model must be altered. This is exactly the situation facing the European economies in the next few years. The fundamental changes in the economy resulting from the

opening of eastern Europe and the increasingly closer linkages between the western European economies renders the application of structural forecasting methods questionable. In contrast, no changes are necessary in the application of the interest rate based models.

Finally, there is mounting international evidence that the structural models do not work as well as interest rate based models for forecasting GDP growth. Using the root mean squared error evaluation criterion, Harvey (1989) demonstrated that none of the seven leading U.S. econometric services were able to outperform the interest rate based forecast. Some of the structural models include hundreds of equations and thousands of variables. This differs sharply from the interest rate model which contains only one variable – the difference between long term and short term rates.

5. The Evidence

Figure 1 provides a view of the relation between the interest rate spread (term structure) and real economic growth. The graph shows annual real GDP growth (observed every quarter) against the lagged value of the term structure spread (difference between the long term goverment bond yield and the call money rate). More precisely, the spread in the first quarter of 1987 is plotted against four quarters of economic growth from the third quarter of 1987 to the second quarter of 1988. In the special situation that the 'a' coefficient is zero and the 'b' coefficient is one, the spread is exactly the forecast of economic growth. In this case, the dotted line would be the forecasted growth and the solid line the realized GNP growth.

Figure 1 illustrates the ability of the spread to move with real GDP growth. The interest rate variables move with the business cycle. The major turning points are picked up by the spread. The spread correctly forecasts the recessions in 1975, 1977 and 1980. Remarkably there appear to be no false signals of recession. However, there does appear to be a decrease in the forecasting ability of the term structure after 1981. This anomaly is examined in detail in a subsequent section

7

of the paper.

The stock market does not appear to have the ability to track economic growth like the interest rates. Figures 2 and 3 plot the annual GDP growth against quarterly and annual stock returns. The stock market appears to be forecasting a recessions in 1975-76, 1979, 1983 and a severe recession in 1989. Only one of these four recession forecasts was realized. The statistical performance of these forecasts are assessed in Table I.

The results in Table I indicate that the interest rate variables have a significant ability to forecast GDP growth after 1971. The coefficients are precisely estimated. The risk tolerance coefficient is almost four standard errors from zero. The percentage of variance in GDP that is explained by the model is over 20%. Table I also indicates that the Italian stock market has little or no ability to forecast economic growth in the 1971–1988 sample.

Forecasting performance is also measured by the mean absolute error and the root mean squared error of the forecasts. For this method of forecast evaluation, only out-of-sample forecasts are used. For example, a forecast of growth for 1982 is based on the coefficients estimated with data through 1981. Table II reports these forecast evaluation statistics.

The three different forecasting frequencies are considered: quarterly, semi-annual and annual. The forecasts for each frequency are annual forecasts, i.e. quarterly is interpreted as four annual forecasts done at each quarter. The mean absolute errors are 1.8% for the forecasts made each quarter, 1.8% for the semi-annual forecasts and 1.7% for the annual forecasts. The root mean squared errors for the three forecast intervals are 2.1%, 2.3% and 2.3% respectively. These forecast evaluation statistics are consistent with the ones found by Harvey (1989) for the U. S. economy.

6. Italian, German and U.S. Economic Growth

Harvey (1989) presented evidence on the relation between the U.S. term structure and U.S. economic growth. In addition, Harvey (1990) offered evidence on the relation between the German term structure and German economic growth. Intuitively, it seems reasonable to posit a relationship between Italian growth and that of its large trading partners, the U.S. and Germany. To explore this possibility, linkages between the U.S., German and Italian economies are examined. Further, the relation between the term structures of the three countries is explored.

Figure 4 provides a plot of real annual GDP growth in Italy (solid line), annual growth in Germany (dashed line) and annual growth the in U.S. (dotted line). From 1971, the economies are closely linked. The correlation between the annual growth rates is 38% for the U.S. and Italy and 64% for Germany and Italy. Two departures from the general association of growth rates are evident. One occurs in the early 1978 when the Italian economy experienced a recession while growth in the U.S. and Germany remained relatively strong. The second occurs in the early 1980's when the U.S. experienced two recessions (1979 and 1981) while Italy and Germany only experienced one. The Italian and German recessions begin in 1980. Although the growth rates of the three countries are highly correlated, there is no indication that the U.S. or German economy leads the Italian economy.

Figure 5 depicts the Italian term structure (solid line) against the U.S. (dotted line) and German (dashed line) term structures. The U.S. and German term structures have many similarities. In contrast, the Italian term structure deviates markedly from those of the other two countries. The difference between the long and short rates is usually less in Italy than in the other two countries. Prior to 1981, this corresponds to the difference in the business-cycles between Italy and the other the two countries After 1981, the Italian term structure seems to be providing little information about the future path of economic growth.

One possible explanation for this effect involves the liquidity of the Italian market. In general, the liquidity of Italian capital markets is much lower than that of the capital markets in the U.S. and Germany. In a market where trading is thin,

9

prices are less likely to accurately reflect true expectations about the path of future economic growth. As a result, the term structure may not track with economic growth. Since Italian economic growth is highly correlated with economic growth in the U.S. and Germany, the term structure in these two countries (where capital markets are extremely liquid) should provide information useful for forecasting Italian growth.

Another explanation for the small amount of information in the Italian term structure in recent years concerns the instrument used in calculating the spread. In contrast to the U.S. and Germany, the short term interest rate in the Italian spread is the call money rate. This rate is usually higher than the Treasury bill rate. Unfortuately, the Italian three month Treasury bill rate is only available from 1974 and there are some missing observations in the series. We re-estimated our forecasting model with an alternative composite series of three, six and twelve month Treasury bills that was available from 1969. While the yield spreads are higher in the post-1981 period, this series failed to show increased forecasting ability.

Table III provides the statistical evidence on the ability of the term structure in the United States and German to forecast Italian economic growth. In the post-1971 sample, the German term structure is able to explain 36% of the variation in Italian economic growth (compared to 21% for the Italian term structure). In the same sample, the U.S. term structure is able to explain 19% of Italian economic growth.

Table IV shows the result of combining all three term structure variables in a single forecasting equation. Over the 1972:2–1989:1 period, the three term structures are able to explain 57% of the variation in Italian GDP growth. This model explains substantially more of the variation in Italian economic growth than the forecasting model reported in Table I (which only included the Italian term structure).

Italy is not the only country where the U.S. term structure helps forecast economic growth. Table VI provides comparison of the explanatory power of the U.S. term structure for other Group of seven (G-7) countries. All models

10

are estimated over the common period 1966:2–1989:1. In this period, the U.S. term structure explains a trivial portion of Italian economic growth. However, as shown earlier, this fraction increases substantially (to 19%) if the more recent data are examined. Perhaps it is not surprising that the U.S. term structure can explain 23.6% of Canadian economic growth considering the high degree of integration of the two economies. However, the U.S. term structure is able to explain 24.6% of the growth in the United Kingdom and 16.5% of the growth in Germany. Interestingly, none of the Japanese economic growth is explained.

The results in Tables III and IV suggest that the differences between the term structures in Italy and the United States may be able explain the differences in their business cycles. This is tested in Table V. The goal is now to forecast the difference between the growth rates in Italian GDP and U.S. GNP. Over the 1972:2–1989:1 period, the differences in the term structures are able to forecast 26% of the differences in the growth rates.

The results in Tables IV-VI suggest that the U.S. term structure may explain the common components of many countries' business cycles. That is, the U.S. term structure may reflect expectations of the world business cycle. Variation in world economic conditions affects Italy as well as other countries. The differences between the Italian term structure and the U.S. term structure may indicate the country-specific components of the business cycle.

7. Conclusions

Today, there is considerable uncertainty about the path of Italian economic growth. One factor causing uncertainty is the ability of Italy to compete in an increasingly integrated Europe with a unified German economy. Traditional structural models are of limited use in this extraordinary situation. However, the interest rate model is well suited for the task.

Uncertainty about future economic growth has many negative implications. Perhaps the most serious consequence concerns the business investment process.

If the path of economic growth is uncertain, it is more likely that businesses will delay investment projects. This could exacerbate the slow growth situation.

An accurate forecasting model may help reduce any uncertainty. Accuracy is measured in many different ways. Traditionally, accuracy is measured by the difference between forecasted values and actual values. The results in this paper show that the term structure forecasts are able to account for a large portion of the actual variation in Italian GDP. Accuracy is also measured by the ability to pick up the turning points in the business cycle. The term structure model has correctly signaled all the economic turning points in the last 20 years. In addition, the term structure model also has the ability to pick up more subtle [non-recessionary] turning points.

Bibliography

Breeden, D. T. (1979), An Intertemporal Asset Pricing Model with Stochastic Consumption and Investment Opportunities, *Journal of Financial Economics* 7, pp. 265–296.

Fama, E. F. (1981), Stock Returns, Real Activity, Inflation, and Money, *American Economic Review* 71, pp. 545–565.

Fisher, I. (1907), *The Rate of Interest*, (New York: Macmillan).

Harvey, C. R. 1988, The Real Term Structure and Consumption Growth, *Journal of Financial Economics* 22, pp. 305–334.

Harvey, C. R. 1989, Forecasts of Economic Growth from the Bond and Stock Markets, *Financial Analysts Journal*, September/October, pp. 38–45.

Harvey, C. R. 1990, Interest Rate Based Forecasts of German Economic Growth, Working paper, Duke University.

Lucas, R. E. Jr. 1978, Asset Prices in an Exchange Economy, *Econometrica* 46, pp. 1429–1445.

Merton, R. C. 1973, An Intertemporal Capital Asset Pricing Model, *Econometrica* 41, pp. 867–887.

Newey, W. K. and West, K. D. 1987, A Simple, Positive Semi-Definite, Heteroskedasticity Consistent and Autocorrelation Consistent Covariance Matrix, *Econometrica* 55, pp. 703–708.
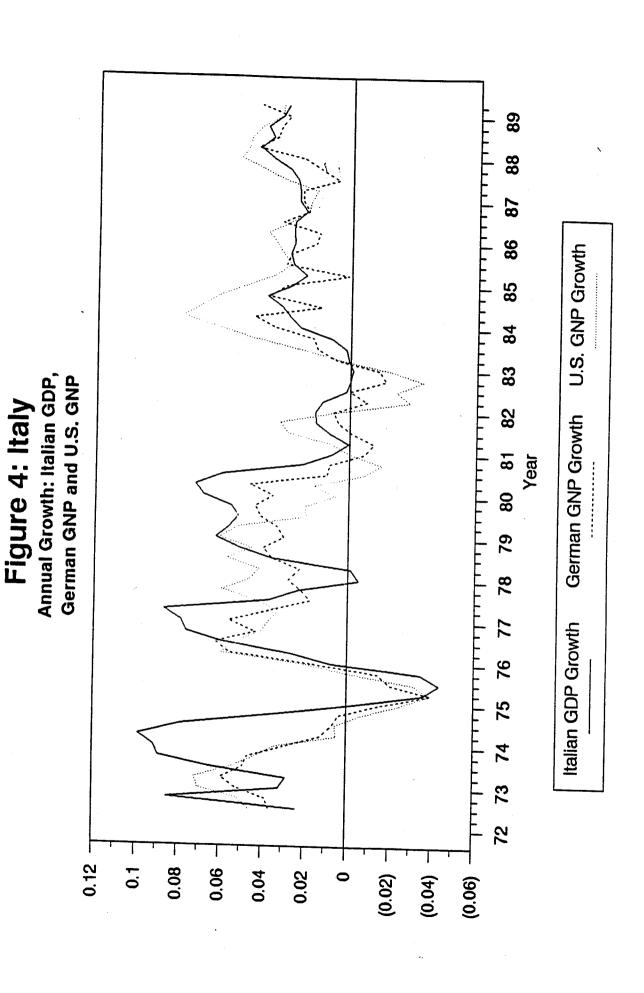
Figure 1: Italy

Annual GDP Growth and Lagged Yield Spread
Quarterly Observations

Year

Yield Spread   GDP Growth
....

Figure 2: Italy
Annual GDP Growth and Lagged Quarterly
Stock Market Return

GDP Growth Quarterly Return

Year

Figure 3: Italy
Annual GDP Growth and Lagged Annual
Stock Market Return

GDP Growth
Annual Return

Figure 4: Italy
Annual Growth: Italian GDP,
German GNP and U.S. GNP

Year

Italian GDP Growth   German GNP Growth   U.S. GNP Growth

Figure 5: Italy
Italian Yield Spread,
German Yield Spread and U.S Yield Spread

Year

Italian Yield Spread   German Yield Spread   U.S. Yield Spread

Figure 6: Italy
Annual GDP Growth and Predicted Growth
Based on the German Yield Spread

Predicted Growth   Actual Growth

Year

Table I Forecasting Italian Real Gross Domestic Product Growth with the Yield Spread and Stock Market Return Models: 1972:2–1989:1*

Model	a	b	$\overline{R}^2$
1972:2–1989:1 (68 observations)			
Term structure	.034 [6.20]	0.665 [3.76]	.206
1 quarter stock return	.032 [5.03]	0.012 [0.50]	.000
4 quarter stock return	.034 [5.20]	-0.014 [-1.37]	.010

*The model estimated is: $\Delta IGDP_{t+1:t+5} = a + bX_t + u_{t+5}$. $\Delta IGDP$ is the annual logarithmic growth in Italian real Gross Domestic Product from quarter $t + 1$ to quarter $t + 5$. X is one of: the logarithm of the ratio of one plus the long-term government bond yield divided by one plus the call-money rate, the one quarter return on the Morgan Stanley Capital International (MSCI) index for Italy, or the four quarter return on MSCI stock index. The quarterly yields are the arithmetic average of the yields over the quarter. The stock return represents the total (continuous) return over the quarter (or the past four quarters). t-ratios are in brackets. The standard errors are corrected for the implied fourth order moving average process and for conditional heteroskedasticity with Newey and West's (1987) method.

‡ ⎨

Table II Out-of-Sample Forecasting Performance* for Italy's Term Structure Model: 1982:1–1988:4

Variable	Frequency of the Forecasts	Mean Absolute Error	Root Mean Squared Error
Forecast Horizon: 1982:1–1989:1			
Term Structure	Quarterly	1.76%	2.14%
Term Structure	Semi-annual	1.82%	2.27%
Term Structure	Annual	1.67%	2.30%

*The model estimtated is: $\Delta IGDP_{t+1:t+5} = a_t + b_t X_t + u_{t+5}$. $\Delta IGDP$ is the annual logarithmic growth in Italy's real Gross Domestic Product. X is one of: the logarithm of the ratio of one plus the (annual) long term yield divided by the (annual) call market rate, the one quarter return on the Morgan Stanley Capital International (MSCI) index calculated in local currency, or the four quarter return on the MSCI stock index. The coefficients, a and b, have time subscripts to denote that the regressions are re-estimated at every point in time series.

Table III Forecasting Italy's Economic Growth with the United States' and German Term Structures*

Term Structure	a	b	$\overline{R}^2$
Estimation period: 1972:2–1989:1			
U.S. Interest Rates	.024 [4.04]	0.925 [3.10]	.192
German Interest Rates	.013 [3.38]	1.16 [5.42]	.357
Estimation period: 1977:2–1989:1			
U.S. Interest Rates	.006 [4.18]	0.186 [2.09]	.082
German Interest Rates	.017 [4.16]	0.720 [2.20]	.226

*The model estimated is: $\Delta IGDP_{t+1:t+5} = a_t + b_t X_t + u_{t+5}$. $\Delta IGDP$ is the annual logarithmic growth in Italian real Gross Domestic Product from quarter $t+1$ to quarter $t+5$, X is either the logarithm of the ratio of one plus the long term government bond yield divided by one plus the short term yield for the United States or Italy. t-ratios are in brackets. The standard errors are corrected for the implied fourth order moving average process and for conditional heteroskedasticity with Newey and West's (1987) method.

Table IV Forecasting Italy's Economic Growth with the U.S., German and Italian Term Structures*

Sample	a	b_1 (Italy)	b_2(U.S.)	b_3(Germany)	$\overline{R}^2$
1972:2–1989:1	.015 [3.97]	0.654 [4.18]	0.400 [2.26]	0.900 [4.52]	.569
1977:2–1989:1	.018 [3.80]	0.477 [2.02]	0.317 [1.87]	0.624 [1.81]	.362

*The model estimated is:$\Delta IGDP_{t+1:t+5} = a + b_1 TS_{1,t} + b_2 TS_{2,t} + b_3 TS_{3,t} + u_{t+5}$. $\Delta IGDP$ is the annual logarithmic growth in Italian real Gross Domestic Product from quarter $t+1$ to quarter $t+5$, TS is the logarithm of the ratio of one plus the long term government bond yield divided by one plus the short term yield for Italy, the United States and Germany. t-ratios are in brackets. The standard errors are corrected for the implied fourth order moving average process and for conditional heteroskedasticity with Newey and West's (1987) method.

Table V Forecasting the difference between Italian and U.S. or German Economic Growth with the with the Difference between the Italian and United States' or German Term Structures:* 1972:2–1989:1

Term Structure	a	b	$\overline{R}^2$
U.S. - Italian	.011 [1.17]	0.637 [4.13]	.261
German - Italian	.014 [0.05]	0.245 [5.04]	.061

*The model estimated is:$\Delta GP_{t+1:t+5} - \Delta IGDP_{t+1:t+5} = a + b(TS_t - ITS_t) + u_{t+5}$. $\Delta IGDP$ is the annual logarithmic economic growth in Italy from quarter $t+1$ to quarter $t+5$, ΔGP is the annual logarithmic economic growth from quarter $t+1$ to quarter $t+5$ for the United States or Germany. TS is the logarithm of the ratio of one plus the long term government bond yield divided by one plus the short term yield for the United States or Germany, ITS is the logarithm of the ratio of one plus the long term government bond yield divided by one plus the short term yield for Italy. t-ratios are in brackets. The standard errors are corrected for the implied fourth order moving average process and for conditional heteroskedasticity with Newey and West's (1987) method.

Table VI Forecasting the G-7 Countries' Annual Growth in Real Gross National Product with the United States' Term Structure*

Country	Sample	a	b	$\overline{R}^2$
France	1966:2–1989:1 (92 obs.)	.030 [6.97]	0.224 [0.96]	.008
Canada	1966:2–1989:1 (92 obs.)	.032 [6.65]	0.882 [2.62]	.235
Germany	1966:2–1989:1 (92 obs.)	.021 [3.98]	0.758 [3.30]	.165
Italy	1966:2–1989:1 (92 obs.)	.035 [5.36]	0.549 [1.46]	.049
Japan	1966:2–1989:1 (92 obs.)	.057 [6.33]	0.012 [0.03]	.000
United Kingdom	1966:2–1989:1 (92 obs.)	.016 [4.67]	0.879 [3.90]	.246
United States	1966:2–1989:1 (92 obs.)	.018 [5.22]	1.351 [6.72]	.482

*The model estimated is: $\Delta GNP_{j,t+1:t+5} = a + bX_t + u_{t+5}$. ΔGNP_j is the annual logarithmic growth in the G-7 country's real Gross National Product from quarter $t + 1$ to quarter $t + 5$ (real Gross Domestic Product is used for France, Italy and the United Kingdom), X is the logarithm of the ratio of one plus the U.S. ten year (annually compounded) yield divided by one plus the U.S. 90 day (annually compounded) Treasury bill rate. t-ratios are in brackets. The standard errors are corrected for the implied fourth order moving average process and for conditional heteroskedasticity with Newey and West's (1987) method.