

ASSESSING ECONOMIC ACTIVITY BY USING TERM SPREADS

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ABSTRACT

Indeed, term spreads have been viewed as a major indicator of economic growth. Both linear and non-linear models have been used in literature to assess the forecasting power of the term spread on output. The main objective of this research work has been to assess the predicting capacity of the variable term spread on economic growth in the context of a developing country, Mauritius in this particular case. An extended production function has been chosen including variables such as Spread, Investment, Human Capital, Openness to Trade, Foreign Direct Investment, and Inflation. After the preliminary tests, the autoregressive distributed lag (ARDL) model has been opted.

Keywords: Term Spread, Economic Growth, Extended Production Function, Developing Countries, ARDL Regression Model

INTRODUCTION

Indeed, term spreads have been viewed as a major indicator of economic growth. Professionals as well as academics agree on the fact that a recession can be detected with an inverted yield curve whereas an upward-sloping yield curve announces an expansion of the economy.

A popular field of study in the recent decades remained on the relationship between term structure of interest rates and economic activity. In fact, the correlation between business cycles and those of interest rates has been observed by Kessel (1965). Some researchers have also based their studies on the potential capacity of term spreads in signalling. These included Estrella and Hardouvelis (1991), Estrella and Mishkin (1998), Bernard and Gerlach (1998), Wright (2006).

Ludvigson and Ng (2009), Joslin, Priebsch and Singleton (2010), Rudebusch and Swanson (2012) found empirical evidence on the impact of bond premia shifts on economic growth. Ang, Piazzesi and Wei (2006), Rudebusch, Sack and Swanson (2007) found that the motivational factor to study the forecasting power of the term spread was mainly influenced by the market participants' forward-looking behaviour who expected reactions from the central bank. In the event on an anticipated recession, the central bank would deliberately decrease the interest rates so as to respond to disinflationary pressures and GDP contractions. Consequently, the short-term rates became higher than the long-term rates creating a negative spread.

Estrella, Rodrigues and Schich (2003), Stock and Watson (2003), Giacomini and Rossi (2006) found evidence that parameter uncertainties and settings have reduced the power with which the term structure forecasted future economic growth, since the mid-1980's. However, they also noticed that after the mid-1960's, the yield curve forecasted every recession apart from one case where a recession had not followed a yield curve inversion. Based on these findings, it could be right to position term spread as an important indicator of economic growth.

In this paper, the main objective is to assess the predicting capacity of the variable term spread on economic growth. Given that term spread is not structurally related to economic growth, investigators especially policy makers have to judiciously assess the movements in the term structure. It is, indeed, very crucial for decision makers to have correct predictions of the future state of the economy.

ESTIMATION

Several studies using different types of data and methodologies had examined the extent to which the term spread forecasted economic growth. Initial reports were more concentrated on the United States Post-World War II. However, more recent studies have assessed the impact of term spread on economic growth from other countries' perspective and over a different time period. The purpose of conducting all these studies demonstrated the desire to understand the relationship between the output growth and term spread and also to determine the reasons as to why and how term spread could forecast economic growth.

The empirical assessment on the forecasting power of the term spread on economic growth was more common using linear estimation models. An example of such model is as shown in the equation below:

$$\Delta G_t = \alpha + \beta Spread + \gamma(Lag)\Delta G_{t-1} + \varepsilon_t$$

Where

ΔG_t = Output growth rate (e.g., real GDP)

$Spread$ = Difference between long-term and short-term Treasury securities' yields

$\gamma(Lag)$ = Lagged polynomial up to four periods (current and three lags, assuming quarterly data)

ε_t = Error term

Evidence 1: Multivariate Linear Methods

Numerous studies empirically examined the forecasting power of the term spread in models that also contained other explanatory/independent factors. Furthermore, several studies also found that the term spread had positive impact on economic growth. A few examples of researchers that supported the term spread as a powerful variable are Estrella and Hardouvelis (1991), Plosser and Rouwenhorst (1994), Estrella and Mishkin (1997), Hamilton and Kim (2002), and Feroli (2004). They found the term spread had positive and significant forecasting power for GDP growth, even when the model included other independent variables such as a measure of monetary policy or short-term interest rate. The resulting outcome proved that the impact of term spread on economic growth could not have been explained solely by monetary policy. However, Stock and Watson (2003) showed that having other variables in the model did not improve the forecasting power of the spread over output growth.

Focusing their study on Germany and the United States, Estrella, Rodrigues, and Schich (2003) main objective remained to look for breakpoints that were unknown in the forecasting relationship that linked output growth to the term spread. Despite finding that in general the relationship between output growth and term spread was significant for both countries one year ahead, a break was identified in September 1983 when using one-year future predicting models for the United States. However, for the United States, no breaks in the longer period forecasting models were found and for Germany also no breaks were detected for both short and long period estimation models.

Using forecast breakdown tests that they developed back in 2006, Giacomini and Rossi (2009) assessed the predicting performance of the term spread on real GDP growth. Giacomini and Rossi (2006) argued that economic growth models could be viewed as a series of predictability. Specifically, forecast breakdowns were found to be empirically significant during the periods 1974 to 1976 and 1979 to 1987, using a one-year forecast horizon. Improved output growth stability and the use of other macroeconomic variables has been described as the main reasons to explain as to why the term spread had a the less powerful impact on output growth since the mid-1980s.

Evidence 2: Non Linear Methods

Based on existing literature, most researchers have studied the forecasting power of the term spread on output growth using linear models. However, the term spread's capacity and power to forecast real GDP growth has varied over time in such a way that even non-linear models have been put forward as an

alternate solution. Studies have already made use of non-linear models and data on Canada and United States. Furthermore, non-linear models are being more extensively used by researchers. For instance, Galbraith and Tkacz (2000) empirically found the presence of a threshold effect between output growth and term spread for Canada and the United States which was, however, not noticed in the other major developed countries. Precisely, Galbraith and Tkacz (2000) found that the term spread had a strong and statistically significant impact on conditional expectations of output growth. However, it was noted that the forecasting impact a rise in term spread had on output growth was reduced when the term spread increased above a certain limit.

Neural network models were adopted by Shaaf (2000) and Tkacz (2001) to cater for non-linearity in the output growth and term spread relationship. It was found by both researchers that this type of non-linear model generated forecast errors that were smaller as compared to linear models. Venetis, Paya, and Peel (2003) used transition models classified as non-linear that could cater for both parameters that are time-varying as well as having non-linear behaviours, to estimate the term spread's forecasting power on output growth and also checked whether the relationship between economic growth and term spread was a stable one. Focusing their studies on Canada, United Kingdom and the United States, Venetis, Paya, and Peel (2003) observed that the relationship between output growth and term spread was more robust when a certain positive threshold level was not exceeded by the past values of the term spread. Duarte, Venetis, and Paya (2005) applied both non-linear as well as linear regression models to assess the forecasting power of the term spread on output growth for countries situated in the Euro area. The researchers argued that both the non-linear and linear forecasting models produced positive results over a period of four quarters and they further added that the variables term spread turned out to be strong indicator of future recessions and economic growth in the Euro zone. However, the authors found signs of instability in the linear models whereas there was significant evidence of non-linearities as regards to lagged output growth and time. Furthermore, it was seen that the non-linear forecasting model adopted by the researchers performed better than the linear model for predictions of output growth one-year in the future.

METHODOLOGY

Solow (1956) had introduced the neoclassical growth model which remained as the pioneer in the classical economic growth theories. The model had been made on basic assumptions such as; reducing marginal capital productivity, technical advancements, sustained returns to scale, and inter-changeability between labour and capital. With the neoclassical model the ratio of investment or savings was seen as major factors of economic growth in the short-term whereas technological progress, although being a key factor in the long-run, was regarded as unrelated and in isolation with respect to other economic determinants and as such remained under explored in the model.

More recent works, especially those agreeing on constant and increasing returns to capital, have reviewed the contribution of technology in the economic model, since the latter has been portrayed as a key factor in the long-run economic growth. These economic growth theories, endogenous in nature, claimed the addition of any new variable, for instance innovation and knowledge, would entail having an economic growth that is self-maintained. Based on pivotal studies carried out by Romer (1986) and Lucas (1988), three important sources of growth had been identified: public infrastructure (Barro, 1990), new knowledge (Romer, 1990, Grossman and Helpman, 1991), innovation (Aghion and Howitt, 1992). Consequently, the role of policies in ensuring long-term economic growth became an extremely important and vital one.

The extended production function used in this paper for regression purposes is as follows:

$$GDP_t = a_o + a_1 Spread_t + a_2 INV_t + a_3 HC_t + a_4 OPEN_t + a_5 FDI_t + a_6 INF_t + \varepsilon_t$$

Where

GDP_t = Economic growth at time t

Spread_t = Spread between the 3-months and 1-year T Bills rates

INV_t = Investment rate at time *t*

HC_t = Human Capital at time *t*

OPEN_t = Openness at time *t*

FDI_t = Foreign Direct Investment at time *t*

INF_t = Inflation at time *t*

α_0 = Intercept

α_{1-6} = Slope Coefficients

ε = Error Term

CONCLUSIONS

There has been an increasing interest in assessing whether the spread between long-term and short-term Treasury Bills has an impact on economic growth. However, studies have been made mainly on developed markets. To bridge that gap, this study has adapted that literature in the context of a developing country, namely Mauritius. The variable spread has been added in an extended production function and the results have been quite reassuring. First of all, for Mauritius the production function did not have any long-run relationship. This was an expected result as Mauritius is a country which has been and is still largely dependent on external factors. For instance, any impact in exchange rates would have a huge effect on the economy. The country's vision and objectives remain primarily focused for the short to medium term. Any fluctuation in the international market will likely have an impact on the domestic economic activity. As regards to the variable spread, it can be concluded that it can be used to depict economic growth for Mauritius.

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