ECONOMIC ACTIVITY FORECAST IN EMERGING MARKETS

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Abstract

This paper uses a forecasting model for real economic activity for a group of emerging economies (Brazil, India, Mexico and Russia) based on the information contained in their capital markets. We forecast the industrial production in emerging markets throughout different time horizons using information contained in stock and fixed-income markets. Our results suggest that fixed-income and stock markets do not reveal information regarding future economic growth in Brazil, Mexico and Russia. In the case of India, the yield spread explain part of the variation of the economic activity, but the stock market does not have predictive power.

Keywords: Economic Growth, Emerging Markets, Forecast

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1 Introduction

The process of decision-making made by the various economic agents is based upon the understanding of the current and future state of economic activity. When a new series about the production of a country is disclosed, the agents update their analyzes of economic developments and redo their forecasts, which impact their decisions on short and long term. Despite advances regarding dissemination of official statistics, quarterly national accounts data from different countries are published with a delay ranging from 30 days to 90 days after the end of the quarter. However, a huge amount of information about the financial-economic evolution becomes available to economic agents. This timely information feeds expectations and the behavior of the private sector and, consequently, is reflected in asset prices. Expectations of economic agents at the aggregate level, contained in the pricing of financial assets in efficient capital markets, can be used to obtain a more immediate picture of the evolution of future real economic activity.

Several authors have documented that the yield spread, the difference between the yields of long and short term, contains relevant information about future real activity. Harvey (1989) offers a robust theoretical framework for using the yield spread in economic growth forecasting. He argues that the forecasts of real activity based on the yield curve are superior when compared to predictions based on other financial variables.

Several researchers have built predictive models to capture the movements of business cycles in several developed nations (Camba-Mendez, Kapetanios, Smith and Weale, 2001, Hamilton and Kim, 2002, and Runstler Sedillot, 2003). Chen, Wang and Yen (2005) perform a similar analysis for Asian nations.

This work applied a forecasting model to predict real economic activity in Brazil, Mexico, India, and Russia using information contained in stock and fixed-income markets. Our estimation models follow the assumptions made by Hamilton and Kim (2002), Chen, Wang and Yen (2005) and Harvey (1989). The predictive power of the yield spread and the returns of the equity markets is analyzed taking into account additional information such as monetary policy (Anderson and Vahid, 2001) and oil prices (Hamilton and Kim, 2002).

Our results suggest that fixed-income and stock markets do not reveal information regarding future economic growth in Brazil, Mexico and Russia. In the case of India, the yield spread explain part of the variation of the economic activity, but the stock market does not have predictive power..

The paper is divided into four sections. Section 2 presents the literature review and the models of real economic growth. Section 3 shows the data and methodology used in the study. Section 4 reports the results of the prediction models, whereas Section 5 discusses the main conclusions.

2 Literature review

The theory of asset pricing suggests that the yield curve contain information about expectations of economic growth. This link between the market for financial assets and real economic growth was first formalized by Fisher (1907). If there is consensus about the possibility of economic downturn, investors should buy long-term bonds and sell short-term securities. As a result, prices of short-term bonds decrease, prices of long-term bonds increase, and the yield curve becomes flatter. Consequently, the theory suggests that changes in the term structure of interest rates, measured through the yield spread between long

and short term bonds, provide information about future economic growth.

In particular, one would expect that inversions in the yield curve corresponded to periods of economic recession. Kessel (1965) shows that the term structure moves with the business cycle, and shows that the difference between long and short term yields is lower immediately after a recession. This difference increases before and during the recovery period. Fama (1986) argues that there should be an upward sloping yield curve during favorable seasons and an inverted slope yield curve during recessions.

The asset pricing models based on consumption suggests that cyclical changes in personal consumption are also evident in the cyclical movements of expected asset returns. The theory suggests that real rates of return on assets contain information about expectations of future economic growth.

The fundamentals of asset pricing models based on consumption of Rubinstein (1976), Breeden and Litzenberger (1978), Lucas (1978) and Breeden (1979) have its origin in Fisher (1907). The underlying idea is that investors get a greater benefit from a certain amount of money during a recession (when consumption levels are low) than the same amount during the peak of the business cycle (when consumption is high).

The hypothesis that the yield curve signals the possibility of a recession has been studied since the late 80s in the United States (Harvey, 1989, Mishkin, 1990a, 1990b, Estrella and Hardouvelis, 1991). The economic explanation is that the slope of the yield curve is an indicator of monetary policy. The reduction in the money supply results in higher short-term interest rates when compared to long-term rates, and high short-term rates contribute to a slowdown in economic growth (Bernanke and Blinder 1992). Further, low long-term yields may also reflect lower real incomes based on expectations of a slowdown in growth (Arnwine, 2004), which leads to an inversion of the yield curve.

Besides the United States, evidence on the ability of the yield curve to predict economic growth is limited to a small number of developed nations (Plosser and Rouwenhorst, 1994, Bonser-Neal and Morley, 1997, Kozicki, 1997, Estrella and Mishkin, 1997, Estrella, Rodrigues, and Schich, 2003). In general, the results confirm that the slope of the yield curve has predictive power for the growth of the countries.

The number of studies analyzing the power of the yield curve as a predictor of economic growth is scarce in emerging markets. Chen, Wang and Yen (2005) analyze the effect of the yield curve on future economic activity in developing Asian nations, and find no significant results. The evidence for other emerging economies such as Brazil, Mexico, India or Russia, is almost nonexistent since the fixed income markets in these nations have matured only recently.

Besides the yield curve, the stock market has also important information about the real economic activity. Several empirical studies demonstrate co-movements of stock returns and real GDP in the United States (Fama, 1981, Kaul, 1987). To the extent that corporate profits are positively correlated with economic growth, stock prices provide relevant information on the expectations of future economic activity.

Variations in stock prices reflect both changes in expectations of economic growth and changes in the risk perception of the future cash flows of the companies. Changes on the perceived risk of the cash flows of the companies can also affect stock prices. Although most investors believe that the stock market serves as an important indicator, its accuracy and reliability are constantly questioned.

3 Data and methodology

This study predicts industrial production growth in four emerging countries: Brazil, Russia, India and Mexico. We use monthly data of industrial production, interest rate (short, medium and long-term), money supply, oil prices and stock market returns. All data come from the database of IFS (International Financial Statistics). We analyze the following periods: 2000 to 2011 (Brazil and Mexico), 1996 to 2011 (India), and 1999 to 2010 (Russia).

Our methodology is based on Estrella and Hardouvelis (1991), Estrella and Mishkin (1997), Dotsey (1998), Hamilton and Kim (2002), and Chen, Wang and Yen (2005). In order to examine the predictive power of yield spread and stock market, we run regression models of future industrial production growth in the following 1, 6, 12 and 24 months. The estimated model is reported below:

$$IPGRO_t = \beta_0 + \beta_1 IPGRO_{t-1} + \beta_2 YLDSPR_t + \beta_3 MARKET_t + \beta_4 \Delta M_t + \beta_5 \Delta OIL_t + \mu_t \quad (1)$$

$IPGRO_t$ is the annual growth rate of industrial production for the month t, $YLDSPR_t$ is the difference between long and short-term rates in month t, $MARKET_t$ is the return of the stock market index in month t compared to the previous month, ΔM_t is the 12-month growth of the monetary base M1 in month t, and ΔOIL_t is the 12-month growth of the oil price in month t.

Following the assumptions of Plosser and Rouwenhorst (1994), industrial production is used to represent the economic activity. The slope of the yield curve is the difference between long term (5-10 years) and short-term government bonds (90 days). The following stock market indices are used: Ibovespa (Brazil), BSE-SENSEX 30 (India), IPC (Mexico), and MICEX (Russia). Similar to the studies of Hamilton and Kim (2002), we use three additional variables to predict future activity: lagged industrial production, monetary base change, and oil price change.

4 Results

Table 1 shows the results of the regression models to check the predictive power of in Brazil. The results indicate that the yield spread and the stock market are not statistically significant in almost all models. The stock market is significant only in one model (12-month ahead). The lagged industrial production growth is positive and statistically significant at 1%. Therefore, we can conclude that yield spread and the stock market do not predict future economic activity in Brazil.

Table 1. Industrial production growth model in Brazil

Regression models where the dependent variable is the growth rate of industrial production in Brazil from 2000 to 2011. The p-value are reported in parentheses. The definition of each variable can be found in Section 3. ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

Variables	1-Month	6-Month	12-Month	24-Month
Constant	-0.86	0.25	0.87***	0.68***
	(0.72)	(0.67)	(0.01)	(0.00)
YLDSPR	0.00	0.00	0.00	0.00
	(0.40)	(0.32)	(0.92)	(0.57)
MARKET	0.69**	0.04	0.04	-0.01
	(0.03)	(0.63)	(0.94)	(0.57)
$IPGRO_{t-1}$	0.02	0.72***	0.83***	0.83***
	(0.84)	(0.00)	(0.00)	(0.00)
ΔM	0.08	0.11	-0.06	-0.06**
	(0.84)	(0.23)	(0.19)	(0.05)
ΔOIL	-0.15*	-0.08***	-0.01	0.01
	(0.10)	(0.00)	(0.66)	(0.34)
R^2 adj	0.07	0.74	0.82	0.80

Table 2 shows the results of the regression models to check the predictive power of in India. The results indicate that the yield spread is significant in two models (12-month and 24-month ahead), whereas the stock market is significant in one model (12-month ahead). The lagged industrial production growth is positive and statistically significant at 1%. Therefore, we can conclude that yield spread explain part of the variation of economic activity in India.

Table 2. Industrial production growth model in India

Regression models where the dependent variable is the growth rate of industrial production in India from 1996 to 2011. The p-value are reported in parentheses. The definition of each variable can be found in Section 3. ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

Variables	1-Month	6-Month	12-Month	24-Month
Constant	2.37	-1.31	-0.80	0.55
	(0.85)	(0.65)	(0.28)	(0.15)
YLDSPR	0.71	0.64	0.59***	0.21*
	(0.81)	(0.35)	(0.00)	(0.06)
MARKET	0.59	0.00	0.10***	-0.03
	(0.37)	(0.99)	(0.01)	(0.19)
$IPGRO_{t-1}$	0.52***	0.48***	0.00	0.66***
	(0.00)	(0.00)	(0.28)	(0.00)
ΔM	0.46	0.46	0.74***	0.11
	(0.82)	(0.34)	(0.00)	(0.12)
ΔOIL	-0.06	-0.03	-0.05**	0.00
	(0.69)	(0.38)	(0.00)	(0.41)
R^2 adj	0.23	0.23	0.45	0.60

Table 3 shows the results of the regression models to check the predictive power in Mexico. The results indicate that the yield spread and stock market are significant in only one model (1-month and 24-month ahead, respectively). The lagged industrial production growth is significant only 1-month ahead.

Therefore, we can conclude that yield spread and the stock market do not explain future economic activity in Mexico.

Table 3. Industrial production growth model in Mexico

Regression models where the dependent variable is the growth rate of industrial production in Mexico from 2000 to 2011. The p-value are reported in parentheses. The definition of each variable can be found in Section 3. ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

Variables	1-Month	6-Month	12-Month	24-Month
Constant	2.34	-5.78	-1.97	-0.19
	(0.94)	(0.29)	(0.49)	(0.89)
YLDSPR	-22.67*	-0.15	-0.28	0.76
	(0.10)	(0.95)	(0.82)	(0.26)
MARKET	1.22	-0.32	0.12	-0.37**
	(0.76)	(0.64)	(0.74)	(0.04)
$IPGRO_{t-1}$	-1.03***	-0.03	-0.02	-0.11
	(0.00)	(0.77)	(0.82)	(0.24)
ΔM	-3.29	0.69	0.39	-0.13
	(0.58)	(0.50)	(0.45)	(0.63)
ΔOIL	-0.85	-0.08	-0.10	0.05
	(0.28)	(0.54)	(0.14)	(0.15)
R^2 adj	0.49	0.00	0.00	0.06

Table 4 shows the results of the regression models to check the predictive power in Russia. The results indicate that the yield spread and stock market are not statistically significant The lagged industrial production growth is significant only 1-month ahead. Therefore, we can conclude that yield spread and the stock market do not explain future economic activity in Russia.

Table 4. Industrial production growth model in Russia

Regression models where the dependent variable is the growth rate of industrial production in Russia from 1999 to 2010. The p-value are reported in parentheses. The definition of each variable can be found in Section 3. ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

Variables	1-Month	6-Month	12-Month	24-Month
Constant	-0.22	-2.74	-4.20**	-1.30
	(0.99)	(0.49)	(0.04)	(0.58)
YLDSPR	0.06	0.06	0.00	-0.01
	(0.93)	(0.57)	(0.95)	(0.81)
MARKET	0.30	0.03	0.08	0.18
	(0.91)	(0.93)	(0.66)	(0.11)
$IPGRO_{t-1}$	-0.49***	-0.02	-0.02	0.04
	(0.00)	(0.78)	(0.81)	(0.67)
ΔM	0.19	0.30	0.43***	0.16
	(0.93)	(0.34)	(0.01)	(0.33)
ΔOIL	0.14	-0.27**	-0.05	-0.05
	(0.89)	(0.05)	(0.44)	(0.24)
R^2 adj	0.21	0.00	0.03	0.06

5 Conclusion

This study analyzes the forecasts of industrial production growth in four emerging countries: Brazil, Russia, India and Mexico. We use monthly data of industrial production, interest rate (short, medium and long-term), money supply, oil prices and stock market returns, and estimate regression models of future industrial production growth in the following 1, 6, 12 and 24 months.

Our results suggest that fixed-income and stock markets do not reveal information regarding future economic growth in Brazil, Mexico and Russia. In the case of India, the yield spread explain part of the variation of the economic activity, but the stock market does not have predictive power.

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