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Article

Lead-lag patterns in the Spanish and other European equity markets

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ABSTRACT

The predictability of market performance is a matter of interest not only for traders and investors in financial market instruments but also for those attempting to understand the dynamics of these markets. According to the efficient market hypothesis, the price of an asset is a perfect reflection of all the information available, and consequently, it is not possible to capitalize on "undervalued or overvalued" asset; thus making market price prediction practically impossible. However, there are several groups of reasons (for example, transaction costs) that have led some economists to believe that prices are at least partially predictable. In this context, this study tries to evaluate the gradual information diffusion theory proposed by Hong et al. (2007) where industries with valuable, fundamental economic information tend lead the equity market as well as the economic activity. This hypothesis is not supported in the case of Spain, where company characteristics, and especially size, may be more relevant in understanding lead-lag patterns.

1. Introduction

Predictability of market performance is a matter of interest not only for traders and investors in financial market instruments but also for institutions, such as securities regulators, in their attempt to understand the dynamics of these markets. The efficient market hypothesis states that market prediction is not possible because the price of an asset is the perfect reflection of all the information available, and consequently, it is not possible to capitalize on an "undervalued or overvalued" asset. However, there are several groups of reasons (for example, transaction costs or the existence of information that is not freely available) that have led some economists to believe that prices are partially predictable. In fact, during the nineties, papers related to the identification of lead-lag patterns in the equity markets abounded.

Some of these studies, based on behavioural finance, state that the information diffusion process is relevant in the predictability of stock prices. The rate of reaction to news plays an important role in the lead-lag effect. Other papers deal with "stock market overreaction" and explain lead-lag patterns in terms of the existence of an excess of optimism or pessimism. Company characteristics and other financial variables have often been presented as good explanations of lead-lag patterns. In particular, the company size plays an important role. More recently, the study of Hong et al. (2007) proposed another gradual information diffusion theory, where industries with valuable fundamental economic information tend to lead the equity market as well as the economic activity. This is the hypothesis we have tested for Spanish equity markets and other European markets.

According to our results, Spanish industries that are leaders in the stock market are not necessarily leaders in economic activity. As a consequence, the gradual information diffusion theory does not hold up for Spanish data. In general, Spanish industries in a leading market position are characterized by the presence of big companies (oil, telecom, utilities, retail), thus suggesting that company characteristics may play a significant role in the estimated lead-lag patterns. The results obtained in other European countries reveal similar conclusions, highlighting the fact that differences in characteristics of companies listed in European stock markets with respect to those listed in US markets may explain these findings.

The remainder of the paper is structured as follows: Section 2 summarizes the background and academic literature regarding the potential existence of lead-lags patterns in equity markets. Section 3 describes the data regarding equity markets (broad market index and industry indexes) and macroeconomic variables. Section 4 presents the evidence related to the presence of these lead-lag

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patterns in the Spanish equity market and provides potential explanations. Section 5 performs a similar analysis for other European markets. Finally, Section 6 lays out the main conclusions.

2. Theoretical background and data

Predicting asset returns and, consequently, identifying lead-lag patterns in financial markets are topics that have been addressed by academics from very different perspectives. In general, daily stock-price changes are determined by the interplay of the company's internal factors (fundamentals), external factors (macroeconomic trends, financial market indicators, information, . . .) and expectations that may have a direct or indirect effect on the price. The most concerning and controversial question is whether a stock return (industry or market) is predictable, based on a set of variables. There are many theories that have been tested in a variety of studies on investors' ability to predict the price of an asset. No clear consensus has yet been reached on this topic according to the results of these studies.

This section presents the most important theories and evidence on the predictability of stock market prices. Our starting point must be the efficient market hypothesis, which states that the price of an asset is the perfect reflection of all the information available. Under this hypothesis, it would not be possible to capitalize on an "undervalued or overvalued" price. The efficient market hypothesis, widely accepted some years ago thanks to the famous article of Fama (1970), is usually akin with the idea of the "random walk process". Under this process, price series are characterized in a way in which next price changes represent random departures from previous prices.

Given that the assumptions under the efficient market hypothesis may be too strong, three degrees of efficiency have been stated (strong, semi-strong and weak efficiency). Strong efficiency is the purest form of efficiency: all information in a market, public or private, is accounted for in a stock price. Not even insider information could give an investor a leading edge. Semi-strong efficiency implies that all public information is factored into a stock's current share price. Neither fundamental nor technical analysis can be used to attain superior gains. Finally, the weak efficiency hypothesis claims that all past prices of a stock are reflected in today's stock price.

The existence of transaction costs, information that is not freely available to all investors, and discrepancies among investors were often cited as sources of inefficiencies in the markets, and some economists and econometricians started to believe that prices could be at least partially predictable. During the nineties, a significant number of studies proliferated in order to understand the black box under the potential predictability of the stock market prices.

There is a group of papers on behavioural finance in which the information diffusion process is relevant in the case of stock price predictability. According to Lo and MacKinlay (1990), Brennan et al. (1993) and Badrinath et al. (1995), the rate of reaction to information plays a prominent role in the lead-lag effect. In some studies, the possibility of some investors underreacting to information may cause serial correlation across stock prices and consequently predictability.

Another group of papers on behavioural finance are related to "stock market overreaction" (see, for example, DeBondt and Thaler, 1985; DeLong et al., 1989). Under these theories, there is a tendency for stock-market prices to "overreact" due to an excess of optimism or pessimism that may trigger prices to deviate systematically from their fundamentals values. After a period of time, these prices exhibit a reversion to the mean. In these cases, the predictability of the asset price is due mainly to the negative serial autocorrelation of stock prices.

Some studies have attempted to explain stock price predictability based on some financial parameters (dividend yield, interest rates. . .) and company characteristics. Company size, the level of analyst coverage or trading volumes have been the most commonly examined characteristics in these studies. Regarding size, Hou (2007) found that company size (in function of the market capitalization) may be a key factor, since big company prices tend to lead small company prices within the industry. Lo and MacKinlay (1990) also proved that company size plays an important role, since the lead-lag patterns relies on it, as big companies lead small ones. Several reasons have been argued with regards to small companies exhibiting this delay: differences in liquidity (or trading volumes), differences in analyst coverage or in institutional ownership (Badrinath et al., 1995; Menzly and Ozbas, 2010).

The relevance of differences in trading volumes (measured as the turnover of 16 portfolios) was highlighted in Chordia and Swaminathan (2000). They demonstrate that high trading volume portfolios lead low trading volume portfolios, as a consequence of the ability of the high trading volume portfolio to adjust faster to information. The role of the analyst coverage was shown by Brennan et al. (1993).

Hong et al. (2007) addressed the matter of the information diffusion theory differently. They focused on predicting the aggregate stock market return based on individual industry returns and propose a gradual information diffusion model where only industries with information about market fundamentals can lead the market. If these industries exhibit information on market fundamentals, they should also lead the economic activity. The authors, who performed this exercise for the US stock market using data from 34 industries, found a strong correlation between an industry's ability to predict the stock market and economic activity. However, Tse (2015), who re-examined these results using extended data (48 industries) and the period of time, found substantially fewer industries with the ability to predict the stock market.

In this paper, we apply the methodology of Hong et al. (2007) for the case of Spain as well as for some of the other European countries (core and peripheral countries). In general, we find some evidence of predictability of stock market returns, although industries that lead the market do not generally lead economic activity. We argue that, in future work, lead-lag patterns in Spain, and possibly in other European countries, should be explored in terms of the characteristics of the companies. Examination of causality relationships between the stock market and industries may also be interesting.

Our data comes from a single commercial database: Thomson Datastream. In the case of equity market variables, we used monthly data on the benchmark broad market equity index and industry sector indexes according to Datastream classification. This fact introduces a higher level of comparability among results from different countries, although it is important to mention that there is some heterogeneity in the availability of data at the industry level. Fig. 1 shows the industry classification provided by Thomson Datastream with the maximum degree of granularity. In general, we have data on most of the industries for the core European countries, but we have a smaller number of industries for the rest of the countries (see Table A3). We required data starting in 1999. For Spain, we have information on 24 industries (orange-shaded blocks in Fig. 1), which compares well with other European countries.

Other financial variables used in our predictive regressions include: three-month interest rates (Treasury bills or interbank market), dividend yield, equity market volatility, default spread,

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