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Does PIN measure information? Informed trading effects on returns and liquidity in six emerging markets

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ABSTRACT

Market microstructure models imply that informed trading reduces liquidity and moves prices in the direction of the information. We test this implication using the dynamic PIN model (Easley, Engle, O'Hara and Wu 2008) as a time-varying measure of informed trading in the six largest Latin America stock markets. Under alternative specifications and robustness tests, the results suggest that signed dynamic PIN is related to returns, as a proxy for information asymmetry rather than just liquidity effects. These results contribute to the ongoing discussion on whether PIN is a valid informed trading measure, and to a better understanding of price formation in emerging markets.

1. Introduction

Classical microstructure models imply that information asymmetry affects prices and liquidity on financial markets (Kyle, 1985; Glosten & Milgrom, 1985; Easley and O'Hara, 1992). These models argue that informed traders improve market efficiency by exploiting their informational advantage and thus contribute to a more rapid adjustment of prices towards fundamental values. In turn, the liquidity provider faces adverse selection by having to trade with unidentified informed traders hidden among many uninformed traders. The higher the probability of informed trading, the larger the transaction costs and the lower the liquidity. All in all, information asymmetry allows informed traders to earn extra returns at the expense of uninformed traders. Informed trading, in turn, should cause prices to better reflect fundamentals and force liquidity providers to increase trading costs.

Empirical studies of information asymmetry in financial markets hinge critically on a valid measure of informed trading. Easley, Kiefer, O'Hara, and Paperman (1996), and Easley, Kiefer, and O'Hara (1997) present the probability of informed trading (PIN) as a reliable proxy of information asymmetry, based on the assumption that informed traders cause an important part of the observed order imbalance. Using the data on directional individual trades, the PIN model estimates the probabilities of informed and uninformed trading using as inputs the total number of trades and the order imbalance.[2] Those early PIN models yield what we

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[2] Theoretical support for the PIN model can be found in Copeland and Galai (1983), Kyle (1985) and Glosten and Milgrom (1985).

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call a "static PIN", since they assume constant arrival rates of informed and uninformed trades and typically are estimated in a stock-quarter basis. A numerous literature has used alternative varieties of the static PIN as a measure of information asymmetry, for example Easley, Hvidkjaer, and O'Hara (2002), Chung, Li, and McInish (2005), Vega (2006), and more recently, Chung, Elder, and Kim (2010), Chen and Zhao (2012), Lin, Lee, and Wang (2013), Sankaraguruswamy, Shen, and Yamada (2013) and Chang and Lin (2015). By construction the "static" PIN is limited to measure cross-sectional variation of informed trading, rather than time-series effects. As an alternative, Easley, Engle, O'Hara, and Wu (2008) (henceforth EEOW) propose a dynamic model allowing for time-varying arrival of informed and uninformed trades. The authors present evidence of a direct relationship between dynamic PIN and liquidity for a sample of 16 US stocks.

This paper presents evidence that informed trading, estimated by the dynamic PIN, causes prices to move on the direction of the information and simultaneously reduces liquidity, as predicted by the market microstructure literature. To estimate informed trading we use the dynamic PIN model of EEOW (2008) which, to the extent of our knowledge, has only been run on the options markets (Engle & Neri, 2010). Specifically, we test whether the dynamic PIN is related to liquidity and returns on the six largest Latin American stock markets as predicted by the theory. We know of no previous test on the ability of the dynamic PIN measure to predict liquidity and returns in a wide sample of stocks.

The contribution of this paper to the literature is twofold. First, by focusing on six emerging markets instead of the US, this study provides an out-of-sample test of the theoretical relation between informed trading and liquidity and returns. Whereas abundant evidence have been provided in US markets on the relation between information and liquidity (e.g. Chung et al., 2005; Lei & Wu, 2005), not much has been provided on the times series effect of informed trading on realized returns. Second, this paper contributes to the ongoing debate on whether the family of PIN models renders a valid measure of information asymmetry. Some evidence has cast doubt on the validity of PIN. Using the Static PIN model on T-Bills, Akay, Cyree, Griffiths, and Winters (2012) argue that PIN measures trading clusters rather than information. Aktas, de Bodt, Declerck, and Van Oppens (2007) report that static PIN is unable to detect information leaking around M&A announcements. However, those results could be explained by the inability of Static PIN to detect short-term variations in informed trading. In turn, Duarte and Young (2009) and Lai, Ng, and Zhang (2014), studying samples on US and on 47 international markets respectively, fail to find a relation between the static PIN and the cross-section distribution of returns. However, the absence of a cross sectional relationship between PIN and returns doesn't invalid PIN as an information measure. The effect of idiosyncratic information on prices is expected to be diversified away and thus should not be a priced risk factor.

Our results are supportive of the PIN as a valid informed trading measure, based on two critical differences with previous research. First, we use the dynamic PIN model, which, unlike the Static PIN, is able to detect changes on information asymmetry over time. Second, we provide evidence that dynamic PIN has a permanent effect on prices at daily frequency, only slightly reversed at the next day, which cannot be explained if PIN is just detecting liquidity effects not related to information. This permanent effect of the dynamic PIN on prices is robust under several alternative specifications that take care of three confounding effects: differential effects of PIN on returns on individual stocks, the endogeneity between daily returns and informed trading, and the bid-ask bounce effects on daily returns.

The group of six Latin American emerging markets is an interesting and barely explored object for market microstructure, for their wide variety of size, liquidity and stages of development. The liberalization of Latin American emerging markets in the late 80's and early 90's, as well as their impressive performance in the 2000's, has heralded their increasing role in the world financial system. However, concerns remain about their liquidity, institutional design, governance and efficiency (Kearney, 2012).

Market microstructure studies have been mostly conducted in individual exchanges of US and other G7 countries, without much comparison between international markets. A direct precedent of the current study is Cruces and Kawamura (2005) who estimate the static PIN for seven Latin-American stock markets, finding a cross-sectional relationship between the quality of corporate governance and the average PIN across countries. Moreover, two recent studies have used PIN as a proxy of informed trading in Brazil (Barbedo, Camilo, Pereira, & Leal, 2010; Martins, Paulo, & Albuquerque, 2013). Additionally, Villarraga, Giraldo, and Agudelo (2012) study the distribution of dynamic PIN in the same sample of six emerging markets, focusing on the relation with trading activity, size and day-of-the-week. Two other precedents are Lesmond (2005) who conducts a comprehensive study of liquidity in 31 emerging markets, in quarterly frequency and Bekaert, Harvey, and Lundblad (2007), who test whether liquidity is a priced factor in a set of 19 emerging markets, both studies using liquidity proxies.

The rest of this paper is organized as follows: Section 2 provides the background for the dynamic PIN model and the theoretical relationship between information asymmetry and asset liquidity and returns. Section 3 describes the methodology, providing details on the estimation of the dynamic PIN model and the econometric approach. Section 4 presents and discusses the results found for the six Latin-American stock markets. Finally, Section 5 concludes.

2. Background

2.1. Estimating the dynamic probability of informed trading

The static PIN model describes the arrival of informed and uninformed traders to a market, where a designated market maker provides liquidity (Easley et al., 2002; Easley, Kiefer, O'Hara and Paperman, 1996; Easley et al., 1997; Easley & O'Hara, 1992). Several studies have extended this framework by allowing the rates of arrival of both types of traders to vary over time. Lei and Wu (2005) propose a Markov Switching model of informed and uninformed arrival, resulting in a time-varying PIN model.

Tay, Ting, Tse, and Warachka (2009) present a dynamic PIN model based on asymmetric autoregressive conditional duration that allows for a joint modeling of the duration and direction of trades, enabling an intraday PIN estimation. Easley, Lopez de Prado, and