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## Commonality in liquidity: An empirical examination of emerging order-driven equity and derivatives market<sup>☆</sup>

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## ABSTRACT

Using a sample of actively traded stocks and options from emerging order-driven market, this study examines and provides satisfactory evidence for the existence of commonality in liquidity for both spot and derivatives market. For equities, the market- and industry-wide commonality remain strong even after controlling for market returns and individual firm volatility and for options after accounting for the underlying stock market liquidity and implied volatility. Compared to the stock market, options market exhibit an increased commonality in liquidity with market capitalization. Here, information asymmetry acts as an important microstructure related source of commonality in liquidity across markets. The findings are robust across call and put options with negligible evidence of cross-sectional error correlation for all the liquidity measures.

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### 1. Introduction

Liquidity is an important property of any capital market. Liquid markets require market-makers who are willing to buy and sell, and be patient while doing so. A lack of market liquidity may be responsible for inadequate trading in some markets. The liquidity in-turn results in better price discovery, lesser market manipulation and lower transaction cost. The relationship between liquidity and stock market crashes has been one of the central issues in the international corporate finance literature. The level and variability of liquidity in a particular market has direct implication on the portfolio selection strategies of the investors because liquidity risk is a key determinant of asset prices. Prior to seminal work of Chordia et al. (2000), traditional research on liquidity had been primarily focused on individual assets but post Chordia et al. (2000) there was a swift shift of research focus from a single asset to a market-wide phenomenon with respect to liquidity. Chordia et al. (2000) hypothesize that individual market structure phenomenon such as liquidity has common underlying determinants and hence should not be treated in isolation. This phenomenon is termed as 'commonality in liquidity' (CiL hereafter) and is

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formally defined as the proportion of how much a firm's liquidity is at least partly explained by the market-wide and industry-wide factors (Brockman and Chung, 2002). After Chordia et al. (2000), there has been plethora of research documenting the presence of CiL and the role of common liquidity factors in context with the quote-driven and order-driven markets.

Most of these studies are focused on developed quote-driven markets (Chordia et al., 2000; Huberman and Dominica, 2001; Hasbrouck and Seppi, 2001; Coughenour and Saad, 2004; Kamara et al., 2008; Corwin and Lipson, 2011; Karolyi et al., 2012) or developed order-driven markets (Brockman and Chung, 2002; Fabre and Frino, 2004; Domowitz et al., 2005). Very few studies are dedicated to understand CiL of order-driven markets (Hong Kong by Brockman and Chung, 2002; Australia by Fabre and Frino, 2004 and Taiwan by Lee et al., 2006) let alone emerging markets which are highly illiquid (Lesmond, 2005).<sup>1</sup>

Given the evidence that liquidity risk exists in options market, Cetin et al. (2006) show that liquidity risk could impact option prices significantly. Traders use options for hedging and speculative purposes. The amount of liquidity risk (or CiL) present in these markets can significantly impact the trading strategies and profits. Interestingly there is no evidence of CiL for an order-driven derivatives market. Furthermore it is important to address this issue since the evidence on CiL findings from other asset classes and developed markets may not hold true in the case of emerging derivatives markets because emerging markets are highly illiquid (Lesmond, 2005)<sup>2</sup> consequently resulting in high CiL.

The primary objective of this study is to fill an important gap in the literature by documenting the evidence of CiL in an emerging order-driven equity and derivatives market. To the best of our knowledge, ours will be the first study to examine CiL for an order-driven derivatives market. The results of this study will help the market participants to understand liquidity dynamics of these markets and devise strategies to overcome the negative impact of CiL. The evidence on commonality in derivatives market may shed some light on the reasons for the under-development of the derivatives markets compared to the equity markets in emerging economies. These findings have a two-fold contribution to the literature in understanding the dynamics of CiL of an order-driven options market because these markets typically do not have any appointed market makers and there are also no voluntary market makers for option trading, therefore order-driven emerging markets can experience significant liquidity risk.

The importance of liquidity is widely documented in the finance literature. Even though liquidity affects asset prices, the idea that CiL also affects asset prices is not taken into consideration by the conventional models in the asset pricing literature and thus these models have to be modified to incorporate the effect of CiL on asset prices (Acharya and Pedersen, 2005). Next the issue of concern for the market participants is to know whether the market liquidity is priced or whether the market risk factor due to CiL enters the stochastic discount factor. If the asset returns are strongly associated with market returns, the determinants of CiL may establish a non-diversifiable risk factor and hence it is an expensive risk factor and investors holding such assets in their portfolio require a risk premium. Besides an additional risk for the investors, it also creates problems for portfolio managers in diversifying their risk who depend on choosing uncorrelated stocks (Domowitz et al., 2005). Therefore, CiL is of major concern to government regulators as well as reserve banks because it is a non-diversifiable risk factor and any shocks to CiL may cause market-wide effects and may also impact the smooth working of the financial markets leading to financial crisis or stock market crashes.<sup>3</sup> Therefore, what factors impact CiL and identifying their economic effects will help in preventing future market crashes. Also, a detailed examination of commonality may help in understanding how market-wide and industry-wide liquidity movements impact different asset classes and thereby assist the policy makers to formulate better monetary policies.

By using intraday and daily data we estimate six measures of liquidity (Spread, Percent Spread, Depth, Roll's Spread, Spread\_HL, and Amihud) for equity market and four measures of liquidity (Spread, Percent Spread, Depth, and Volume) for the options market for a period of two years from April 1st, 2010 to March 31st, 2012. We find evidence in support of CiL for both equity and options markets of National Stock Exchange (NSE) in India. Our results are consistent with all the liquidity measures used in the study. By using market-model time-series regressions, we report significant market- and industry-wide CiL. Although concurrent industry-wide CiL is higher compared to market-wide CiL for four liquidity measures, nevertheless sum for the previous, current, and next day market-wide CiL dominates the sum coefficient of industry-wide CiL. Besides finding evidence for size effects in CiL, we also find commonality at portfolio level. Furthermore, we document that asymmetric information; as measured by trading frequency is one of the microstructure determinants of CiL for both stocks and options. Lastly, we establish that over a contemporary sample period, options market CiL is significantly higher than equity market, which might be driven by the illiquid nature of the options market compared to the equity market in India.

The remainder of this article is organized as follows. Section 2 discusses theoretical background and literature review of the work related to CiL. Section 3 talks in detail about the institutional set-up for NSE, India. In Section 4, we explain in detail the data and methodology used in this study. The empirical results on the evidence of CiL on NSE, India are discussed in Section 5. Section 6 discusses the existence of CiL under different market settings. Robustness check for asymmetric

<sup>1</sup> Emerging markets are known to exhibit poor political and legal system and high liquidity cost (Bekaert and Harvey, 2000).

<sup>2</sup> See Tett (2013), (Financial Times, Oct. 31, 2013) – 'If a shock was to hit Brazil, India, Indonesia – or any other emerging market country – tomorrow, how would investors react? Would asset values adjust smoothly, amid an explosion of trading flows? Or would markets instead freeze up, as liquidity evaporated? . . .'

<sup>3</sup> The sudden disappearance of market liquidity across various markets is the major factor causing the Asian financial crisis in 1997–1998 as well as the recent 2008 global financial crisis.

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