



# Liquidity discount in the opaque market: The evidence from Taiwan's Emerging Stock Market



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## ABSTRACT

The decentralized OTC market is extremely illiquid and opaque in comparison with the exchange-listed stock market. Although liquidity risk has been well documented in the finance literature, little is known about how liquidity risk affects the stocks traded in the decentralized OTC market. In this study, we investigate liquidity risk on the cross section of stock returns in Taiwan's Emerging Stock Market (TESM), which is a typical decentralized OTC market. Liquidity risk is measured by the liquidity discount devised by Chen (2012). We empirically find that (i) firm-specific liquidity discounts hinge on the attributes pertaining to firm-specific and economic fundamentals; (ii) liquidity risk is priced in both OTC and exchange-listed stock markets, and the risk premia are material and increase when liquidity deteriorates; and (iii) the effect of the subprime crisis is more severe for stocks with high liquidity discounts, which partially explains the behavior of investors' flight-to-liquidity during the time of crisis.

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## 1. Introduction

The investigation of liquidity risk has come a long way in the past few decades. The importance of liquidity risk premia on the cross section of stock returns has long been advocated in the empirical asset pricing literature, such as Amihud (2002), Pastor and Stambaugh (2003), Sadka (2006), and Hu et al. (2013), to name a few.<sup>1</sup> Most studies focus on stocks traded in major exchange-listed stock exchanges, such as the NYSE, Nasdaq, and AMEX. However, little is known about how liquidity risk affects the stocks

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<sup>1</sup> Other studies that document market liquidity risk and a cross section of stock returns include Amihud and Mendelson (1986), Chordia et al. (2001), and Hasbrouck (2009). Adrian et al. (forthcoming) address funding liquidity risk and a cross section of stock returns.

traded in a decentralized, over-the-counter (OTC) broker–dealer market, where transactions are made by phone or through an electronic system between broker–dealers and investors (see Ang et al., 2013). It is expected that those stocks are subject to more severe liquidity risk. In this study, we explore liquidity risk and its risk premia on cross-sectional stocks traded in the OTC markets by using the data sample from Taiwan's Emerging Stock Market (TESM),<sup>2</sup> which is a typical decentralized OTC market of considerable size.<sup>3</sup>

Our paper contributes to the current literature of asset pricing on liquidity risk in three ways. First, we employ a new methodology proposed by Chen (2012) and Chen et al. (2013) to calculate liquidity discounts as a measure of liquidity risk in a decentralized OTC market. We find that firm-specific liquidity discounts hinge on the attributes pertaining to firm-specific and economic fundamentals. Second, we find that the magnitudes of liquidity discounts are material and increase when liquidity deteriorates. It indicates that liquidity risk is priced in a cross section of stock returns in both TESH and TSE (Taiwan Stock Exchange). Third, the effect of the subprime crisis is more severe for stocks with high liquidity discounts. This can partly explain investors' flight-to-liquidity during the time of crisis.

Measuring a stock's liquidity in the OTC market still poses a significant methodological challenge in the finance literature. For example, two well-documented liquidity proxies, Amihud illiquidity or Pastor–Stambaugh liquidity measures, are ill-functioning in the OTC market due to infrequent transactions.<sup>4</sup> To tackle this methodological challenge, we utilize Chen's (2012) liquidity discount model to gauge a stock's illiquidity traded in the OTC stock market. Chen (2012) devises a CAPM-based model for assets whose evaluations may be largely compressed in substantial discounts in the presence of a liquidity squeeze in the marketplace. In conjunction with the structural credit risk model of Geske (1979) and Geske and Johnson (1984) that can invert equity value to liquid asset value, we are able to directly measure the liquidity discount of an asset via the difference between liquid and illiquid asset values. A large difference in asset values corresponds to a great liquidity risk on an asset since a larger discount in the asset price is associated with deteriorated illiquidity.

For stocks traded on the TESH, we use the sample period from December 2003 to December 2011. We firm-by-firm compute liquidity discounts for each month. Results show that the liquidity discount, on average, reached 13% during normal times and rapidly inflated to 40%–46% over a period of time after the collapse of Lehman Brothers. Our evidence suggests that the TESH was substantially affected by the U.S. financial crisis and experienced severe financial losses during the period.

We first examine the firm-specific liquidity discounts and perform panel regressions by regressing a firm's liquidity discount on a firm's return on equity (ROE), current ratio, debt-to-asset ratio, cash-to-asset ratio, firm size and macroeconomic variables like term yield spreads, commercial paper outstanding, GDP growth rates, and industrial production growth rates. Results show that for the TESH stocks an increase in ROE or cash-to-asset ratio (debt-to-asset ratio) will significantly bring down (up) a firm's liquidity discount. In addition, an increase in commercial paper outstanding and industrial production growth rates (an improvement in funding liquidity and the state of economy) can ease a firm's liquidity deduction.<sup>5</sup>

We then construct stock portfolios formed on liquidity discounts and perform the calendar-time time series regressions to estimate the CAPM alphas and Fama–French (three-factor) alphas that capture the monthly average abnormal returns for portfolios with respect to different degrees of liquidity risk. Results show that the abnormal returns on stocks with high liquidity discounts (highly illiquid stocks) are significantly higher than those on low discounts (low illiquid stocks). Moreover, the abnormal returns on the TESH stocks (a highly illiquid market) are typically higher than those on the comparable TSE stocks (a low illiquid market). Our findings suggest that the premium for illiquidity is pronounced and statistically significant.

<sup>2</sup> Taiwan's Emerging Stock Market (TESM) was established in 2002. It is designated for trading pre-IPO stocks or rising stocks. A significant number of stocks traded in the TSE (Taiwan Stock Exchange) have been traded in the TESH before going public. However, there are some distinctions in these two markets. The TESH is extremely illiquid and opaque in comparison with the TSE. The information quality and dissemination are poor in the TESH. One interesting difference is that the TSE imposes a seven-percent price limit whereas the TESH doesn't have such a restriction.

<sup>3</sup> TESH has grown rapidly. In 2013, 277 stocks were traded on this market. In 2013, 1489 stocks were traded on the TSE. This shows that the size of the TESH is large.

<sup>4</sup> The Amihud illiquidity and Pastor–Stambaugh liquidity measures are based on the price impact of trades and temporary price changes associated with order flow, respectively. They require sufficient sample observations for precision.

<sup>5</sup> Most findings for the TESH stocks continue to hold for the comparable TSE stocks.

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