



# The world price of liquidity risk

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## ABSTRACT

This paper empirically tests the liquidity-adjusted capital asset pricing model of Acharya and Pedersen (2005) on a global level. Consistent with the model, I find evidence that liquidity risks are priced independently of market risk in international financial markets. That is, a security's required rate of return depends on the covariance of its own liquidity with aggregate local market liquidity, as well as the covariance of its own liquidity with local and global market returns. I also show that the US market is an important driving force of global liquidity risk. Furthermore, I find that the pricing of liquidity risk varies across countries according to geographic, economic, and political environments. The findings show that the systematic dimension of liquidity provides implications for international portfolio diversification.

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## 1. Introduction

Liquidity has been shown to affect the cross-sectional differences of asset returns in the US market through two different channels, that is, as either a characteristic

(Amihud and Mendelson, 1986; Brennan and Subrahmanyam, 1996; Amihud, 2002) or a risk factor (Pástor and Stambaugh, 2003; Acharya and Pedersen, 2005; Liu, 2006; Sadka, 2006; Watanabe and Watanabe, 2008). Encompassing multiple channels through which liquidity affects

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asset prices, Acharya and Pedersen (2005) propose the liquidity-adjusted capital asset pricing model (LCAPM), which incorporates three different types of liquidity risk that are independent of traditional market risk: the covariance of liquidity with market liquidity (commonality in liquidity), the covariance of liquidity with market return, and the covariance of return with market liquidity. In their paper, Acharya and Pedersen (2005) also show empirical evidence supporting the LCAPM in the US market.

However, to date, the potential importance of liquidity has not been explored as extensively in international financial markets as it has in the US market. In the study of world market liquidity, earlier research has primarily focused on liquidity level (Rouwenhorst, 1999; Brockman and Chung, 2003; Chiyachantana, Jain, Jiang, and Wood, 2004; Lesmond, 2005; Eleswarapu and Venkataraman, 2006), while researchers have recently paid more attention to the systematic aspects of liquidity (Liang and Wei, 2006; Bekaert, Harvey, and Lundblad, 2007; Brockman, Chung, and Pérignon, 2009; Karolyi, Lee, and van Dijk, 2009). Brockman, Chung, and Pérignon (2009) and Karolyi, Lee, and van Dijk (2009) investigate the commonality in liquidity in global financial markets. Liang and Wei (2006) examine the pricing of liquidity risk that arises from the sensitivity of stock returns to market-wide liquidity in 23 developed-market countries. However, the pricing of multiple liquidity risks in a unified framework such as the LCAPM has not been fully investigated for international financial markets. Recently, Bekaert, Harvey, and Lundblad (2007) investigate various forms of liquidity risk, but at the level of country portfolios, not individual stocks. Moreover, they restrict the sample to 19 emerging-market countries, leaving the importance of liquidity in asset pricing in developed markets for future research.

I contribute to the literature by empirically investigating an equilibrium asset pricing relation with liquidity both as a characteristic and as a risk factor in international financial markets by using 30 thousand stocks from 50 countries from January 1988 to December 2007. To my knowledge, this is the first paper that assesses multiple forms of liquidity risk as well as market risk, as specified in the LCAPM, in global financial markets. I evaluate the unconditional version of the LCAPM on a global level under different assumptions on the degree of world financial market integration. I specifically investigate the following research questions in this paper. First, I examine whether supporting evidence of the LCAPM in the US is also prevalent in global financial markets. In particular, I investigate whether liquidity risks are priced independently of market risk and examine which type of liquidity risk is most significant in pricing. I employ a cross-sectional regression framework and factor model regressions to investigate this issue. Second, I examine whether the US market plays an important role in the pricing of global liquidity risk. To achieve this goal, I compare the pricing of liquidity risk with respect to US factors with the pricing of liquidity risk with respect to global aggregates that are independent of both local and US factors. Third, I investigate the differences in the relative importance of local and global liquidity risk in asset pricing and further

examine the sources of such differences according to geographic, economic, and political environments across countries.

An extension to global markets of the investigation of the pricing of liquidity risks is important for at least the following three reasons. First, the importance of liquidity could be more pronounced in markets other than the US, where liquidity is allegedly high. Hence, extending the study of liquidity to world markets could provide a good opportunity to evaluate the role of liquidity as an additional source of systematic risk. Second, liquidity could be a global phenomenon as can be seen from episodes such as the Asian financial crisis, the meltdown of Long-Term Capital Management, and the ongoing subprime mortgage crisis. As shown by these incidents, liquidity-related events are not restricted to either developed-market or emerging-market countries, but they are pervasive worldwide, making it necessary to investigate both developed and emerging markets together when studying liquidity in global markets. Third, the geographic, economic, and political environment could affect the importance of liquidity risk differently across countries. Extending the scope to global markets provides a unique opportunity to investigate such cross-country or cross-regional variations in the pricing of liquidity risk.

I find that market liquidity is persistent in most of the sample countries, consistent with US results in the literature (Pástor and Stambaugh, 2003; Acharya and Pedersen, 2005; Korajczyk and Sadka, 2008). In addition to this confirmatory evidence, I find some new and interesting results. First, consistent with the LCAPM, I find supporting evidence that liquidity risks are priced factors, independent of market risk, in international financial markets. Specifically, cross-sectional regressions show that, after controlling for market risk, liquidity level, size, and book-to-market, a security's required rate of return depends on the following two covariances: the covariance of its own liquidity with the liquidity aggregated at the local market, and the covariance of its own liquidity with local and global market returns. Factor model regressions show that trading based on local liquidity risk produces 7.6% annual excess returns (trading alpha) in the overall world market and 13.6% in emerging markets. The corresponding figure is 1.8% in the overall world market when trading is based on global liquidity risk. Second, I provide evidence that the global liquidity risk arising from the covariance of individual stock liquidity with US market return is priced. This highlights the key role of the US in global financial markets, contrasting sharply with the finding that the global liquidity risk formed by excluding the US is not priced or is priced with the wrong sign. Third, the pattern of the pricing of liquidity risk varies across geographic, political, and economic environments. On the one hand, global liquidity risk is shown to be more important than local liquidity risk in countries that are more open, that is, in developed countries as well as in countries with high transparency, low political risk, and large cross-border portfolio holdings. On the other hand, in countries with the contrary properties, i.e., where global investors are

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