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## Liquidity Commonality in Foreign Exchange Markets During the Global Financial Crisis and the Sovereign Debt Crisis: Effects of Macroeconomic and Quantitative Easing Announcements

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### ABSTRACT

Noting the time-varying dynamics in liquidity, we use a generalized dynamic factor model (GDFM) to identify market-wide liquidity across foreign exchange (FX) markets. Liquidity commonality across currencies increases during the 2008–2009 global financial crisis and the 2009–2011 European sovereign debt crisis, which affirms the spiral effect between funding liquidity and FX market liquidity. The effect of funding constraint on liquidity in the FX market may be through carry trade activities that link the FX market and other classes of asset markets, as suggested by Melvin and Taylor (2009) and Banti (2016). The shift in liquidity commonality around the release of macroeconomic announcements also can be related to the spurs of unwinding carry trade positions in response to unexpected macro shock that affects interest rate differential. In contrast, quantitative easing (QE) policies in the United States, which inject high capital inflows into financial markets, are associated with decreased liquidity commonality, implying that QE implementation actually improves the funding liquidity and weakens the spiral effect, ultimately inducing weaker commonality in FX liquidity.

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### 1. Introduction

Liquidity shocks related to the 2008–2009 subprime mortgage debt crisis and the 2009–2011 European sovereign debt crisis stressed global financial markets, highlighting the importance of liquidity risk for asset returns. Understanding commonality in the liquidity that exists in global markets in turn is important for risk management and portfolio selection. For example, the foreign exchange (FX) market is the world's largest in terms of trading volume ([Bank for International Settlements, 2013](#)), but as [Mancini, Ranaldo, and Wrampelmeyer \(2013\)](#) and [Karnaukh, Ranaldo, and Soderlind \(2015\)](#) note, relatively minimal research investigates FX liquidity, compared with studies of liquidity in equity and bond markets. But because approximately 60% of FX trading volume consists of major currencies, the liquidity in FX markets differs both by currency and over time, at intraday and daily frequencies ([Mancini et al., 2013](#)). Therefore, we undertake a dedicated investigation of liquidity commonality in FX markets to provide insights into its dynamics during liquidity crises.

Commonality in liquidity reflects co-movement of one asset's liquidity with aggregate market-wide liquidity. Previous research offers profound evidence of liquidity commonality in the stock market (e.g., [Brockman, Chung, & Pérignon, 2009](#);

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Chordia, Roll, & Subrahmanyam, 2000; Hasbrouck & Seppi, 2001).<sup>1</sup> Several studies also document liquidity commonality in bond and FX markets. Chordia et al. (2005) analyze liquidity co-movements between the stock and bond markets. Banti et al. (2012) provide evidence of a common component in liquidity across currencies, such that dealers' responses to incoming orders of different currencies have a common component, seemingly due to their inventory position choices. Moreover, Mancini et al. (2013) find that FX liquidity is not isolated from exchange rates, such that the market liquidities of individual currencies move together and are positively (to varying extents) related to market-wide FX liquidity.

Furthermore, in their analyses of liquidity commonality during liquidity crises, Kamara, Lou, and Sadka (2008), Karolyi, Lee, and Van Dijk (2012), and Rösch and Kaserer (2013) suggest that when liquidity suddenly dries up in the market, due to a financial crisis, it may lead to stronger commonality for liquidity in the stock market. With investigations of liquidity co-movement in FX markets during the 2008–2009 financial crisis, Banti et al. (2012), Mancini et al. (2013), and Karnaukh et al. (2015) show that commonality in FX liquidity is stronger in distressed markets.<sup>2</sup>

According to Hameed, Kang, and Viswanathan (2010), liquidity commonality in stocks exists because liquidity providers withdraw market liquidity after market declines, consistent with a theoretical model by Brunnermeier and Pedersen (2009) that links asset liquidity and traders' funding liquidity. Funding liquidity is a major factor that triggers commonality in liquidity.

Carry trades are popular currency trading strategies that involve borrowing in low interest rate currencies and investing in high interest rate currencies. The returns to carry trade will affect the liquidity in the FX markets abruptly through the unwinding positions of carry trade caused by a burst of big losses (Melvin & Taylor, 2009). Osler (2012) interprets the Brunnermeier and Pedersen (2009) model of funding constraints in the FX context through the channel of carry trade. As the market reverses, carry traders may take a "wait-and-see" approach to timing the market and traders will not simultaneously and immediately liquidate positions. In effect, both carry-trade returns and carry-trade fragility may be self-fulfilling. Brunnermeier, Nagel, and Pedersen (2009) predict a positive relation between crash risk and the extent of carry trading. Once market crashes, carry-trade unwinding increases. Traders will be forced to unwind carry trade positions as they get near to their own funding constraints. Then we may predict that currency markets will be less liquid during times of carry-trade unwinds and that the illiquidity should be more pronounced for investment currencies involved in the carry trade (Mancini et al., 2013).

As the markets are relatively more volatile and illiquid, the tendency of unwinding of carry trade position becomes higher. Brunnermeier et al. (2009) find that a rising VIX index, which indicates heightened market risk and/or risk aversion, is indeed associated with carry-trade unwinds. Karnaukh et al. (2015) also find that FX liquidity tends to decline with the volatility and illiquidity of global equity and bond markets.

To explore how public news arrival affects FX market liquidity, we also study changes in liquidity commonality around macroeconomic announcements and the impacts of quantitative easing (QE) monetary policy announcements. Liquidity shifts following the release of macroeconomic announcements, because the information environment changes (Andersen & Bollerslev, 1998; Andersen, Bollerslev, Diebold, & Vega, 2003, 2007; Bauwens, Omrane, & Giot, 2005; Evans & Lyons, 2005; Evans & Lyons, 2008). Information asymmetry in FX markets may be associated traders' interpretation ability and sophistication about publicly released macro news. (Evans, 2010) The variation in bid-ask spreads can be affected by information asymmetry about market structure and current market condition.

The shift in liquidity commonality around the release of macroeconomic announcements can be related to the spurs of unwinding carry trade positions in response to an unexpected macroeconomic shock. When carry trade positions are adjusted in response to unexpected macro shock, it is possible that a negative news surprise causes the unwinding of carry trade positions during crisis periods, and the commonality in FX liquidity may increase.

Moreover, a negative news surprise may result in an increase in volatility, leading to the wider bid-ask spread and lower liquidity (Stoll, 1978). As argued in Menkhoff, Sarno, Schmeling, and Schrimpf (2012) that carry trade returns related negatively to FX volatility, we may expect that when the FX market volatility increases at the arrival of negative news, the co-movements in FX liquidity may be stronger when the major unwinding of carry trade happen in times of crisis. (Mancini et al., 2013).

By using Electronic Broking Services (EBS) intraday data, we investigate factors that drive dynamic FX liquidity commonality.<sup>3</sup> The liquidity measures calculated from the EBS data exhibit significant autocorrelation. We also use a generalized dynamic factor model (GDFM) to extract commonality in FX liquidity and address the potential effect of autocorrelation. Traditional principal components analyses ignore such autocorrelation and thus may lead to biased measures of the common component in individual currency market liquidities. With this approach, we find that liquidity commonality significantly varies over time; we also find ample evidence of strong commonality in liquidities during periods of financial crisis. Consistent with

<sup>1</sup> The issue of commonality also has been investigated in bond and FX markets. Chordia, Sarkar, and Subrahmanyam (2005) analyze liquidity co-movements between the stock and bond markets. Banti, Phylaktis, and Sarno (2012) provide evidence of a common component in liquidity across currencies, such that dealers' responses to incoming orders of different currencies have a common component, seemingly due to their inventory position choices.

<sup>2</sup> As noted in Galati, Heath, and McGuire (2007) and Karnaukh et al. (2015), with little and no margin requirements on FX spot transactions, currency traders can take highly leveraged positions. However, this feature induces currency liquidity to deteriorate in crisis periods or in times of unexpected high volatility because of the unwinding of leveraged positions in FX and related markets.

<sup>3</sup> The EBS was established by several market-making banks to counter the dominant role of Reuters; when EBS acquired Minex in December 1995, it gained significant market share in Asia. For a detailed description of the structure of FX markets and electronic trading platforms, see Rime (2003).

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