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Information shares of two parallel currency options markets: Trading costs versus transparency/tradability☆

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ABSTRACT

This paper studies whether trading costs or transparency/tradability are more important to price discovery using a unique dataset of currency options that trade simultaneously in two parallel markets. The Over-The-Counter (OTC) market is characterized by sophisticated investors, low trading costs, and low transparency/tradability compared to the Tel-Aviv Stock Exchange (TASE). Pricing errors are much larger on the TASE and the information share of the OTC market is significantly larger than that of the TASE by various information share measures, showing that trading costs and trader type have a first-order effect on price discovery while transparency/tradability have a second-order effect.

1. Introduction

Prices of claims to the same cash flow, but traded in different markets, can deviate from one another in the short run due, for instance, to trading frictions, but will converge in the long run. Of interest to financial economists and investors alike is to determine which market contributes the most to price discovery. A leading market should be both timely and efficient in incorporating new information (Lehmann, 2002). Timely refers to the speed with which one market reflects new (permanent) information regarding the fundamental value while efficient implies a minimization of noise in market prices, which temporarily may result from trading frictions.

This paper examines the information shares of two parallel options markets, the over-the-counter (OTC) market and the Tel-Aviv Stock Exchange (TASE), that simultaneously trade options on the Israeli Shekel versus the U.S. Dollar (ILS/USD) exchange rate. We use these options due to their markets' unique institutional settings which allow us to examine aspects of price discovery in options markets as well as aspects of multimarket trading in general that other options datasets cannot. Our proprietary dataset, generously provided by the Bank of Israel, also contains the categorization of traders and their respective transaction details. Since options traded on the OTC and TASE options markets are derived from the same underlying exchange rate, in a perfect market both options would be

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considered redundant assets. Back (1993) and Easley et al. (1998), however, show that the options trading process need not be redundant if it changes the information flow across assets.

Previous literature is indecisive regarding the question of whether the level of market transparency/tradability or the level of trading costs is more important to the process of price discovery. Bloomfield and O'Hara (1999) and Linnainmaa and Saar (2012) provide evidence that increased transparency reduces the ability of informed traders to trade on their information. Increased transparency has also been shown to decrease trading costs (Bessembinder et al., 2006, Edwards et al., 2007, and Goldstein et al., 2007). This in turn, could make more transparent markets more favorable for informed traders wishing to maximize their return conditioned on trading costs as in Acharya and Pedersen (2005). Recently, Zhu (2014) models that the higher execution risk of dark pools (non-transparent market) makes exchanges (transparent market) with less execution risk more attractive to informed traders and Barclay et al. (2003) show that informed traders prefer electronic communication networks (ECNs) over market-makers on exchanges due the lower execution risk on ECNs for them. Garvey and Fei (2011) further provide evidence that informed traders, in NASDAQ stocks, are willing to trade-off lower trading costs for lower execution risk. Whether the more transparent/tradable market is more or less informative is an empirical question due to this transparency/transaction cost/execution risk trade-off.

Our study's contribution is twofold. First, we study the effects of market transparency and trading costs on market information share by examining the OTC options market versus the TASE options market cross-sectionally as well as within each market. The OTC market is characterized by sophisticated investors, low trading costs,[1] improved liquidity (low bid–ask spreads and high volumes), and low transparency/tradability while the TASE is characterized by less sophisticated investors, high trading costs, and high transparency/tradability. From the differences in market structures between the two options markets, we are able to assess the relative importance of transparency/tradability, trading costs, and investors' type for price discovery. Second, we examine market information shares across the implied volatility (IV) surface, that is across options moneyness (MON) and across options days-to-expiration (DTE). We also examine information shares for the full sample of trades, for interbank trades only, for bank–customer trades only, for comparable trades (matched OTC and TASE options trades) only, and during turbulent versus tranquil periods.

First, across the IV surface, bid–ask spreads (BAS) in the TASE are three times larger than in the OTC market. Differences in Amihud (2002) illiquidity (AILL) and trading volume are even more extreme. Across the IV surface, on average, AILL is in excess of 10 times larger on the TASE than on the OTC market and trading volume is in excess of 10 times larger on the OTC market than on the TASE. Lower trading costs in the OTC market can be explained by the much larger mean trade size by sophisticated investors in the OTC market which is consistent with trading costs in the currency options market being a decreasing function of trade size as found in Galai and Schreiber (2013). These differences in trading costs on the two options markets have important implications for their market efficiency. Variance ratio tests show that the pricing error variance of TASE IVs, in excess of that of OTC IVs, is 29.8% of the OTC IV level. We also find that the 'volatility smile' across options MON and the 'volatility skew' across options DTE are more pronounced in the TASE market than in the OTC market. The variance ratio results, as well as the volatility smile and skew results, indicate that the increased trading costs in the TASE have important implications for the equilibrium prices of options in the two markets leading to TASE currency options IVs containing much larger pricing errors than IVs in the OTC market.

Second, using four different information share measures, we find that the OTC options market has a robustly greater information share than the TASE options market. The information share measures used in this paper include those of Hasbrouck (1995) (*H*), Gonzalo and Granger (1995) (*GG*), Lien and Shrestha (2014) (*LS*), and finally Putnins (2013) (*PYZ*), which transforms the methodology of Yan and Zivot (2010). Each of these measures provides incremental information about market information shares that the others do not. Whereas *H* performs an error variance decomposition of market innovations, *GG* decomposes the common factor into components that each market makes up. *LS* allows the cointegrating vector of IVs in the OTC and TASE markets to be freely estimated, whereas *H* restricts the cointegrating vector to be $(1, -1)'$ thus restricting IVs to be equal in equilibrium. *PYZ* is included since they show through simulations that excessive noise can distort both the *H* and the *GG* measures.

Using these information share measures, the information share of the OTC market is generally greater than 60% and the lower bound of the OTC information share is generally above the upper bound of the TASE information share indicating statistical significance. These information share results are robust across options moneyness, options days-to-expiration, as well as for interbank and bank–customer trades. Further, the correlation between the restricted *H* and the unrestricted *LS* information share measures is not perfect which shows that IVs of similar options traded simultaneously in the two options markets are not equal in equilibrium.

Lastly, we examine the time series behavior of the OTC and TASE information shares. The OTC market has a higher information share than the TASE, persistently over our sample period. Market information shares, however, tend to change depending on the relative states of the two markets. When the difference between OTC IV and TASE IV is less negative, the OTC market loses information share while the TASE market gains information share. A similar relationship holds with respect to the difference in OTC BAS and TASE BAS. This is an important result, since it shows that trading costs are more important to informed traders than transparency/tradability as they prefer to trade-off making their trades more transparent to obtain lower trading costs. Since asset prices and BAS are likely determined endogenously as argued by Acharya and Pedersen (2005) and O'Hara (2003), we use three-stage least squares (3SLS) to test for the simultaneous determination of IV and BAS. The difference in IVs between markets is increasing in the difference in BAS between markets indicating that illiquidity differences, among other variables, affects the equilibrium pricing of IVs in the two options markets.

Our paper importantly differs from the recent empirical studies of Chakravarty et al. (2004), who examine information shares of common stock versus stock options across MON, Anand and Chakravarty (2007), who examine the information content of trade size

[1] Trading costs include, fees and commissions, spreads (ask minus bid), and market impact in the case of high volume trades. Although, fees and commissions are negotiable, experts assess that the average fees and commissions in the TASE are at least three times larger than those prevail in the OTC market.