Order Size Restrictions and Price Discovery in USDKZT Market

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Abstract

This paper presents a detailed microstructure account of the Kazakhstan's FX market with respect to various economic dimensions and "on-the-ground rules" of the game. An in-depth overview of the institutional set-up of the Kazakhstan's FX market in terms of the participant type and specific market instrument has useful recommendations for optimal FX and monetary policy conduct in a developing economy context. In addition, we provide evidence on the link between order size restrictions in the centralized exchange market, implemented in Kazakhstan, and price discovery issues of USDKZT spot market.

JEL Codes: F31, G14, G15
Key Words: market microstructure, FX liquidity, U.S. dollar, financial stability, Kazakhstan

[*] The views expressed in this article and other content are those of the authors and do not necessarily reflect the position of the National Bank of Kazakhstan.

1 Introduction

Traditionally macroeconomists tended to assume away the role of market structure and market frictions in the determination of equilibrium in currency market as unimportant in the long run and focus their attention entirely on the fundamental factors. At the opposite end of the methodological spectrum is the literature that pays attention to the incentives and constraints of market participants, investigates the effect of market design on information flow between them. A promising complementing approach, microstructure analysis provides additional perspective to the study of price determination in foreign exchange market. This is especially relevant for emerging economies where historically high market and regulatory frictions stand in the way of value based trading.

For a small open resource-based economy that only recently transitioned to floating, exchange rate with the reserve currency is arguably the most important price of money. Exchange rate, its level and path, profoundly influence the long-run growth, investment, financial stability issues and overall economic development (Razmi, 2021). At the same time, macroeconomic models fail to explain higher frequency exchange rate fluctuations (Frankel and Rose, 1995).

Microstructure models describing FX market's inner workings examine how specific trading information of market agents become a key source of pricing mechanism of the FX instruments, both at spot and swap exchange rate markets. As a result, trading as a process is considered not as a subordinate component of the market determination of FX prices but rather as its integral process. While incorporating all the necessary features of trading patterns, FX microstructure models study factors that are likely to drive the relationship between FX price discovery dynamics and aggregate macroeconomic fluctuations. Particularly, it provides better understanding of how information flows from one market agent to another during the trading process and the ultimate settlement of the spot exchange rate prices.

We suggest an empirical framework to outline certain stylized facts for a typical emerging market economy on the dynamics of supply and demand forces in the case of Kazakhstan's FX market. We take the limit order book market approach, in which the supply and demand of a given security is represented by limit orders posted on the "book" and trade occurs when buy and sell orders match.

Following the methodology of Obizhaeva and Wang (2013), we describe the shape of the limit order book and specifically how it evolves over time to describe the intertemporal

nature of supply and demand dynamics that market participants experience in the FX market. As a consequence, we attempt to outline the optimal trading strategy that evolves from our empirical analysis of Kazakhstan's FX market.

The paper is organized as follows. Section 2 outlines the key players in theKazakhstan's FX market. Section 3 outlines descriptive data on foreign exchange spot and swap markets. In the fourth section, we present a limit order book framework. In section five we outline our results on the evolution of optimal trading strategies. The last section concludes.

2 Literature Review

In his seminal model, Treynor (1987) demonstrated how two types of traders contributed to the price discovery process, with value-based traders responsible for establishing a relatively broad 'outside' spread and the dealers providing and pricing liquidity based on their inventory and exposure to the price and liquidity risk. Treynor's model of traders' hierarchy set the foundation for the subsequent analysis of microstructure as influencing both types of traders.

Lyons (1995) claimed that microstructure perspective draws particular attention to the trading process of the price discovery and price formation mechanisms in the foreign exchange market. Briefly, the micro-process itself can be divided into three stages (Evans, 2011). First of all, the customers trade with their associated dealers (banks). Then, these dealers organize their own customer orders to trade with other dealers through the electronic inter-dealer market. In the last stage, dealers trade back with customers to balance their net inventory position. Hence, the trading size and transaction position are the key factors, which efficiently characterizes these transactions. As a result, given parameters of the market are summarized by order flow, which is the net balance of buyer-initiated and seller-initiated FX transactions (Lyons et al., 2001).

Osler, Mende, Menkhoff (2006) also approached price discovery in the currency markets in the tradition of Treynor model, with tiered market where assets and information flow between the tiers, and inventory management plays an important role. In the same vein, Osler (2006) sees order flow effects on exchange rate volatility as shaped by three factors: the inventory effect, information effect, and downward-sloping demand and liquidity effects. The inventory effects describes a case of when significant changes in the desired capacity of inventory levels reveal a substantial exposure of dealers to either risk. Hence, in order to lower it, dealers increase their prices to attract more order when their inventory positions are lower than targeted levels. Inventory-

based explanation potentially works well to illustrate short-term exchange rate movements. At the same time, information-based models bear an implicit assumption that order flow and FX market prices are highly interrelated (Bjønnes and Rime, 2005), (Killeen et al., 2006). Interestingly, Osler (2006) introduced "downward-sloping demand curve and liquidity effects" to demonstrate an important relationship between order flow and exchange rate. In particular, author claims that unlike demand for equities and bonds, currency demand originates partly from real-side commerce, and hence, currency flows should be explicit in short-run exchange-rate models.

Previous studies mainly concentrated at analyzing major currency pairs. For instance, Ito et al. (1998) found that informed order flow have a high prediction power for the JPY/USD exchange rate in the short-term period. Rime (2000) shows that DEM/USD, GBP/USD and CHF/USD have a cointegrating relationship with order flow, indicating that the lagged order flow explains exchange rate to a higher degree. At the same time, an increasing number of studies investigated the explanatory power of order flows in small emerging economies. Galati (2000) analyzes currencies of seven emerging markets with 18-month daily trading volume data and reports that most trading volumes significantly and positively correlated with volatility. Frankel (2010) mentions unique characteristics of emerging markets, such as imperfect institutions, moral hazard, default risk and illiquidity, asymmetric information and government intervention. Gereben et al. (2006) explore the role of domestic and foreign customer flow in the Hungarian FX market and concluded that liquidity is largely determined by domestic customer flow. Galac et al. (2006) study the role of market microstructure in explaining the link between trading volume, volatility and bid-ask spreads in Croatia.

In addition, this paper relates to a strand of literature that investigates causes of financial crises. For instance, Friedman and Schwartz (2008) examine economy-side crisis of 1929 in the United States. Kirilenko et al. (2017) analyze renowned "Flash crash" occurred on May 6, 2010 in the U.S. **?** study local micro-crisis of the Russian Ruble in December of 2014. Bian et al. (2018) explain a market crash during the Chinese stock market crash of 2015. As such, 1929 economic crisis and Chinese crisis of 2015 were caused by significant market imbalances related to mass liquidation of marginal positions. Importantly, the Russian Ruble meltdown in December of 2014 spawn out of events, which are comparable to the crises of 1929 and 1987, which emerged from the misbalances, originated from the fire-sale of index futures in the framework of pension funds' strategy realization. In particular, Kyle and Obizhaeva (2022) show that a number of crises on U.S. stock market happened due to large imbalances in supply and demand. Authors claim that invariance theory has a high predicting capacity for price changes, empirically derived from the liquidity measures.

The discussion above still leaves important avenues for research, especially in the light of exchange rate policy and optimal exchange rate path in small open economies. In light of the earlier empirical findings, in this paper, we aim to contribute to the literature by adding evidence on the extent to which order flow explains the behavior of the exchange rate of a developing economy against a global reserve currency. We believe that understanding Kazakhstan's microstructure organization of the FX market, helps us to formulate specific practical policy recommendations that would help practitioners to avoid large swings in the FX market and produce a more stable and competitive foreign exchange rate, which will benefit associated aspects of robust economic development.

2.1 Macroeconomic Environment

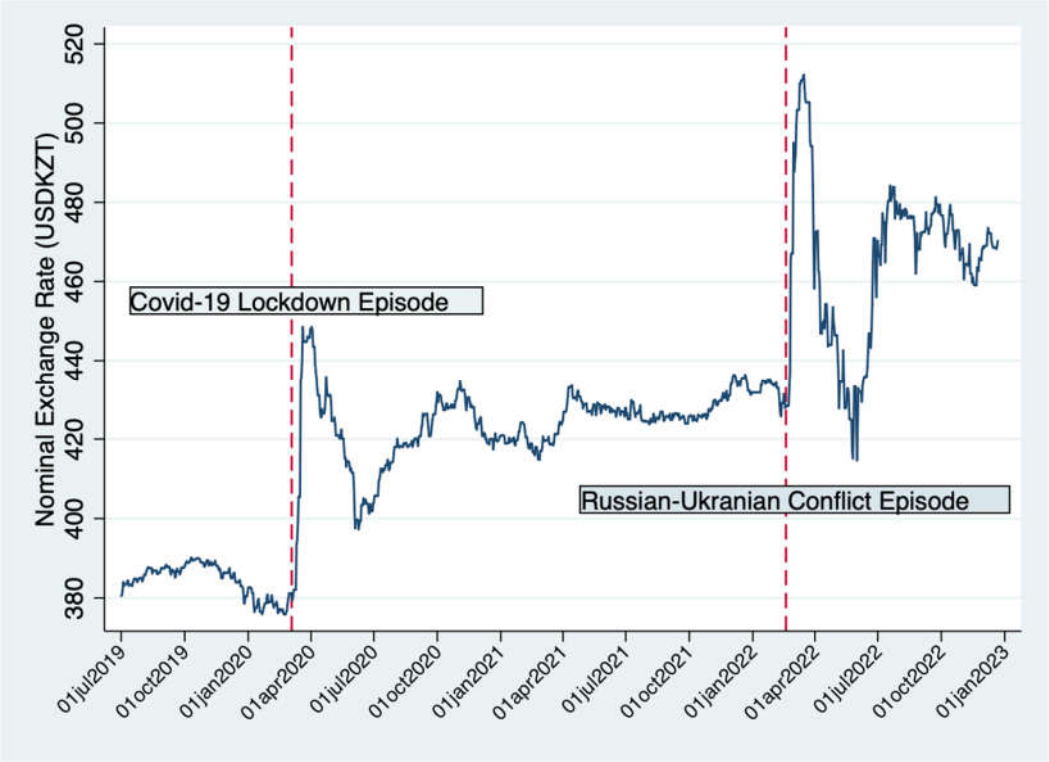
The most recent macroeconomic developments in Kazakhstan has shown the increased fragility of the economy to arising balance of payments difficulties. After the dramatic fall of oil prices in 2015-2016 (please see Figure 1), and a subsequent shrinkage in export revenues, being unable to defend a fixed parity because of external constraints, the National Bank of Kazakhstan has effectively switched from the fixed exchange rate regime to the floating exchange rate regime of its national currency in August of 2015. Interestingly, Razmi (2021) notes that in the short-run, income variable was not found to adjust significantly to disequilibria. There was a weakening of the exchange rate against the background of the strengthening of the global US dollar index against emerging market currencies and an increase in importers' demand for foreign currency. Under the conditions of a free-floating exchange rate regime, the exchange rate of the national currency reflects the consensus of market participants, as well as their expectations on the impact of macro shocks. There was a stabilization period in the year 2023 after a number of external and internal shocks of previous periods, which did not require currency interventions by the National Bank of Kazakhstan.

3 Key Market Players

We provide a broad overview of the institutional set up of the Kazakhstan's FX market in terms of the participant type. On November 15, 1993, Kazakhstan introduced its own national currency - tenge. On November 17, 1993, the Kazakhstan Interbank Currency Exchange was established for the organization and development of the national currency market, which a few years later was renamed to the Kazakhstan Stock Exchange (KASE). Since its establishment, KASE has been the only trading platform in Kazakhstan serving money-, stock-, and currency markets. On November 19, 1993, the first trading in foreign

currencies took place. Banks, but also other financial organizations received direct access to the electronic trading platform. At the same time, legal entities and individuals received client access to the foreign exchange market and therefore carry out their transactions through brokers.

Figure 2: Nominal Exchange Rate USD/KZT, Jul.2019 - Dec.2022

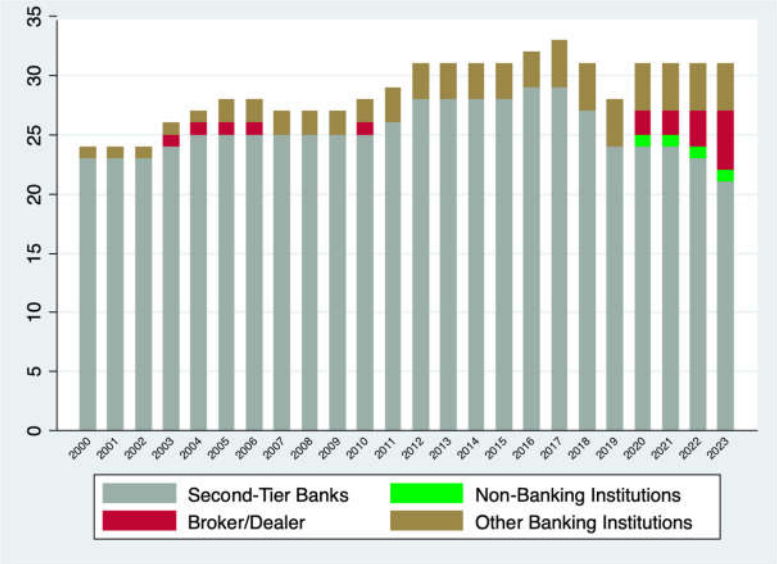


Source: National Bank of Kazakhstan

3.1 Banks and Brokerages

Three main type of market players are typically banks, other type of banks, and brokers/dealers with banking sector heavily dominating the FX market. Changes in the composition of trading by market participants are depicted in Figure 3. We see total number of market participants reported by the Kazakhstan Stock Exchange.

Figure 3: Total Number of FX Market Participants Type, 2000-2023



Note: Non-Banking Institution refer to KazPost. Other Banking refers to Eurasian Development Bank Institution, Kazakhstan Development Bank, National Bank of Kazakhstan, and InterState Bank. Source: Kazakhstan Stock Exchange, author's calculation

3.2 Pension Funds and Public Sector Funds

Pension Funds are the largest institutional investors but all are largely captive. Demand for foreign currency of the largest pension fund, Unified Accumulative Pension Fund (henceafter, UAPF), is managed by the NBK through its investment declaration. There is a particular limit on foreign currency demand for the UAPF. As such, according to the investment declaration of the UAPF, the currency share of pension assets is defined as no more than 50% of the aggregate assets of UAPF[1].

Before 2014, Pension savings were managed by private AMCs. Back then, their demand for FX and foreign assets was managed by bank-like capital regulations which made the equity constrained AMCs to strongly prefer risk free GoK debt denominated in KZT. For private pension funds that manage funds of citizens above a required threshold of 50%, there is a limitation on the currency share of pension assets as constituting no more than 50% of aggregate pension assets under management[2].

[1] Resolution of the Board of the National Bank of the Republic of Kazakhstan dated March 17, 2016 N86 "On the Investment Declaration of the Unified Accumulative Pension Fund"

[2] Resolution of the Board of Agency for Regulation and Development of the Financial Sector of the Republic of Kazakhstan dated February 15, 2021 N. 29 "On the Requirements for Private Pension Funds Managing Investment Portfolio"

4 USD/KZT Market Structure

Kazakhstan Stock Exchange offers instruments with three settlement dates on the FX spot market. They include the following settlement cycles: USDKZT TOD, contracted symbol of US dollar trading on T+0 settlement terms (with execution of deals on the trading day), USDKZT TOM, trade code of US dollar trading on T+1 settlement terms (with execution of deals on the business day following the trading day), USDKZT SPT, trade code of US dollar trading on T+2 settlement terms (with execution of deals on the second business day after the trading day). Kazakhstan sets the official exchange rate based on the settlement cycle of T+1, and switched from T+0 (USD TOD) to T+1(USD TOM) on September 10th of 2018. [3] Trading session that runs from 10:15 through 17:00 (Almaty time) is the main session for settlement of USDKZT TOD. Furthermore, among the FX swap instruments, USDKZT 0 001, contracted symbol of currency swap transaction, opening deal of which is a USD TOD deal, and closing deal is a USD TOM deal. Finally, USDKZT FWD refers to delivered futures on US dollar.

4.1 USDKZT markets on KASE

Today, spot FX transactions typically settle via the exchange of two payments in two different currencies on T+2 settlement scheme.[4] Compare this with the U.S. Securities and Exchange Commission (henceforth, Commission) is adopting rule amendments to shorten the standard settlement cycle for most broker-dealer transactions from two business days after the trade date (T+2) to one business day after the trade date (T+1).[5] The full transition is anticipated in the month of May of 2024. The Commission believes that shortening the settlement cycle will reduce credit, market and liquidity risks arising from unsettled securities trades. This shortened time period between execution and settlement of trades should reduce the number of unsettled trades overall, the time period of exposure to those unsettled trades and potential price movements in the securities underlying unsettled trades. Following the transition by the U.S. regulator, other major emerging market economies also moving to the T+1 settlement cycle organization of its FX and equity markets. For organized summary, please see Table 1.

[3] National Bank of Kazakhstan, https://nationalbank.kz/file/download/14718

[4] Spot transactions with T+0 (same day), T+1 (next day), and T+2 (two business days) settlement)

[5] U.S. Securities and Exchange commission, Final Rules, https://www.sec.gov/rules/final/2023/ 34-96930.pdf

Table 1: USD Trading Instruments and Services on KASE

Membership	All types of banks, non-banking FI, brokers/dealers	
Trading Mode	Electronic Matching System: members quote prices independently and the LOB matches the quotes	
	Over-the-counter (OTC): members negotiate directly 1-1	
Trading Instruments & Regimes	Spot USDKZT	USDKZT_TOD, USDKZT_TOM USDKZT_SPT
	Swap USDKZT	USDKZT_0_001, USDKZT_0_002 USDKZT_0_01W, USDKZT_0_01M USDKZT_0_03M, USDKZT_0_06M USDKZT_0_01Y
		USDKZT_1_01W, USDKZT_1_01M USDKZT_1_03M, USDKZT_1_06M USDKZT_1_01Y, USDKZT_1_001
	Futures USDKZT	USDKZT_FWD
Trading Hours	10:15-15:30 10:15-17:00 10:00-17:30	USDKZT_TOD(T+0) USDKZT_TOM(T+1, T+2) USDKZT_FWD

Note: Table summarizes all the USD-related instruments and its characteristics with Kazakhstan Tenge and USD Dollar. Source: KASE

Importantly, as it is shown in Table 2, bulk of the Kazakhstan's USDKZT spot market organization predominantly goes through 'USDKZT TOM' (T+1) spot regime. Therefore, we are mainly interested in the specification of auction mechanism for 'USDKZT TOM' instrument.

Table 2: Share of FX Spot Deals

Year/Instrument	**USDKZT_TOM**	USDKZT_TOD	USDKZT_SPT
2019	99,34%	0,00%	0,66%
2020	95,57%	3,52%	0,90%
2021	99,99%	0,01%	0,00%
2022	99,99%	0,01%	0,00%

Source: Kazakhstan Stock Exchange

4.2 FX Auction Model: Limit Order Book

According to Article 6 of the Regulations on Trading and Operation of the Control and Collateral System (hence-after, Regulation)[6], the main method of conducting the trading in the FX section of Kazakhstan Stock Exchange is the continuous double auction model (henceforth, CDA). The CDA is a two-sided mechanism adopted by most financial and commodity markets. As such, traders can submit limit orders at any time, and, whenever an incoming order matches an existing one, they trade at the incumbent order's limit price. Schematic representation is given in the Figure 4. The horizontal lines within the blocks at each price level denote the quantity (lot size) amounts from different active orders.

Figure 4: Schematic Representation of Limit Order Book



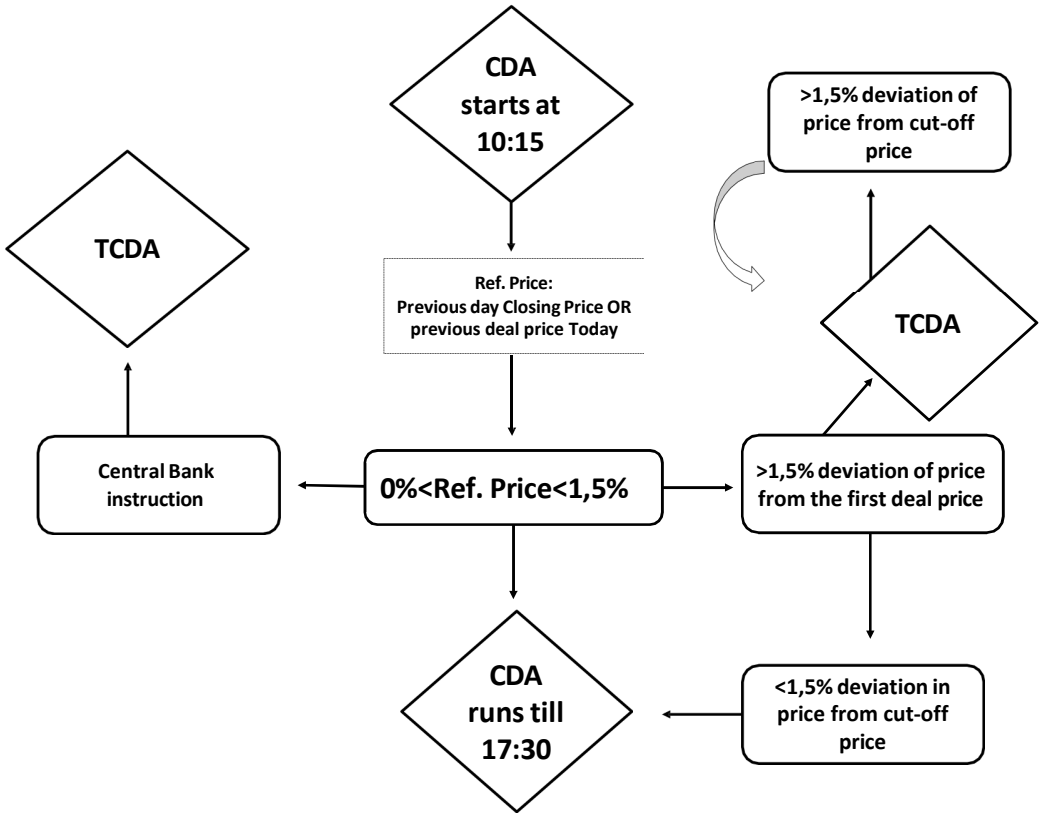
Note: Authors' adaptation.

In general, trading in the financial instrument USDKZT TOM, conducted by the continuous counter double auction (CDA) method, at any time during the day. Schematic representation is illustrated in the Figure 5. However, default auction type has an option to switch to the time constrained discrete auction (TCDA) method, if the following conditions are met: matching or crossing of prices of orders for sale or purchase, the price of the proposed first deal of the current trading day differs from the last deal price of the previous trading day for this instrument by 1.5% or more; or matching or crossing of prices of orders

[6] Regulations on Trading and Operation of the Control and Collateral System, https://kase.kz/en/ kase_rules/

for sale and purchase, the price of the proposed deal differs from the price of the first deal of the current trading day for this instrument by 1.5% or more; repeated matching or crossing of prices of orders for sale and purchase, the proposed deal price differs from the cut-off price fixed at the last discrete auction of the current trading day in this instrument by 1.5% or more.

Figure 5: Auction Mechanism, Kazakhstan Stock Exchange



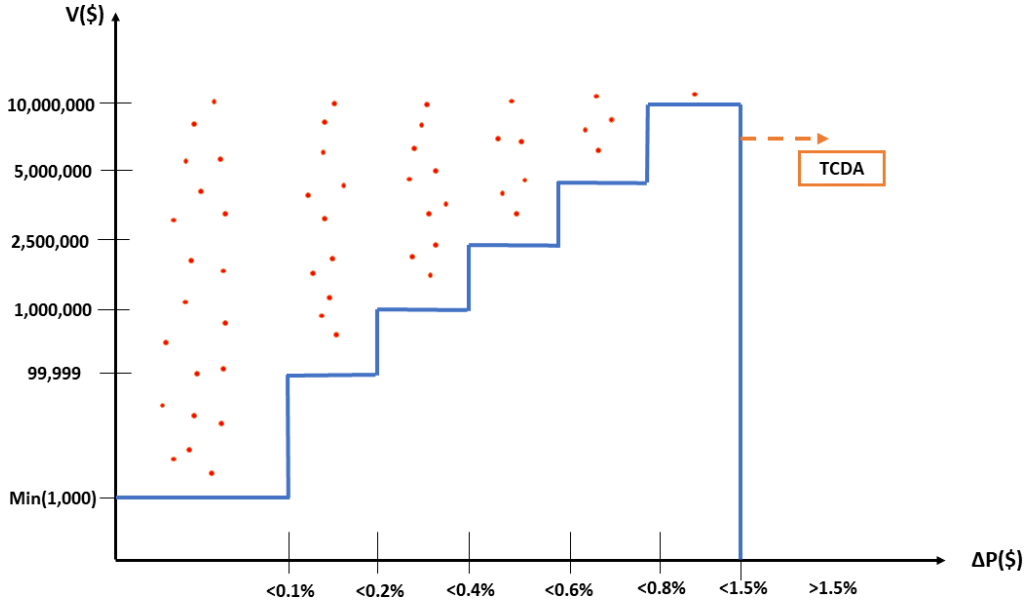
Note: CDA refers to Continuous Double Auction method. TCDA refers to Time Constrained Discrete Auction method. Source: Kazakhstan Stock Exchange, authors adaptation.

Furthermore, according to Article 9 of the Regulations, the size of the minimum number of lots when trading in US dollars depends on the deviation of the price of the submitted order from the price of the last deal and is established by Appendix 2 to the Regulations (please see Table 3). Schematic representation of the actual orders is provided in the Figure 6.

Table 3: Lot Size and Order Price Deviation Rules, Kazakhstan Stock Exchange

N	Minimum amount of lot size, USD	Deviation of order price from last deal price, %
1	from 1 000 to 99 999	<0,1
2	from 100 000 to 999 999	<0,2
3	from 1 000 000 to 2 499 999	<0,4
4	from 2 500 000 to 4 999 999	<0,6
5	from 5 000 000 to 9 999 999	<0,8
6	from 10 000 000 and more	no limits

Figure 6: Lot Size and Order Price Deviation Rules, Kazakhstan Stock Exchange



Note: Red dots are active orders with particular price and quantity amount.

4.3 Central Clearing and Market Makers

Typically, foreign currency settlements use a payment-versus-payment process, which requires both legs of a transaction to be settled either simultaneously or with equivalent assurances that one leg will be settled if and only if the other leg is settled with finality. Kazakhshtan Stock Exchange also uses payment-versus-payment process to settle domestic FX deals.[7] In addition, KASE serves as a central clearing (CCP) for all the deals in the FX market. As such, CCP mitigates credit risk by becoming the legal buyer to every seller and the legal seller to every buyer, a process know as novation. As a result, the need to manage counterparty credit risk is effectively replaced by the CCP's need to manage creditworthiness of its clearing members. Typically, CCP mitigate the credit risk they incur by requiring all of their counterparties to post initial margin, as it is shown in Table 4. In Kazakhstan, similar practices are required by KASE's internal regulations on FX trading.[8]

[7]Article 7 of the Rules for Clearing Transactions with Financial Instruments Deals, website: https://kase.kz/files/normative_base/clearing_rules.pdf

[8]Article 36 of the Methodology for Determining the Risk Parameters of Financial Instruments, website: https://kase.kz/files/normative_base/metodika_rp.pdf

Table 4: Risk parameters for FX market instruments

Currency Pair	FX Risk	Concentration Risk	Interest Rate Risk	Concentration Limit
USDKZT	6%	10%	22%	40 731 066

Taking into account the requirements of paragraph 12 of the Rules on Market Makers Activity, the following additional requirements are established for quotes maintained by the market maker during the entire trading session, The minimum volume of the best mandatory quotation for the purchase (sale) of a financial instrument for the United States dollar and for currency swap/foreign currency transactions in relation to the dollar is 500,000 USD dollars with a maximum spread value for mandatory dollar quotes of 0.3 tenge.

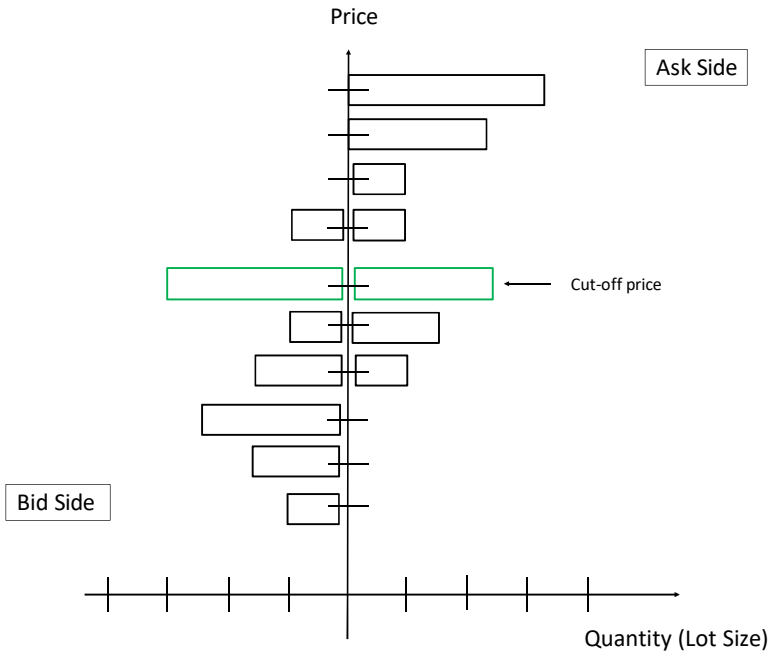
4.4 KASE Auction Circuit Breakers

According to Article 12 of Regulations on methods of conducting trading in the trading and clearing systems.[9] The discrete auction method is based on search of a cut-off price, which ensures the maximum volume of deal concluded in a financial instrument. When conducting a discrete auction, the trading and clearing system determines the period for accepting orders, during which trading participants submit orders at prices of the financial instrument independently determined by them. During the order collection period, the trading and clearing system accepts limit orders with saving in quotes.

The cut-off price during a discrete auction – the price of the financial instrument determined during a particular iteration, and which enables conclusion of deals in this financial instrument to the maximum total amount possible. The cut-off price is calculated in the following order: on the basis of submitted orders on an accrual basis, in the descending price order for each price value, the aggregate demand is calculated (the number of securities put up for purchase), and in the ascending price order on an accrual basis for each price value, the aggregate supply is calculated (number of financial instruments put up for sale);

[9]Regulations on methods of conducting trading in the trading and clearing systems, https://kase.kz/files/normative_base/methods_ASTS_eng.pdf

Figure 7: Schematic Representation of Discrete Auction



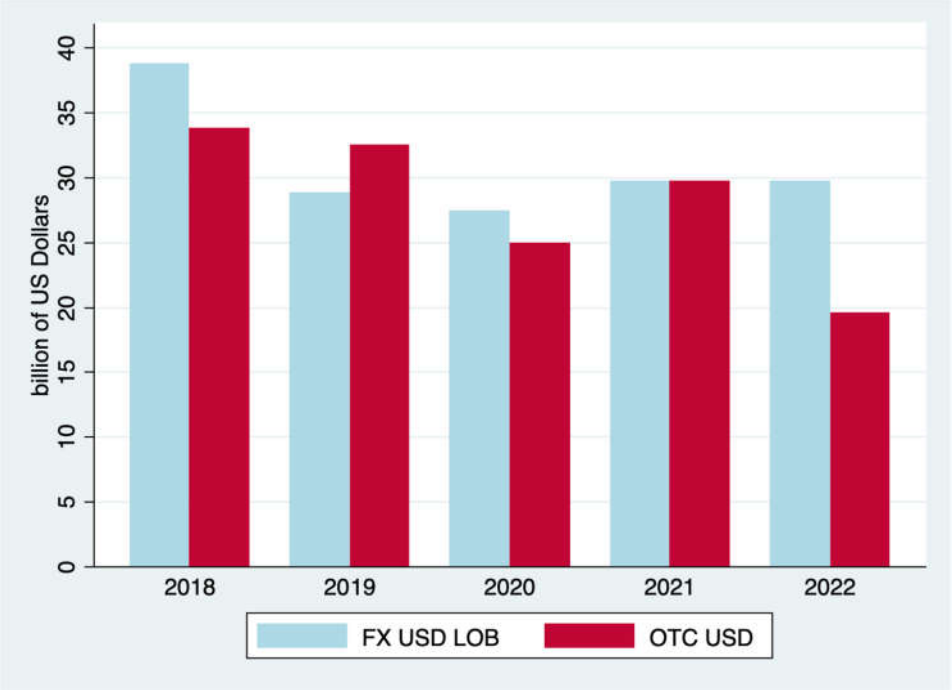
Note: Authors adaptation

4.5 USD Spot Market: Over-the-Counter Transactions

Over-the-counter transaction are private 1-to-1 negotiations, secured, supported and regulated by bilateral agreements. Counter-party risk is managed by limits. Binding and non-binding quotes. No constraints on volume or price change.

The volume of the OTC market for USDKZT currency pair is almost on par with the volume of centralized exchange market. Banks' activities to hedge currency risks are carried out in the foreign exchange markets both between residents and non-residents. Thus, the tenge-dollar exchange rate maintained generally stable dynamics with a transition to some strengthening starting in mid-October 2023, which was accompanied by high volumes of purchases by non-residents, averaging about 30 million US dollars per day.

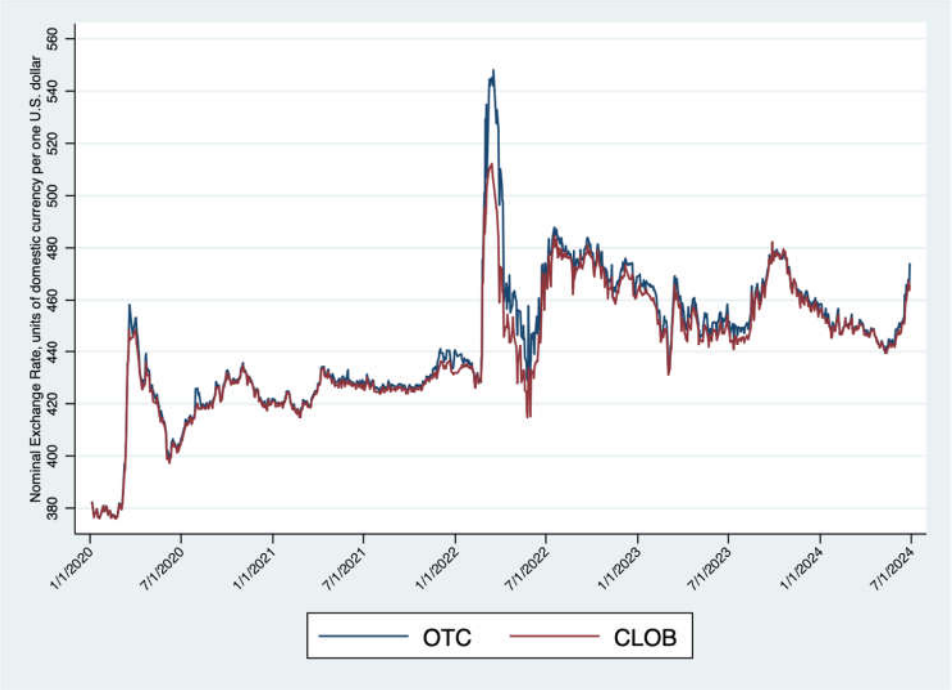
Figure 8: USD Annual Turnover (Spot Market + OTC) to GDP, 2005-2021



Source: National Bank of Kazakhstan

It is important to note, that the exchange rate on centralized exchange market and OTC market closely track each other. However, during crises periods, OTC exchange rate produces greater variations and higher nominal levels. In general, in 2023, there was a strengthening of the US dollar against tenge by 8 tenge, or by 1.7%, in particular in the second half of the year. Despite the strengthening of the exchange rate by the end of the year in the third quarter of 2023, the exchange rate weakened against the background of the strengthening of the global US dollar index against emerging market currencies and an increase in importers' demand for foreign currency. Despite fluctuations in oil prices throughout the year and a 10% strengthening in 2023, the dynamics of the USD/KZT exchange rate was less volatile.

Figure 9: Nominal Exchange Rate USD/KZT, Jul.2019 - Dec.2022



Source: Bureau of National Statistics, author's calculations

5 Price Discovery Role of Centralized Stock Exchange Trading

Although the bulk of trading happens on the OTC, KASE leads OTC informationally. KASE plays a pivotal price discovery role. This is due to KASE being a) the grounds of NBK fx interventions, b) the use of KASE price as the official and widely accepted reference exchange rate, used in financial accounting and contracts; c) by virtue of KASE auction being multiparty, relatively transparent in showing both demand and supply of several participants, unlike the bilateral negotiations of OTC. Which of these three factors are more important depends on the exchange rate regime. The first two factors were probably more decisive during the times of fixed exchange rate. However, whenever the authorities began to complement the open market operations in the FX market with the more coercive methods of exchange rate management such as suasion, regulations, supported by (threat of) punitive actions, OTC would overtake KASE as an indicator of equilibrium prices, even if not particularly suited to play the price discovery role.

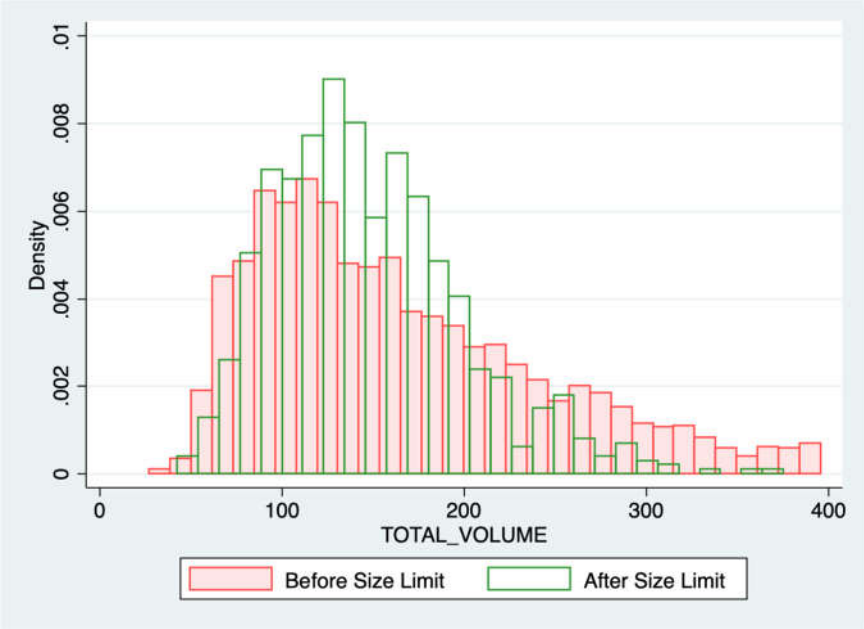
5.1 Data Description

Data on FX deals comes from the electronic limit order book and include the following characteristics: 1) date and time of the deal, 2) price of the deal, 3) quantity of the deal, 4) volume of the deal, 5) code of the instrument, 6) code of the account, and 7) direction of the deal. Structure of the data given allows us to decompose the trading dynamics of each market participant and investigate the microstructure of the USD exchange market. We preliminary report that volumes are typically associated with lower exchange rate, which signals that higher trading activity (more liquid markets) facilitate a more stable and lower (stronger) exchange rate level.

5.2 Empirical Analysis

Next, we analyze if the order size restrictions mentioned above produced substantial price discovery constraints. For this purpose, we first present distributions of total volumes before and after the introduction of the policy change in the workings of the stock exchange trading system. As we can see from the Figure 10, we see that price distortions were much smaller after the order size limit, which led to the greater price discovery mechanics of the centralized stock exchange system.

Figure 10: Total Volume of Deals on Centralized Exchange, USDKZT Spot Market

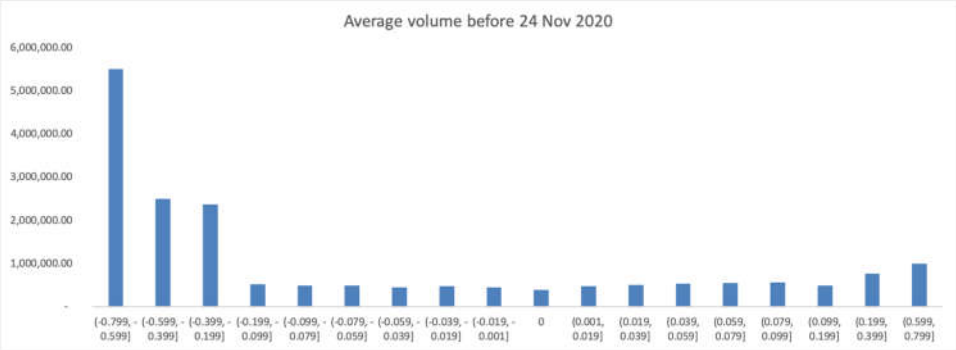


Note: Author's calculation.

Second, we inspect order volume distribution around the date of the i

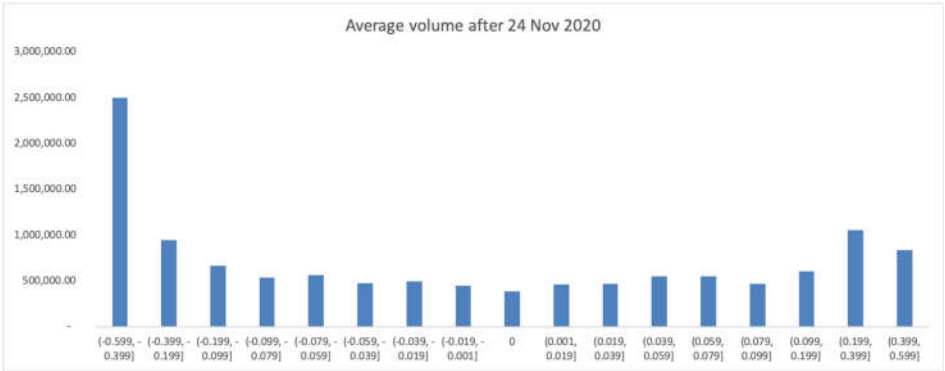
ntroduction of order size restrictions. To this end, we present distributions of order volumes before and after the introduction of the policy change in the workings of the stock exchange trading system. As we can see from the Figure 10, we see that price distortions were much smaller after the order size limit, which led to the greater price discovery mechanics of the centralized stock exchange system.

Figure 11: Order Volume Distribution at Centralized Exchange, USDKZT Spot Market



Note: Author's calculation.

Figure 12: Order Volume Distribution at Centralized Exchange, USDKZT Spot Market



Note: Author's calculation.

Third, we run the following specification in order to assess how the trading constraints affected the price response function of the trading system:

$$\delta Price_t = \alpha_0 + \alpha_1 Order\ Volume_t + \alpha_1 Deal\ Volume_t + \alpha_2 Dummy_{constraint} + \alpha_3 Price_{t-1} + \alpha_4 Volume_{t-1} + \varepsilon_t, \quad (1)$$

where $Price_t$ is the log value of 1 U.S. dollar per units of domestic currency (tenge), with subscript t for the time period, $Order\ Volume_t$ is the log of order volume of the USDKZT currency pair, $Deal\ Volume_t$ comprises the log of the volume of deals of the USDKZT currency pair, $Dummy_{Constraint}$ is the dummy variable for the order size limit introduction period, and ε_t is the error term.

Table 5 presents estimates of the short-term impact of order size restrictions on price discovery issues, reflected in changes of the level in the nominal USDKZT. Column 4 is a key regression specification with full set of controls. Hence, Columns 1-3 show different specifications of regression in Equation 1 to monitor distinct marginal contribution of each explanatory variable. Overall, negative sign on Constraint Dummy means that implementation of order size restrictions leads to a greater change in the level in the nominal USDKZT per the same amount of total volume. This result shows first signs of quantitative usefulness of the order size restrictions on price discovery characteristics on the USDKZT spot market.

Table 5: Price and Volume on USDKZT

	Price	Price	Price	Price
	1	2	3	4
Total Volume	-0.008	-0.070***	-0.049***	-0.053***
	(0.009)	(0.010)	(0.006)	(0.006)
Lag Volume	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Total Order Volume		0.058***	0.012***	0.012***
		(0.002)	(0.002)	(0.002)
Dummy Constraint			0.201***	0.201***
			(0.004)	(0.004)
dummyCB				0.013***
				(0.005)
Constant	6.055***	6.007***	6.083***	6.088***
	(0.042)	(0.039)	(0.024)	(0.024)
Observations	1691	1691	1691	1691
R^2	0.013	0.103	0.645	0.646

Standard errors in parentheses: $p < 0.10$, $p < 0.05$, $p < 0.010$

6 Further Questions

Does MICEX play a price discovery role on KASE? Test metric of price volatility, intensity and other innovation effects of MICEX opening hours. Does MICEX lead KASE in price discovery assume RUBKZT more stable a pair than either USDKZT or USDRUB (need to test).

7 Conclusion

This paper presents a detailed microstructure account of the Kazakhstan's FX market with respect to various economic dimensions and "on-the-ground rules" of the game. An in-depth overview of the institutional set-up of the Kazakhstan's FX market in terms of the participant type and specific market instrument has useful recommendations for optimal FX and monetary policy conduct in a developing economy context. In addition, we provide evidence on the link between order size restrictions in the centralized exchange market, implemented in Kazakhstan, and price discovery issues of USDKZT spot market.

8 References

Bian, J., Z. He, K. Shue, and H. Zhou (2018). Leverage-induced fire sales and stock market crashes. Technical report, National Bureau of Economic Research.

Bjønnes, G. H. and D. Rime (2005). Dealer behavior and trading systems in foreign exchange markets. *Journal of Financial Economics 75* (3), 571–605.

Evans, M. D. (2011). *Exchange-rate dynamics*. Princeton University Press.

Frankel, J. A. (2010). Monetary policy in emerging markets: a survey. Technical report, National Bureau of Economic Research.

Frankel, J. A. and A. K. Rose (1995). Empirical research on nominal exchange rates. *Handbook of international economics 3*, 1689–1729.

Friedman, M. and A. J. Schwartz (2008). *A monetary history of the United States, 1867-1960*, Volume 16. Princeton University Press.

Galac, T., A. Burić, I. Huljak, et al. (2006). Microstructure of foreign exchange market in croatia. Technical report.

Galati, G. (2000). Trading volumes, volatility and spreads in foreign exchange markets:

evidence from emerging market countries.

Gereben, A., G. Gyomai, and N. Kiss M (2006). Customer order flow, information and liquidity on the hungarian foreign exchange market. Technical report, MNB Working Papers.

Ito, T., R. K. Lyons, and M. T. Melvin (1998). Is there private information in the fx market? the tokyo experiment. *The Journal of Finance 53* (3), 1111–1130.

Killeen, W. P., R. K. Lyons, and M. J. Moore (2006). Fixed versus flexible: Lessons from ems order flow. *Journal of International Money and Finance 25* (4), 551–579.

Kirilenko, A., A. S. Kyle, M. Samadi, and T. Tuzun (2017). The flash crash: High-frequency trading in an electronic market. *The Journal of Finance 72* (3), 967–998.

Kyle, A. S. and A. A. Obizhaeva (2022). Market microstructure invariance: A meta-model approach. *Anna A., Market Microstructure Invariance: A Meta-Model Approach (October 4, 2022)*.

Lyons, R. K. (1995). Tests of microstructural hypotheses in the foreign exchange market. *Journal of Financial Economics 39* (2-3), 321–351.

Lyons, R. K. et al. (2001). *The microstructure approach to exchange rates*, Volume 333. Citeseer.

Obizhaeva, A. A. and J. Wang (2013). Optimal trading strategy and supply/demand dynamics. *Journal of Financial Markets 16* (1), 1–32.

Osler, C. L. (2006). Macro lessons from microstructure. *International Journal of Finance & Economics 11* (1), 55–80.

Osler, C. L., Mende, A., Menkhoff, L. (2006) Price discovery in currency markets, Germany, September 2006

Razmi, A. (2021). Walking the tightrope of real exchange rate policy for development: the roles of targets, instruments, and saving rates. *Journal of Post Keynesian Economics 44* (4), 623–642.

Rime, D. (2000). Private or public information in foreign exchange markets? an empirical analysis.

Treynor, J. L. (1987). The Economics of the Dealer Function. *Financial Analysts Journal*, Vol. 43, No. 6, 27-34.