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Stock Market Indicators and Domestic Market Capitalization of Emerging Markets

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Abstract

Market capitalisation plays a significant role in the performance of emerging stock markets. This study, therefore, analysed the trend of Dar es Salaam Stock Exchange's (DSE) indicators on its domestic capitalisation. Specifically, the study analysed trends of stock market indicators, namely, individual participation, share volume, share turnover, and DSE All Share Index. Time series monthly data from 2014 to 2020 were analysed using the ARMA model. The study further examined how the stock market indicators influence the domestic market capitalisation (DMC) of DSE using the ARMAX model. Results indicated that individual participation, turnover, and the DSE All Share Index significantly influenced DMC. However, the volume of shares traded did not influence DSE's domestic market capitalisation. Hence, DSE's performance is associated with share turnover, price, and public participation. Thus, the study urges stock brokers to reduce transaction costs to attract individual investors. It also recommends that DSE encourage new listings to trigger trading and increase the market share index. This study's results can help the government improve policies and plans to increase public participation, reduce income inequality and improve the economy.

Keywords: Market Capitalisation, Share volume, DSEI, Individual participation

Introduction

Market capitalisation plays a significant role for an investor in determining stocks, risk, and firm performance before investment (Pavone, 2019). Capital is also among the key components in generating a country's economic output (Idenyi *et al.,* 2017). Thus, among the key indicators measuring the market's capitalisation performance includes the share index, the number of transactions (volume), turnover, total equity and share price (Indrayana *et al*., 2020; Abdel & Al-Afeef, 2020; Idenyi *et al*., 2017). Consequently, the Government of Tanzania introduced different policies and programmes to foster participation, leading to increased market capitalisation and economic growth. The programmes introduced included Improved Business Climate (IBC) and Local Investment Climate (LIC), aiming at creating a conducive investment environment for local and international investors. It introduced the policy requiring private mobile telecommunication companies to issue at least 25% of their authorised share capital through IPO to local shareholders (URT, 2016). These changes also increased the number of listed companies at DSE, the number of brokers, public participation and public-owned companies (Kamazima & Omurwa, 2018).

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As indicated by scholars, policy reviews and reforms have brought significant changes in stock market indicators in different parts of the world. In the US, Individual participation decreased from 80% in the 1970s to 20% (2020), while in Nairobi, it decreased from 27% in 2008 to 4% in 2015, which signals an increase in institutional investors in the market (Fichtner, 2020; Langat & Rop, 2019). However, other authors reported increased stock market indicators in different markets. For example, in China, the share price increased by 1.38%; volume changed by 8.62%; and individual participation increased from 13% in 2015 to 55% in 2021 (Peng *et al*., 2022; Khandelwa, 2021; Ma *et al*., 2017; Ibrahim & El Haron, 2018). Reports show that the increases were due to policy reforms and technological changes (online trading) in stock market operations (Peng *et al*., 2022; Brown *et al.,* 2021). The changes in stock market indicators facilitate growth in market capitalisation and liquidity of different markets. According to the World Federation of Exchange (2017) statistics, Egypt's retail trade (volume of shares and participants) value is 64% of the market capitalisation, and, in Colombo, such trade contributes up to 20% to market capitalisation.

Similarly, the market capitalisation of DSE as an emerging market has shown changes since its commencement of activities in 1998. The changes include an increase in the number of listed companies from five (5) to twenty-nine (29) and the inclusion of small and medium enterprise companies (SMEs). Likewise, the change of DSE into an automated trading system increased the number of brokers to 15, and DSE was demutualised into a public-owned company in 2016 (Kamazima & Omurwa, 2018). The consequences of these changes include growth in overall market capitalisation and an increased number of listed companies. DSE's statistics indicate that cumulatively, market capitalisation grew from TZS 5,979.79 billion in 2014 to TZS 9,157.19 billion by 2020, and individual participants increased from 201,011 in 2014 to 556,121 participants in 2020. However, there was a decrease in volume and DSE All Share Index from 2,172 units in 2014 to 1,830 units by 2020 (DSE data, 2021b).

However, data and graphical presentation (Figures 2 and 3) show an inconsistent trend in market capitalisation, volume, turnover and DSE All-share index (DSEI). The inconsistency indicates that changes in stock market indicators do not transform domestic market capitalisation. Even though previous studies evaluated changes in stock market indicators and economic growth (Omodero, 2020; Mubarak & Hamdan, 2016), the focus of the analysis was mainly on the price of stocks/shares, corporate governance, and market capitalisation. However, Kuvshinov and Zimmermann (2021) focused only on share price, and Pavone (2019) analysed the sale of shares and their contribution to market capital. In Tanzania, Abbas *et al*. (2016) focused on market capitalisation and the country's economic growth, while Haji and Jianguo (2014) examined the effect of exchange rate and market capitalisation on DSE's share price using a multiple regression model. Impliedly, in Tanzania, the focus has mainly been on economic growth, share price and institutional investors.

Apart from price, corporates and institutional investors that highly contribute to DSE's overall market capitalisation and liquidity, equity shares also play a vital role. Volume and turnover of shares traded by investors (including individual investors) also contribute to the DSE's market capitalisation. DSE focusing more on institutional investors than individual investors affects government efforts to reduce income inequality and makes individuals financially self-sufficient as per SDG 2030 (UNDP, 2015). Apart from that, DSE can overlook the consideration of

financial costs and trading restrictions to reduce risks for individual investors because individual investors have less/no influence on the market compared to institutional investors. Hence, it is necessary to address individuals' participation in the equity market (volume and turnover of equity) along with the share index and their contribution to the domestic market capitalisation.

Notably, as an emerging market, differences in the socio-cultural and economic advancement of DSE might affect the trend of domestic market capitalisation across markets. Although DSE is growing with local and foreign listed companies, knowledge of individual participation trends, share volume, share turnover, and share index trends show the progress of the stock market and the way forward towards the country's economic advancement. Hence, it is crucial for the study to specifically examine the trends of the four indicators and the domestic market capitalisation of DSE from 2014 to 2020. Therefore, this study was intended to forecast stock market indicators using the ARMA model for the next four years. Apart from that, it was essential to examine whether trends of individual participation in DSE, DSE All Share Index, volume, and turnover contributed by equity shares had any impact on the domestic market capitalisation of DSE.

This study's findings provide a long-run plan for developing emerging stock markets as it provides historical data on equity trading, public participation and causes of the reported performance. It further provides a synopsis of the future performance of DSE's equity market indicators and suggestions for improving the performance of DSE. Apart from that, Dow theory (Thomsett, 2019) and the Box-Jenkins model (Al-Mamun *et al.*, 2020). facilitated simple prediction of DSE's indicators and domestic market capitalisation. The results contribute to the body of knowledge as they answer the critical questions of whether equity shares and individual participation influence the domestic market capitalisation of DSE. The rest of the paper is organised as follows. Section 2 covers a literature review containing theoretical and empirical literature and the hypotheses tested. Section 3 presents a methodological framework for analysing stock market indicators and domestic market capitalisation. In section 4, the paper presents results and a discussion of findings while responding to the tested hypotheses. The last section (Section 5) gives conclusions from the findings and suggestions for future studies.

Theoretical Literature Review

The Dow Theory, developed by Charles Dow in series from 1900 to 1902, guided the study. The theory propounds that the stock market does not move randomly but is in an up/down ward trend when one of its averages (industrial) declines/advances above a previous critical high and a similar decline/advance in the other average (transportation) follows (Hamilton, 1922). Three cyclical trends or movements influence the change, which Sheimo (1998) termed primary, secondary, and minor (tertiary) movements. Furthermore, This theory, according to Thomsett (2019), contains six tenets, including 1) Three market movements, including primary trends, medium trends, and minor trends; 2) Phases of market dynamics, such as the phases of accumulation, public participation, and distribution; 3) News that the market discounts as reflected in prices; 4) A trend which must be seen in the major average and confirmed in one of the others to be recognised as new and in opposition to prior trends; 5) Trading volume serves as a reliable indicator of trend strength because it indicates the trend's general direction; and 6) Trends persisting until clear indications that they have come to an end.

The theory is appropriate for this study as observing the trend of individual participation and changes over time, having primary and secondary movements along with minor movements. Apart from that, changes in volume, price, and individual participation act as signals of market capitalisation changes at DSE. Hence, the movement of domestic market capitalisation was observed through a change in volume, turnover, price, and individual shareholding. An assessment of whether these factors influenced the trend of market capitalisation was also done. Nevertheless, the Random walk theory (Thomsett, 2019) developed by Burton Malkiel in 1973 argues that the price change is random and, therefore, unpredictable. It can be 50/50 with positive or negative direction caused by the poor quality of the information in the market. However, the reaction to information by investors at DSE may only last for a while and, therefore, cannot conclude to affect the market movement. Apart from that, with well-interpreted facts (information), market movements (DSE market capitalisation and indicators) can be predicted. The random walk also highly focuses only on price and factors affecting price movement in the market. Therefore, the Dow Theory is appropriate because the signals such as a change in policy, change in leadership, introduction of new issues, and change in the volume of shares traded can trigger a change in market trend and make it predictable.

Empirical Review and Hypotheses Development

Participation of individual investors and domestic market capitalisation

Radtke *et al*. (2018) viewed participation as an individual's ownership and co-ownership of assets and benefit in financial returns from these assets. However, Sivaramakrishnan *et al.* (2017) measured stock market participation by individuals' intention to invest in the stock market. Therefore, the current study indicates individual participation as direct public participants in trading shares at the DSE, whereby their participation may affect the market capitalisation of the DSE. Blume and Keim (2012) analysed the institutional investors and market liquidity relative to individual participation and market capitalisation. The authors noted that the illiquidity of the firm decreases with an increase in market capitalisation caused by an increase in individual and institutional investors. However, it was argued that institutional investors are higher contributors to market capitalisation than individual investors. On the other hand, Robinson (2020) noted that higher retail investor participation helps the EU capital markets grow and increase the volume of the fund. Notably, De La Cruz *et al*. (2019) reviewed the ownership structure of 10,000 companies in 54 countries. The authors concluded that, in the US, individual investors contribute up to 4% of the market capitalisation, 13% of China's market capitalisation, and 6% of emerging countries' market capitalisation. Therefore, individual participation in the stock market contributes to increased funds of the listed firms, and so does the stock market capitalisation.

On the contrary, Alderighi and Gurrola-Perez (2021), investigating investor types, liquidity and price formation, analysed that although retail investors have superior ability in stock-picking, they are not excellent contributors to liquidity. Active retail investors demand immediate trading of shares and therefore, snatch liquidity. Impliedly, individual investors contribute to small firms' market capitalisation, but institutional investors highly contribute to the overall market capitalisation. Hence, previous studies focused on institutional investors, while others focused on ownership structure and the contribution of individual investors to a specific firm's capital, as per Alderighi and Gurrola-Perez (2021). Although individual participants are small in number in Tanzania, totalling 556,121 which is less than 2% of the working population participants as per

DSE statistics (DSE, 2021b), their contribution to domestic market capitalisation was found necessary to be examined, leading to the formation of the hypothesis *(*H_{01}):
H_{01}: Individual participation in DSE does not affect the domestic market capitalisation of the DSE

Volume of shares and domestic market capitalisation.
Trading volume is information that signals the future movement of the stock market and, therefore, has a significant impact on the participation and liquidity of the firm (Hariyanto, 2021). Hence, an increase in volume encourages individuals to participate more, and a decrease discourages investors, leading to a decrease in market capitalisation. Indrayana *et al*. (2020) analysed the effect of income, volume, dividend, and the average price on corporate market capitalisation. Results showed that increased volume indicated increased stock demand, significantly affecting corporate market capitalisation. Impliedly, an increase in the volume of shares acquired by investors increases demand, resulting in increased price, and so does the firm capitalisation. Wan and Hendrawaty (2018) assessed the Indonesian market's stock market liquidity and capitalisation using a qualitative descriptive approach. The authors found that the frequency of transaction signals impacts changes in trading volume. Thus, increasing the trading volume of shares increases the firm's liquidity, leading to high market capitalisation.

Thus, previous studies focused on the contribution of volume to corporate capital, while Wan and Hendrawaty (2018) used qualitative analysis to analyse the contribution of volume to firm capital. DSE, being among the emerging stock markets, addresses the volume of shares transacted, but its contribution to domestic market capitalisation is limited. Hence, this study was intended to analyse the contribution of the volume of shares traded to DSE domestic market capitalisation (capital formulated/generated by local companies only). Thus, the following hypothesis was developed:
H_{02}: The volume of shares traded does not influence the domestic market capitalisation of the DSE.

Turnover and Domestic Market Capitalisation
Bonga and Sithole (2019), who studied stock market development focusing on capital market trends, revealed that an increase in market shares of the firm through the sale of shares increases the firm's capital base and encourages expansion. Turnover indicates the number of shares traded in the market at a given price. Variations in company share price may negatively or positively affect a firm's performance (Abina & Lemea, 2019). The study indicated that price change and domestic market capitalisation are positively correlated. Therefore, an increase in price leads to an increase in domestic market capitalisation, and a decrease in price leads to a decrease in domestic market capitalisation. On the other hand, Wan and Hendrawaty (2018) noted that high stock transactions indicate high investors' interest in investing, signalling a firm's good performance and encouraging stocks to be more liquid. As a result, increasing share transactions increases liquidity and improves performance.

Although investors who transact their shares at the DSE are approximately two per cent of the total issued shares (DSE, 2021b), it is necessary to analyse whether they influence the stock market performance. Previous studies focused more on firm performance in relation to turnover. However, the influence of turnover on domestic market capitalisation is yet to be addressed.

Henceforth, analysis deems it necessary to examine to what extent investors' share turnover contributes to the DSE's overall domestic market capitalisation. Hence the following hypothesis was formed:

H_{03}: The share turnover does not influence the domestic market capitalisation of the DSE.

DSE All Share Index and Domestic Market Capitalisation

DSE All Share Index (DSEI) is a market capitalisation-weighted index with a base reference of 1000, representing all stocks listed under DSE (DSE, 2021a). It usually shows the market situation, as Babarinde *et al*. (2020) examined how stock market indicators such as volume and share index impact gross capital formation in Nigeria. Findings revealed that the share index significantly influences gross capital formation. Not only does the share index contribute to the capital formation of firms but also to the market (Eze, 2019). Therefore, increased share indices indicate firms' and markets' growth, leading to economic development. In confirming this, Maxwell *et al*. (2018) analysed the impact of the Nigerian All Share Index, Market Capitalization and Number of Equities on Gross Domestic Product and revealed that All share indices positively relate to market capitalisation and Gross Domestic Product.

Apart from share indices contributing to market growth, it acts as an indicator for individual investors to choose an investment sector. Initially, the selection of firms was based on market capitalisation, but currently, random walk evidence is observed in stock indices, enabling investor assurance and forecasting of investment (Shamshir *et al*., 2018; Uzuke *et al.*, 2016). The authors in previous studies focused on the indices and their usage in investment decisions, economic growth and evaluating market performance. DSE, as a growing market, faces continuous change in the DSEI and is affected by the difference in price among listed companies. As a result, the stability and growth of DSEI are hard to attain; therefore, the attraction of DSE investors to improve performance cannot be guaranteed. So, it was crucial to examine the fluctuation of DSEI, whether it impacts the domestic market capitalisation of DSE, and to what extent, resulting in the formation of the following hypothesis:

H_{04}: The DSE All Share Index does not influence the domestic market capitalisation of DSE.

Conceptual Framework

The conceptual framework (Figure 1) shows the relationship between the dependent and independent variables reflecting the study objectives. Therefore, the dependent variable DSE's domestic market capitalisation indicates the capital of local listed companies. The study, therefore, analyses whether the domestic market capitalisation of the DSE is influenced by the volume of shares traded, turnover and share index, as suggested by Indrayana *et al*. (2020) and Omodero (2019). It further included individual participation and the DSE All Share Index (DSEI) to examine their influence on DSE's domestic market capitalisation.

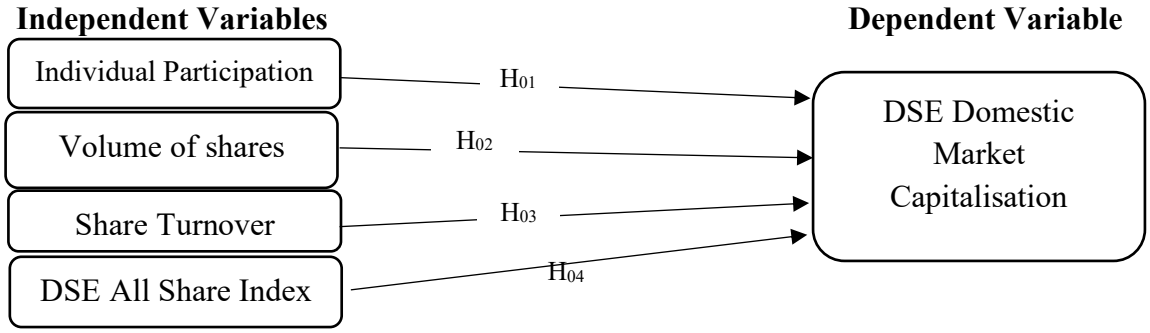

Figure 1: Conceptual Framework

Methodology

Research Design and Data

This study focused on secondary time series data accessed from DSE for seven years. Singh (2006) stated that trends are based on considering recorded data, representing past and present situations and, therefore, what is likely to happen. Therefore, the study contains secondary data relating to the historical phases of DSE in terms of domestic market capitalisation, volume, turnover, and individual participation from June 2014 to June 2020 to examine the current status of DSE. Time series data were generated from equity shares, covering 73 monthly observations.

Time series Analysis

The study used the Autoregressive (AR) Moving Average (ARMA) mathematical model to predict time series data as per Al-Mamun *et al.* (2020). The Box-Jenkins model of1976(Anderson, 1977) is often known as the ARIMA (p, q, d) model, whereby 'p' represents AR, 'q' represents I, and 'd' represents MA. The model consists of four (4) phases, namely identification, parameter estimates of the model, diagnostic testing, and forecasting. Data needs to be stationary to analyse and forecast the trend of indicators. Hence, ARMA (p, d) was employed in this investigation because the domestic market capitalisation and stock market indicators data were stationary, and therefore, no Integration (q) was required. Simple Moving Average was used to get an average of the variables because it reduces the variations and makes it easier to observe the trend of variables. Several related studies, for example, Shah *et al.* (2019) and Uzuke *et al.* (2016), also applied the Box-Jenkins model in analysing the stock market performance. On the other hand, the model links the dependent variable (Domestic Market Capitalization) and independent variables (volume, turnover, individual participation, and DSEI) using the ARMAX model. The ARMAX model is an extension of ARMA known as the ARMA regression model with exogenous variables.

Model Identification

The identification method involves examining the data to obtain the proper ARMA class. It further considers consecutiveness and seasonality in DSE data to make the series stationary. The study's results indicated that domestic market capitalisation, volume, turnover, individual participation and DSEI data were stationary. The study identified stationarity patterns in both mean and variance using the autocorrelation function (ACF) and partial autocorrelation function (PACF). As a result, it was possible to detect the presence of AR and MA components in the residues. Results showed that ACF and PACF had sufficient sparks and were closer to zero, indicating that the data were stationary.

Model Estimation

In estimating the model that best fits all DSE indicators, the study used monthly data from 2014 to 2020. Furthermore, the study determined the best-fit model using the normalised Bayesian information criterion (BIC) and Akaike information criterion (AIC). A comparison of the non-seasonal ARMA models' p-values and BIC determined that the five models with the highest p-values (higher than 0.05) and lowest BIC were chosen. The comparison made it easier to choose the best ARMA model for forecasting purposes, and the following values were used: domestic market capitalisation was (2,0,0) (0,0,0); DSE All Share Index was (1,0,0) (0,0,0); volume was (0,0,0) (0,0,0); and turnover was (1,0,0) (0,0,0); individual participation was (1,0,0) (0,0,0) (*Appendix II-Table 1)*. From the best ARIMA, the data were stationary with zero (0) for Integration (q); therefore, ARMA was appropriate. In domestic market capitalisation, the model included AR (p) at lags 1 and 2 with no transformation, whereas other variables (volume and individual participation) underwent natural log transformation.

Diagnostic Test

The study required running diagnostic tests to find whether the model well fitted the data after validating that the data were stationary and choosing the proper approximated ARMA parameters. The diagnostic tests involved model residuals examination using the ACF, PACF, and normal probability plot of the residual testing the significance. The results demonstrate that the model's residuals had constant variance and zero means (*Appendix III (1)*). Apart from that, analysis of residuals, whether they were white noise, was performed using the portmanteau test. The portmanteau null hypothesis states that variables do not follow a white noise or random walk effect. Results indicated that stock market indicators were not white noise as p-value = 0.9852 > 0.05; therefore, the null hypothesis was accepted. Therefore, the data were predictable *(Appendix III (2))*.

Forecasting using the best ARMA

Forecasting was achievable since the best ARMA was found; the residual had zero mean and variance, and all stock market indicators showed white noise. Using the best ARMA, the study projected domestic market cap, individual participation, volume, turnover, and DSE All Share Index between July 2020 and June 2024. The results showed that the outcome would remain as predicted- Figure 4 and *Appendix IV*.

ARMAX Model

ARMAX (Autoregressive Moving Average with exogenous variables) was appropriate in examining the relationship between domestic market capitalisation and stock market indicators. Because data were not integrated and had no seasonal effect, which would fit in pure ARIMA, previous data explained the predicted data as per ARMA. Apart from that, Domestic Market Capitalisation (**DMC**), as a dependent variable, indicated by yt, was explained by several independent variables, including Turnover (TS), numbers of individual participants (**IP**), volume shares (**VS**), and DSE All Share Index (**DSEI**) as defined in Table 1. The model was adapted from Himilton (2013) and applied to show the relationship between variables as shown:

$$y_t = \beta_0 + \beta_1 TS_{1,\,t-1} + \beta_2 IP_{2,\,t-1} + \beta_3 VS_{3,\,t-1} + \beta_4 DSEI_{4,\,t-1} + \mu_t$$

Where: y_t = domestic market cap at time t, and it is a function of lag-1 and lag-2 values of predictor variables TS, IP, VS, and DSEI, and disturbance μ_t

Table 1: Definition of Variables and Measurement

Dependent Variables		**Description of Variables and Measurements**	**Relationship**
DMC	Domestic Market Capitalisation	Domestic Market Capitalisation DMC= Price X Outstanding shares of Domestic Listed Companies DMC= Monthly trend of DMC from 2014-2020	
Independent/exogenous Variables			
VS	The average volume of shares	The average volume of shares traded; VS= Monthly volume of shares from 2014-2020	+/-
IP	Individual Participation trend	Time series data of individual investors from 2014-2020	+/-
TS	Average turnover of shares	The trend of Average Turnover of shares from 2014-2020	+/-
DSEI	DSE All Share Index	The trend of DSEI from 2014-2020	+/-

FINDINGS AND DISCUSSION

The findings are presented in two parts: Part one is a trend analysis of variables relating to individual participation, market capitalisation, volume, price, and turnover of shares traded under DSE by individuals from 2014 to 2020. Part two comprises findings that show the relationship between the variables (turnover, price index, volume, individual participation) and how they affect the domestic market capitalisation of DSE.

Trends of variables

Market capitalisation

The findings show that the domestic market capitalisation trend has changed significantly from 2008 to June 2020 and has mainly been stationary.

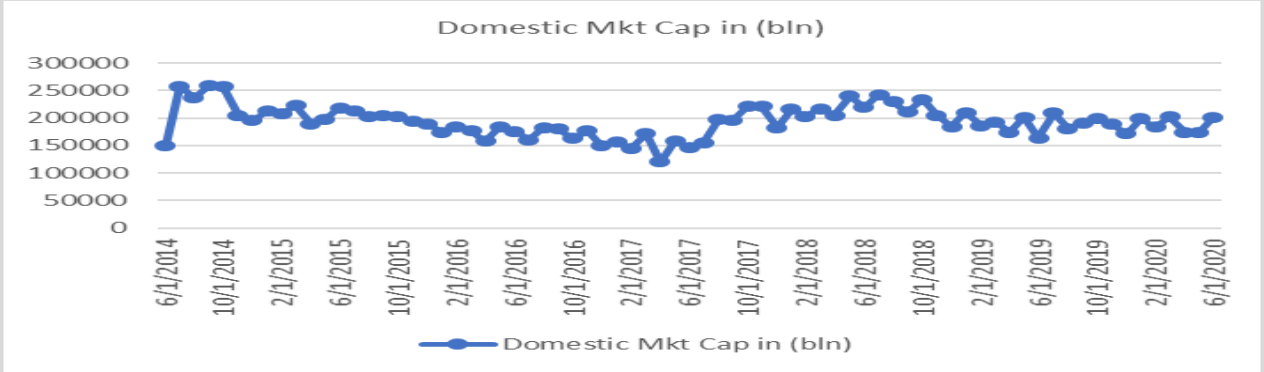

Figure 2: DSE Domestic Market capitalisation trend

The findings, as provided in Figure 2, show that in 2014 there was an increase in domestic market capitalisation. From 2015 to mid-2017 domestic market cap kept declining but increased by the end of 2017 to 2019, then it maintained an average of TZS 194,036 billion (*Appendix II*). The domestic market cap trend series was not uniform but did not vary much because the number of listed companies did not increase frequently. The small volume of shares traded

resulted in a small or no impact on the domestic market capitalisation. Hence, the trend of domestic market capitalisation depended on price and changes in outstanding shares. As a result, few listed companies existed from establishing DSE in 1998 to 2010. However, the number of listed companies increased with the issuing and trading of securities, leading to increased domestic market capitalisation.

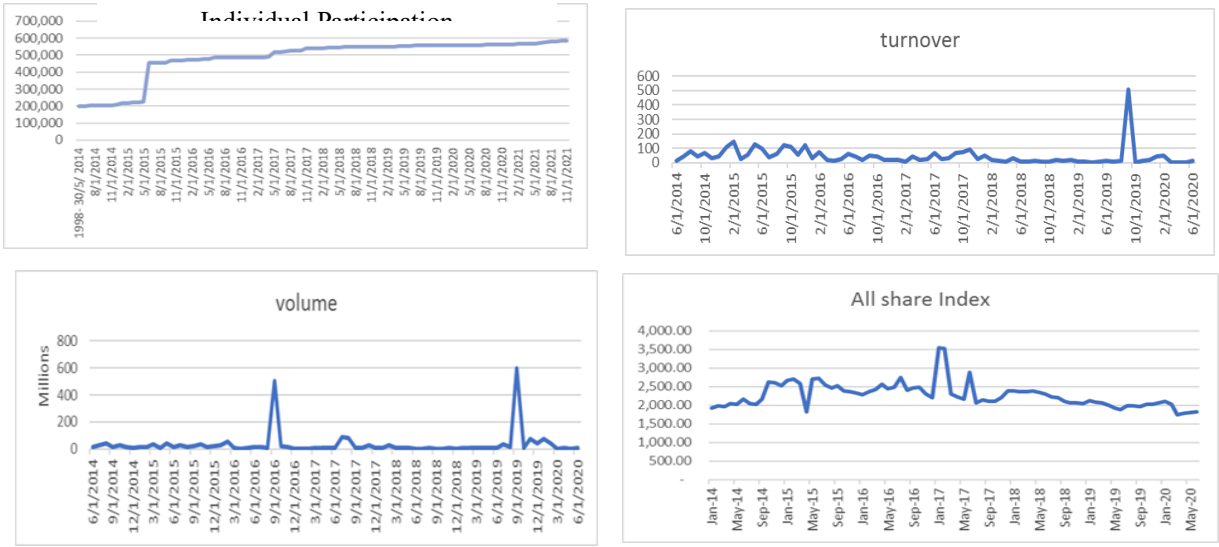

Figure 3: Stock Market indicators
Source: Secondary data

As shown in Figure 3, individual participation was stationary, having a minor increase except in 2015. The rapid increases in 2015 might be associated with the policy change whereby communications companies were required to issue 25% of their shares to individual investors (URT, 2016). Apart from continuous trades by listed companies, Vodacom and Mwalimu Commercial Bank issued new shares, contributing to the increased number of participants. Therefore, the change in individual participation in DSE was small and constant, averaging 4,900 individuals per month. Figure 3 indicates that the turnover had more or less remained the same. However, it increased sharply in mid-2019, caused by an increase in sales by local investors, and decreased at the end of the year, associated with a decrease in the price of shares for DSE Plc, CRDB, DCB, and TBL (DSE, 2019). Generally, the trend for turnover was constant, with a mean value of 44.91 billion. In the case of volume, the findings showed that the trend of the number of transacted shares at DSE was constant. The sharp increase in mid-June 2016 was due to the listing of DSE shares and an increase in share price (DSE, 2016). The decrease at the end of 2016 was associated with selling pressure resulting from socio-economic needs and decreased foreign investors' activities, which affected the volume traded (DSE, 2017a). On the other hand, the increase in 2019 was caused by an increase in sales by local individual investors, as reflected in turnover (DSE 2019). DSEI also ranged between 2,000 units and 2,500 units. However, it increased in the first quarter of 2017 due to increased trade of DSE shares, but it was also assisted by increased trade of cross-listed counters (DSE, 2017a). The decreased volume in the quarter ending June 2017 links to a decrease in the price of some domestic listed and cross-listed companies. For example, ACACIA and Swissport prices decreased by 31 and 30 per cent, respectively (DSE, 2017b). Appendix I shows the average mean trend valuesfor each of the four stock market indicators.

Forecasting

The presented domestic market capitalisation and stock market indicators (individual participants, the volume of shares traded, turnover, and DSEI) were forecast for the subsequent four years, from July 2020 to June 2024. Continuous equities trading in DSE led to a moderate increase at the end of 2020 for domestic market cap, share index, and turnover. However, the variables were expected to remain stationary unless triggered by introducing new shares, policy changes, price changes and other financial and economic changes. Predicted values are shown in *Appendix IV*, while figures are shown in Fig. 4.

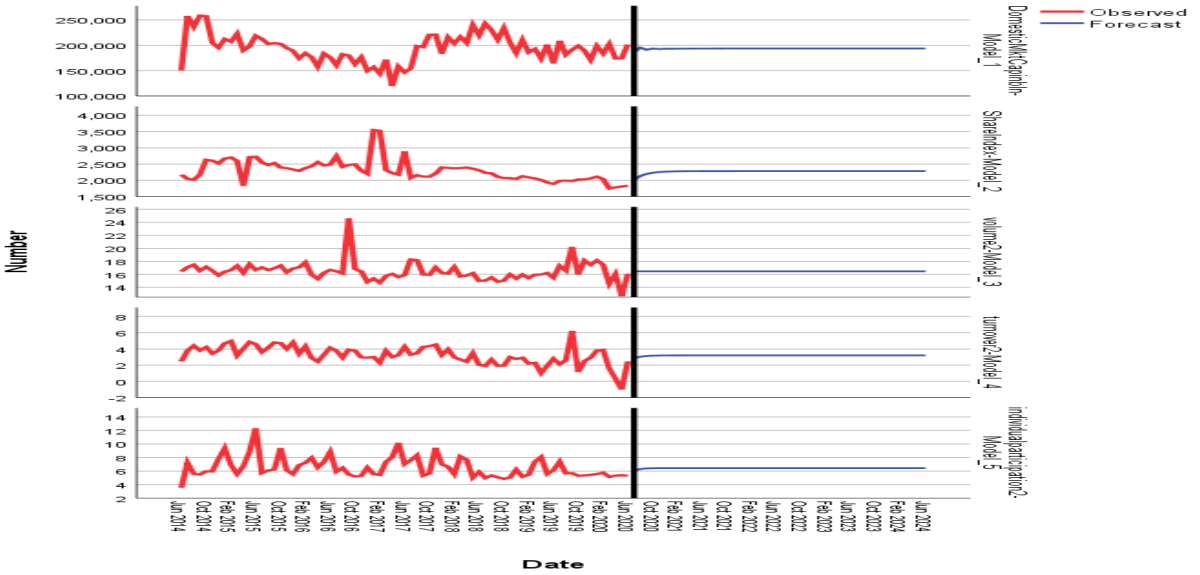

Figure 4: Predicted stock market indicators
Source: Forecasted data for DSE

Relationship between stock Market Indicators and Market Capitalisation

In measuring the relationship between individual participation, DSEI, volume, and turnover of equity shares traded by individuals and how they affected domestic market capitalisation, the ARIMAX model was used; results as shown in Table 2.

Table 2: ARMAX model

Domestic Mkt cap.	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
DSEI	-19.272	0.615	-31.33	0.000	-20.477	-18.066	***
Turnover	6604.37	323.22	20.43	0.000	5970.871	7237.869	***
Individual part.	-1950.471	222.593	-8.76	0.000	-2386.745	-1514.196	***
Volume	966.262	1401.842	0.69	0.491	-1781.298	3713.821	
Constant	229585.64	1497.723	153.29	0.000	226650.16	232521.12	***
L	0.066	0.075	0.88	0.381	-0.081	0.213	
L2	0.041	0.081	0.51	0.61	-0.117	0.199	
Constant	2612.037	746.561	3.50	0.00	1148.804	4075.27	

**** p<.01, ** p<.05, * p<.1*

Individual participation in DSE had a significant negative relationship with domestic market capitalisation with a t-statistic of -8.76 and a p-value <0.05, as shown in Table 2. It was found

that domestic market capitalisation had decreased by 1950 units for a unit increase in individual participation at the DSE. The change was because individuals acquired shares in small quantities, compared to institutional investors who acquired shares in large quantities and the shares hence highly contributed to domestic market capitalisation. With a given price, a small number of shares acquired and transaction costs decrease the domestic market cap. Thus, the null hypothesis was not accepted because the changes in individual participation influenced DSE's domestic market capitalisation. The findings agree with the theoretical review as they relate to Robinson's (2020) and Blume and Keim's (2012), who noted that institutional investors are bigger contributors to market capitalisation than individual investors. The results also relate to the Dow Jones theory because public participation changes the overall market trend. However, the results reflect negative changes to the market brought by the public.

In the case of volume, as seen in Table 2, it was observed that the volume of shares related to the domestic market cap because a rise by a unit volume in shares traded affected the market cap by 966 units. However, the volume of shares transacted appeared to have no significant impact on the domestic market cap of DSE as the P-value was 0.491 ($p > 0.05$). Because most of the shares transacted were in small volumes, their impacts could be seen when combined with price. As a result, the null hypothesis that the volume of shares transacted does not influence domestic market capitalisation was accepted. The findings contradict Hariyanto (2021) and Indrayana *et al*. (2020), although they focused on firms' capital. Similarly, the findings contradict rule five (5) of the Dow theory that the trading volume confirms the market trend because the findings indicated no influence on the market capital. The contradiction can be due to the fact that Hariyanto (2021) and Indrayana *et al*. (2020) focused on the contribution of volume in firms' capital and not on the overall stock market's capital.

The study hypothesised that share turnover does not influence the domestic market capitalisation of DSE. Table 2 indicates that an increase in equity turnover significantly influenced domestic market capitalisation with t-statistics of 20.43 and a p-value <0.05. Hence, whenever there was a unit increase in share turnover, the domestic market cap increased by 6604 units. Hence, the null hypothesis that turnover does not influence domestic market capitalisation was not accepted. The sale of shares increased firms' capital, which led to an overall positive contribution to domestic market capitalisation. The findings align with theoretical expectations and partly with Bonga and Sithole (2019) and Pavone (2019) that an increase in the sale of shares facilitates expansion due to capital accumulation.

Initially, the study suggested that the DSE All Share Index does not influence DSE's domestic market capitalisation. As shown in Table 2, DSEI negatively influenced domestic market capitalisation as the P-value was < 0.05. Hence, the null hypothesis was not accepted, and the alternative hypothesis that the DSEI influences the domestic market cap was accepted at the 1% significant level. The influence was because the share price and domestic market capitalisation were linearly related. However, an increase in the unit of DSEI decreased the domestic market cap by 19 units. The decrease is because as price increases, shareholders sell more for capital gain, which leads to high supply and low demand, resulting in a decline in the price and capital of the market. These findings relate to studies by Eze (2019), Maxwell *et al*. (2018) and Idenyi *et al*. (2017), who identified a causal relationship between market cap and share indices.

Therefore, the results relate to the Dow theory because the price negatively affected the stock market as a reflection of market information (random walk theory).

Conclusion and Implications

The study found that stock market indicator trends were constant with major primary trends. Furthermore, individual participation, DSEI, and equity turnover influenced domestic market capitalisation, while volume did not influence domestic market cap. Therefore, the study concludes that an increase in individual share acquisition increases the number of outstanding shares acquired per given price. However, individuals acquire a small number of shares targeting decreased price, which decreases the firm's and DSE's domestic market capitalisation. Hence, DSE should encourage listing new firms, which leads to the issue of new shares through IPO and facilitates public participation. With an increase in listing and public participation, domestic market capitalisation increases.

Regarding the volume, share transaction at DSE was in a small volume of equities with a given share price. Thus, limited share acquisition by individuals at DSE indicates the small volume of shares traded and thus does not indicate future growth in share trading; hence does not influence the market. Thus, the study urges brokers to advise and encourage individuals to invest to increase the volume and value of shares acquired. On the other hand, turnover involves free float shares (tradable shares) limitedly traded by investors; however, they have a high impact on domestic market capitalisation. Because share price differs per company along with the number of shares traded, high trading companies facilitate increased turnover, influencing the firm's and the market's capitalisation. Therefore, individual investors should be encouraged to acquire shares in large amounts to take advantage of the cost and continue to increase market capitalisation. Where necessary, DSE should establish joint share acquisition among individual investors, such as through social groups or SACCOS, enabling large acquisitions so that they can acquire shares in large amounts, leading to increased share turnover.

DSEI, among the key indicators of firms and market performance, is growing. The growth is due to increased listed companies and local and international investors, which bring in high capital to firms and DSE. As a result, DSEI influences domestic market capitalisation, although an increase in the supply of shares due to increased price negatively affects domestic market capitalisation. As a result, listed companies should develop new strategies that attract investors and trigger share trading and the price of shares. Practically, an increase in trading companies and the price of listed shares can lead to an increased DSEI, indicating the good performance of the DSE.

Theoretically**,** public participation in the stock market and the DSE All Share Index to influence the DSE domestic market capitalisation trend aligns with the Dow Theory. The individual participation, share index and the market movement reflects the tenets of Dow theory. Apart from that, changes in DSE's indicators and domestic market capital did not occur randomly but were triggered by signals such as price changes, policy changes, new issues, or new listings in the market as suggested by Dow theory. However, although the volume of shares traded in DSE is a good indication of the market, it contradicts the theory as it does not signal the general direction of the overall market. The contradiction can be due to the theory focusing more on the firms than the overall market. Apart from that, share trading in Tanzania is still in small

quantities. Therefore, the current study's findings on individual participation trends, volume and turnover and how they influence stock market capitalisation improves the implementation and improvement of policies and initiatives aimed at providing a favourable environment for individual investors. Additionally, policies pertaining to individual investors' protection and motivation tactics might be improved.

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APPENDICES

APPENDIX I: Summary of Mean Values for each variable

Variable	Obs	Mean	Std. Dev.	Min	Max
Individual Participant	73	4900.521	3949.153	34	26,457
Domestic Mkt Cap (bln)	73	194036.13	27872.413	119934.4	258643.92
Turnover (bln)	73	44.911	64.713	37	505.59
Volume (Million)	73	715	588.3	307984	502.9
All share index	73	2293.708	333.304	1747.7	3549.44

APPENDIX II

Table 1: Model Estimation (Best Fit)

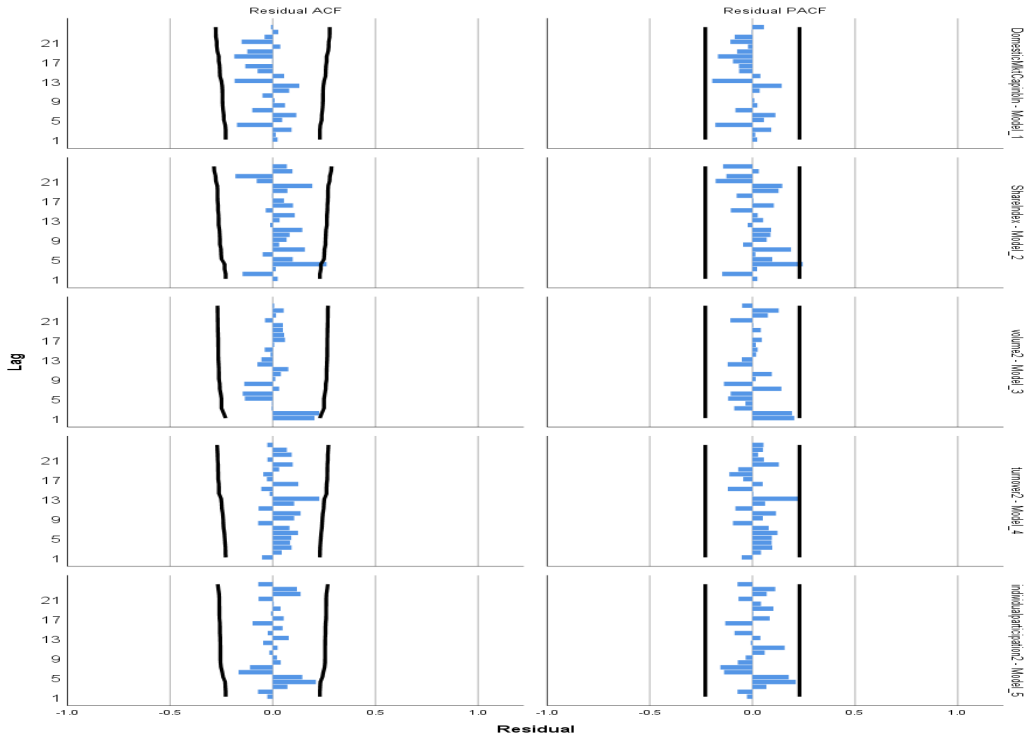
Model Description	**Model Type**
Domestic Mkt Cap in (bln)	ARIMA (2,0,0) (0,0,0)
Share Index	ARIMA (1,0,0) (0,0,0)
Volume 2	ARIMA (0,0,0) (0,0,0)
Turnover 2	ARIMA (1,0,0) (0,0,0)
Individual participation 2	ARIMA (1,0,0) (0,0,0)

Table 2: Parameter estimation

ARIMA Model Parameters				**Estimate**	**SE**	**t**	**Sig.**
Domestic Mkt Cap	No	Constant		193722.730	9039.370	21.431	0.000
	Transformation	AR	Lag 1	0.282	0.103	2.725	0.008
			Lag 2	0.460	0.106	4.324	0.000
Share Index	No	Constant		2283.201	74.517	30.640	0.000
	Transformation	AR	Lag 1	0.576	0.098	5.864	0.000
Volume 2	Natural Logarithm	Constant		2.798	0.010	293.241	0.000
Turnover 2	No	Constant		3.206	0.223	14.361	0.000
	Transformation	AR	Lag 1	0.465	0.105	4.432	0.000
individual part. 2	Natural Logarithm	Constant		1.840	0.035	52.178	0.000
		AR	Lag 1	0.332	0.112	2.954	0.004

APPENDIX III Diagnostic checking

1)Test of Residual ACF & PACF



2) Portmanteau test

Portmanteau test for white noise

Portmanteau (Q) statistic = 12.1638

Prob>Chi2(25) = 0.9852

APPENDIX IV: Forecasted Values

	Domestic Mkt Cap in (bln)-			Share Index-Model_2			volume2-Model_3			turnover2-			individualparti		
Model	Forecast	UCL	LCL	Foreca.	UCL	LCL	Foreca	UCL	LCL	Forec.	UCL	LCL	Forecast	UCL	LCL
20-Jul	186961.18	229019.41	144902.95	2022.04	2569.16	1474.92	16.47	19.31	13.95	2.86	4.92	0.81	6.07	8.91	3.97
20-Aug	195404.51	239101.93	151707.09	2132.66	2764.17	1501.15	16.47	19.31	13.95	3.05	5.32	0.78	6.32	9.46	4.04
20-Sep	191086.15	240323.94	141848.36	2196.42	2853.58	1539.27	16.47	19.31	13.95	3.13	5.44	0.82	6.40	9.60	4.08
20-Oct	193753.19	244397.14	143109.23	2233.18	2898.64	1567.72	16.47	19.31	13.95	3.17	5.49	0.85	6.43	9.64	4.09
20-Nov	192518.35	245003.59	140033.11	2254.37	2922.56	1586.18	16.47	19.31	13.95	3.19	5.51	0.87	6.44	9.66	4.10
20-Dec	193397.23	246706.47	140087.98	2266.58	2935.68	1597.48	16.47	19.31	13.95	3.20	5.52	0.87	6.44	9.66	4.10
21-Jan	193076.89	247135.80	139017.99	2273.62	2943.02	1604.22	16.47	19.31	13.95	3.20	5.53	0.88	6.44	9.66	4.10
21-Feb	193390.92	247878.89	138902.95	2277.68	2947.18	1608.18	16.47	19.31	13.95	3.20	5.53	0.88	6.44	9.67	4.10
21-Mar	193332.07	248155.03	138509.11	2280.02	2949.55	1610.49	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
21-Apr	193459.95	248496.63	138423.28	2281.37	2950.91	1611.82	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
21-May	193468.93	248661.83	138276.03	2282.14	2951.69	1612.60	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
21-Jun	193530.29	248827.76	138232.82	2282.59	2952.14	1613.04	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
21-Jul	193551.72	248923.48	138179.96	2282.85	2952.40	1613.30	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
21-Aug	193585.99	249008.53	138163.45	2283.00	2952.55	1613.45	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
21-Sep	193605.51	249063.69	138147.33	2283.08	2952.63	1613.54	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
21-Oct	193626.78	249109.54	138144.01	2283.13	2952.68	1613.58	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
21-Nov	193641.75	249141.68	138141.83	2283.16	2952.71	1613.61	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
21-Dec	193655.76	249167.58	138143.94	2283.18	2952.73	1613.63	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
22-Jan	193666.60	249186.69	138146.50	2283.19	2952.74	1613.64	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
22-Feb	193676.10	249201.94	138150.25	2283.19	2952.74	1613.64	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
22-Mar	193683.76	249213.60	138153.92	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
22-Apr	193690.29	249222.91	138157.67	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
22-May	193695.66	249230.20	138161.11	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
22-Jun	193700.17	249236.06	138164.28	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
22-Jul	193703.92	249240.74	138167.09	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
22-Aug	193707.05	249244.52	138169.58	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
22-Sep	193709.65	249247.58	138171.73	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
22-Oct	193711.83	249250.06	138173.60	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
22-Nov	193713.64	249252.09	138175.19	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
22-Dec	193715.15	249253.76	138176.55	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
23-Jan	193716.41	249255.12	138177.70	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
23-Feb	193717.46	249256.25	138178.68	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
23-Mar	193718.34	249257.17	138179.51	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
23-Apr	193719.07	249257.94	138180.20	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
23-May	193719.68	249258.57	138180.79	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
23-Jun	193720.19	249259.09	138181.28	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
23-Jul	193720.61	249259.53	138181.69	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
23-Aug	193720.96	249259.89	138182.03	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
23-Sep	193721.26	249260.19	138182.32	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
23-Oct	193721.50	249260.44	138182.56	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
23-Nov	193721.70	249260.65	138182.76	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
23-Dec	193721.88	249260.82	138182.93	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
24-Jan	193722.02	249260.96	138183.07	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
24-Feb	193722.14	249261.08	138183.19	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
24-Mar	193722.23	249261.18	138183.29	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
24-Apr	193722.32	249261.26	138183.37	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
24-May	193722.39	249261.33	138183.44	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10
24-Jun	193722.44	249261.39	138183.49	2283.20	2952.75	1613.65	16.47	19.31	13.95	3.21	5.53	0.88	6.44	9.67	4.10