MALTA STOCK EXCHANGE
EQUITY TOTAL RETURN INDEX
(MSETRX)
METHODOLOGY

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1. Introduction

This document details the calculation of the Malta Stock Exchange Equity Total Return Index (MSETRX).

The Exchange publishes the Index, which is calculated at various intervals during the trading day.

2. MSETRX Overview

The MSETRX takes into account the market capitalisation of its constituents, based on the last closing prices. Corporate actions that are accounted for in the MSETRX calculation include:

- Dividends
- New company admitted to trading
- A company leaves the index
- Addition of shares
- Subtraction of shares

Securities will be eligible for inclusion in the MSETRX if:

- The security is an ordinary share
- The security is admitted to trading on the Malta Stock Exchange official list.

Securities will be removed from the MSETRX Index after the close of trading on delisting date.

The MSETRX Index is based at 1,000 on December 27, 1995.

Historic data for the MSETRX Index from the 27th December 1995 onwards is available on www.borzamalta.com.mt

3. MSETRX Calculation Formulae

The basic equation for the Index at time 't' is:

$$\text{Index}_t = \frac{\sum_{i=1}^{n} (P_{it} * Q_{it})}{\sum_{i=1}^{n} (P_{it-1} * Q_{it-1})} * \text{Index}_{t-1}$$

Whereby:

t	=	Computation date of the Index	
n	=	Number of companies included in the calculation of the Index	
P_{it}	=	Closing price of share i at time t	

Q_{it}	=	Number of shares of company i at time t
t-1	=	The last day before a change in the base market capitalisation occurred
P_{it-1}	=	Closing price of share i at time t-1
Q_{it-1}	=	Number of shares of company i at time t-1
$\sum_{i=1}^{n}(P_{it}*Q_{it})$	=	Total capitalisation of all companies at time t.
$\sum_{i=1}^{n}(P_{it-1}*Q_{it-1})$	=	Total capitalisation of all companies prevalent at the session before the change occurs.

The value of the MSETRX is calculated on a daily basis, (Monday – Friday) using the closing share prices and the entire amount of issued shares of all the securities included in the calculation of the Index.

If no trading takes place for a security on the trading day concerned, the last known price will be taken.

The aim of the compiler of the MSETRX when making adjustments is to ensure that the Index continues to reflect as close as possible the value of the underlying portfolio.

All adjustments must meet the requirement that the Index shall remain unchanged as a result of an operational adjustment. Hence, the Index shall not be affected before trading occurs in a security submitted to a change.

4. Corporate Actions

The composition of the portfolio on which the MSETRX is based may change as a result of corporate actions of one or more of the constituent securities. Such actions will therefore be reflected in the calculation of the Index.

4.1 Corporate Action Types – Announcement of a Dividend

When a company announces the payment of a dividend, the net cash dividend (NCD) is added to the market capitalisation of the company. This is accounted for on the day the equity concerned is trading ex-dividend. The equation to be used is as follows:

$$\text{Index}_t = \frac{\sum_{i=1}^{n} (P_{it} * Q_{it}) + \sum (NCDt)}{\sum_{i=1}^{n} (P_{it-1} * Q_{it-1})} * \text{Index}_{t-1}$$

Whereby:

$\sum_{i=1}^{n}(P_{it}*Q_{it})$ = Total capitalisation of all companies at time t.

NCDt = Net cash dividends, including any net amounts with the right to be converted to scrip shares.

The net amount is calculated by multiplying the net dividend per share by the number of listed shares.
If the applicable tax rate is not announced by the time of the corporate action adjustment, the net dividend per share is calculated at the corporate tax rate applicable at the time, currently 35%

$\sum_{i=1}^{n}(P_{it-1}*Q_{it-1})$ = Total capitalisation of all companies prevalent at the session before the change occurs.

4.2 Corporate Action Types – Company Joins the MSETRX

A newly listed company on the Exchange shall be added to the MSETRX on the day it is admitted to trading. If the new company trades at par with its listing price, the index will not be affected.

If we assume 'Company D' is to join the index the computation will be made as follows:

$$\text{Index }_t = \frac{\sum_{i=1}^{n-D}(P_{it} * Q_{it}) + (P_{Dt} * Q_{Dt})}{\sum_{i=1}^{n}(P_{it-1} * Q_{it-1}) + (P_{Djt} * Q_{Djt})} * \text{Index}_{t-1}$$

Whereby:

$\sum_{i=1}^{n-D}(P_{it}*Q_{it})$ = Total capitalisation of all companies excluding Company D (The newly listed company).

$(P_{Dt} * Q_{Dt})$ = Market capitalisation of Company D. (Until the equity trades for the first time following the corporate action, PDt refers to the listing / offer price.)

$\sum_{i=1}^{n}(P_{it-1}*Q_{it-1})$ = Total capitalisation of all companies prevalent at the session before the change occurs.

$(P_{Djt} * Q_{Djt})$ = Market capitalisation of the new equity at the listing / offer price.

Index_{t-1} = Index reading of the session before the change in capitalisation.

4.3 Corporate Action Types – Company Leaves the MSETRX

Whenever a constituent company leaves the index, the MSETRX is recalculated in such a manner that it will remain unaltered.

If we assume 'Company E' is to leave the index the computation will be made as follows:

$$\text{Index}_t = \frac{\sum_{i=1}^{n} (P_{it} * Q_{it})}{\sum_{i=1}^{n} (P_{it-1} * Q_{it-1}) - (P_{Et} * Q_{Et})} * \text{Index}_{t-1}$$

Whereby:

$\sum_{i=1}^{n}(P_{it}*Q_{it})$ = Total capitalisation of all companies at time t.

$\sum_{i=1}^{n}(P_{it-1}*Q_{it-1})$ = Total capitalisation of all companies prevalent at the session before the change occurs.

$(P_{Et} * Q_{Et})$ = Latest market capitalisation of the equity leaving the index.

Index_{t-1} = Index reading of the session before the change in capitalisation.

4.4 Corporate Action Types – Addition of shares of a company already included in the MSETRX

Changes in the capital structure of a constituent company are accounted for in the computation of the Index. The index shall remain unaffected if the security is not traded. Hence an adjustment is made to its capitalisation until it is traded on the market.

Additions of shares might include:

- Rights Issue
- Share Option Scheme
- Bonus Issue
- Share Split

> ➢ *In the event of a Rights Issue, the Index will be recalculated through the following equation. The same principle applies in the case of a Share Option Scheme.*

If we assume 'Company F' offers a rights issue the computation will be made as follows:

$$Index_t = \frac{\sum_{i=1}^{n-F} (P_{it} * Q_{it}) + (P_{Frt} * Q_{Frt})}{\sum_{i=1}^{n} (P_{it-1} * Q_{it-1}) + (P_{Frrt} * Q_{Frrt})} * Index_{t-1}$$

Whereby: $\sum_{i=1}^{n-F}(P_{it}*Q_{it})$ = Total capitalisation of all companies at time t excluding the Company F (The company offering the Rights Issue.)

$(P_{Frt} * Q_{Frt})$ = Market Capitalisation of Company F. (Until the equity trades for the first time following the corporate action, PFrt refers to the adjusted close price.)

Determining the adjusted close price:

A = No. of Shares before the Rights Issue
R = New Shares
C = Attribution Price

$$Adjusted\ Close\ Price = \frac{(Closing\ price * A) + (C * R)}{(A + R)}$$

$\sum_{i=1}^{n}(P_{it-1}*Q_{it-1})$ = Total capitalisation of all companies prevalent at the session before the change occurs.

P_{Frrt} = Price C at which shares are offered in the Rights Issue.
Q_{Frrt} = Quantity of shares offered in the Rights Issue.
$(P_{Frrt} * Q_{Frrt})$ = Capitalisation of the new shares of Company F.
$Index_{t-1}$ = Index reading of the session prior to the change in capitalisation.

> ➤ *In the event of a Bonus Issue, the Index will be adjusted in such a way that the value of the Index remains the same. , the Index will be recalculated through the following equation. The same principle applies in the case of a Share Split and when Scrip Shares are admitted to trading.*

If we assume 'Company G' is giving a bonus issue the computation will be made as follows:

$$Index_t = \frac{\sum_{i=1}^{n-G} (P_{it} * Q_{it}) + (P_{Gbt} * Q_{Gbt})}{\sum_{i=1}^{n} (P_{it-1} * Q_{it-1})} * Index_{t-1}$$

Whereby:

$\sum_{i=1}^{n-G}(P_{it}*Q_{it})$ = Total capitalisation of all companies at time t excluding the Company G (The company giving a Bonus Issue.)

$(P_{Gbt} * Q_{Gbt})$ = Market capitalisation of Company G. (Until the equity trades for the first time following the corporate action, PGbt refers to the adjusted close price.)

Determining the adjusted close price:

A = No. of Shares before the Bonus Issue
B = Bonus Shares

$$Adjusted\ Close\ Price = \frac{(Closing\ price * A)}{(A + B)}$$

$\sum_{i=1}^{n}(P_{it-1}*Q_{it-1})$ = Total capitalisation of all companies prevalent at the session before the change occurs.

$Index_{t-1}$ = Index reading of the session prior to the change in capitalisation.

4.5 Corporate Action Types – Subtraction of shares of a company already included in the MSETRX

Changes in the capital structure of a constituent company are accounted for in the calculation of the Index. The index shall remain unaffected if the security is not traded. Hence an adjustment is made to its capitalisation until it is traded on the market.

Subtraction of shares might include:

- Consolidation of Shares

> *In the event of a Consolidation of Shares, the Index will be adjusted in such a way that the value of the Index remains the same. The Index will be recalculated through the following equation.*

If we assume 'Company H' announces a consolidation of its shares the computation will be made as follows:

$$\text{Index}_t = \frac{\sum_{i=1}^{n-H}(P_{it} * Q_{it}) + (P_{Hct} * Q_{Hct})}{\sum_{i=1}^{n}(P_{it-1} * Q_{it-1})} * \text{Index}_{t-1}$$

Whereby:

$\sum_{i=1}^{n-H}(P_{it}*Q_{it})$ = Total capitalisation of all companies at time t excluding the Company H (The company consolidating its shares.)

$(P_{Hct} * Q_{Hct})$ = Market capitalisation of Company H. (Until the equity trades for the first time following the corporate action, PHct refers to the adjusted close price.)

Determining the adjusted close price:

A = No. of Shares before Consolidation
J = Amount of Shares to be subtracted

$$\text{Adjusted Close Price} = \frac{(\text{Closing price} * A)}{(A - J)}$$

$\sum_{i=1}^{n}(P_{it-1}*Q_{it-1})$ = Total capitalisation of all companies prevalent at the session before the change occurs.

Index_{t-1} = Index reading of the session prior to the change in capitalisation.

5. Capital denominated in foreign currencies

The MSETRX includes companies whose equity is denominated in foreign currency. In such cases the capitalisation of such companies is converted to EUR using the monthly average exchange rate of the last month as issued by the European Central Bank and henceforth updated every first trading of the month or when the compiler of the Index deems necessary. The same principle applies when these same companies announce a dividend payment and the net cash dividends are added to the index. The denominator will be calculated using the exchange rate before the change in index.

The formulas to determine the market capitalisation of non EUR denominated companies for the numerator and the denominator are:

$(P_{it} * Q_{it}) * AvgX$ = Market capitalisation of the company at time t converted to EUR using the Average exchange rate of last month.

$(P_{it-1} * Q_{it-1}) * AvgX_{-1}$ = Market capitalisation of the company at time t-1 converted to EUR using the Average exchange rate of the previous month.
If during the month there is a change due to a corporate action after the change to exchange rate has been effected, the exchange rate of the denominator will be equal to the exchange rate of the numerator.

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