MSCI TECHNICAL COMMUNICATION

MSCI Unexpected Market Closure Index Variant

MSCI Product Development

November 2018

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INTRODUCTION

Dear Valued Subscriber,

As announced on November 6th, 2018, MSCI will make available a new index level variant that would be adjusted for Unexpected Market Closure Events starting March 2019.

MSCI will determine the MSCI Indexes for which this new variant will be calculated only at the monthly and quarterly expiry dates for MSCI Index-linked futures. Prior to the futures' expiry date, MSCI will not monitor Unexpected Market Closure Events or calculate the additional variant for indexes.

The new index level variant will be calculated for MSCI Market Cap and Small Cap Indexes, MSCI Value and Growth Style Indexes, as well as for MSCI Sector Indexes. The variant will not be calculated for MSCI Factor Indexes, MSCI FX-hedged Indexes, MSCI Thematic Indexes, MSCI Strategy Indexes, or MSCI ESG Indexes.

Description of the notification and file delivery process:

- On the day of monthly and quarterly expiries email notifications will be sent to the derivatives exchanges which are licensed for the use of MSCI Index data for futures and options. These notifications will include closing values for all MSCI indexes which are the basis for futures or options, and they will also highlight those indexes which include markets which were unexpectedly closed.

- In instances where an index contained an unexpectedly closed market on a monthly or quarterly expiry, another set of email notifications will be sent to the exchanges on the day the unexpectedly closed market reopens. These emails will include the values of the newly calculated variant(s) for the indexes which contained unexpectedly closed markets which reopened.

- The notifications will be sent to the exchanges in accordance with the distribution schedules of MSCI Core and Small Cap modules. Each daily notification email will only

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include the index variants of the indexes which are distributed in the module cycle. Currently MSCI modules are distributed in three cycles daily.

- The values for indexes and the underlying securities information will also be made available to all subscribers of MSCI Indexes through the view 'derivatives' via the MSCI Index API. The following scenarios describe each stage of the data distribution through the API:
    - No unexpected market closure: The MSCI Index API will return a message saying no unexpected market closure has occurred to clients who in an automated way will try to extract information.
    - Unexpected market closure: The API will return a message saying there is an unexpected market closure and that the alternative index variant will be calculated and made available when market reopens.
    - Market reopens: The API will provide Index and Constituent level information for all indexes which were impacted by the unexpected market closure.

Enclosed in this announcement are sample emails with data content of all possible market disruption scenarios, as well as the JSON file to be used for API product delivery.

For further information or support please email clientservice@msci.com.

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APPENDIX I: EMAIL FORMAT

The format of the emails containing closing values for all indexes which are the basis for futures/options, as well as when an index contains an unexpectedly closed market, are as follows:

Day of Derivatives Expiry – At the End of the Day

Computation Date	Settlement Date	Index Code	Index Name	Index Variant	Index Currency	Index Level	Includes markets with unexpected closure	Final Adjusted Index Level
20181026	20181026	891800	MSCI EM (Emerging Markets)	STRD	USD	1213.14	Yes	No
20181026	20181026	891800	MSCI EM (Emerging Markets)	NETR	USD	444.34	Yes	No
20181026	20181026	899700	MSCI EM Asia	STRD	USD	456.45	Yes	No
20181026	20181026	912400	MSCI Canada	STRD	USD	1665.65	No	Yes

Market with unexpected closure	Market ISO Code	Disruption Start Date	Disruption End Date
PHILIPPINE SE (MANILA)	XPHS	20181026	

On the Day when the Market(s) Reopen(s) after the Disruption

Computation Date	Settlement Date	Index Code	Index Name	Index Variant	Index Currency	Index Level	Includes markets with unexpected closure	Final Adjusted Index Level
20181029	20181026	891800	MSCI EM (Emerging Markets)	STRD	USD	1215.15	Yes	Yes
20181029	20181026	891800	MSCI EM (Emerging Markets)	NETR	USD	445.35	Yes	Yes
20181029	20181026	899700	MSCI EM Asia	STRD	USD	457.45	Yes	Yes
20181029	20181026	912400	MSCI Canada	STRD	USD	1665.65	No	Yes

Market with unexpected closure	Market ISO Code	Disruption Start Date	Disruption End Date
PHILIPPINE SE (MANILA)	XPHS	20181026	20181029

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APPENDIX II: API/JSON FILE DETAILS & INSTRUCTIONS

A new view 'derivatives' will be added to the Index Performance, Security & Constituents APIs.

The 'derivatives' data allows clients to download MSCI Index Data for Indexes that have derivative contracts (Futures & Options) associated with it. The new Index level variant will only be calculated for the defined Indexes which have an associated derivative contract, and thus the 'derivatives' view would also only be available for these Indexes in the event of an unexpectedly closed market occurring on a settlement date.

A detailed technical documentation for the API titled 'MSCI Index API for Unexpected Market Closure Data' (Version 1.0) will be made available.

SAMPLE JSON OUTPUT FOR INDEX PERFORMANCE API

URL:
https://api.msci.com/index/performance/v1.0/indexes/990100/derivatives?computation_date=20181018&settlement_date=20181018


```
{
        "msci_index_code": 990100,
        "INDEX_DESCRIPTION": {
                "computation_date: "20181018"
                "settlement_date : "20181018"
                "msci_index_code": 990100,
                "index_name": "WORLD",
                "nb_of_securities": 1638,
                "nb_of_issuers": 1621,
                "is_Final" : true // or false when at least one Market in Index is
disrupted
        },
        "INDEX_MARKET_CAP": [
                {
                        "ISO_currency_symbol": "USD",
                        "adj_mkt_cap_eod": 40882190.817495,
                },

        ],
        "INDEX_PERFORMANCE": [
                {
                        "index_variant_type": "GRTR", // repeated for "NETR" & "STRD",
                        "ISO_currency_symbol": "USD", //repeated for other currencies as
applicable
                        "level_eod": 8801.723101,
                        "level_eod_prev_day": 8833.801313,
```


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```
                        "perf_eod": -0.363,  //populated only for Base currency, null
for others
                } ... ,
        ],
}
```


SAMPLE JSON OUTPUT FOR INDEX CONSTITUENTS API

URL:
https://api.msci.com/index/constituents/v1.0/indexes/990100/derivatives?computation_date=20181018&settlement_date=20181018


```
“indexConstituents”:[
{
  "computation_date": 20161028,
  "settlement_date": 20161028,
  “msci_index_code":990100,
  “nb_of_securities”:1653,
  "ISO_currency_symbol": "USD",
  “initial_mkt_cap_eod”: 37039.16,
  "unadj_mkt_cap":37039.16,
  "adj_mkt_cap_eod": 37039.16
  “constituents”:[
   {
          "msci_security_code": "1016301",
          “msci_timeseries_code”: 180,
          “full_mkt_cap_adjustment_factor”: 1,
          “sec_initial_idx_market_cap_usd”: 826,330,050,000,
          “sec_adj_idx_market_cap_usd”: 826,330,050,000,
          “sec_unadj_idx_market_cap_usd”: null,
          “initial_weight”: null,
          “closing_weight”: null,

   }…. //repeated for all constituents.
}
]
```


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SAMPLE JSON OUTPUT FOR SECURITY MASTER API

URL:
https://api.msci.com/index/secmaster/security/v1.0/securities/ALL/derivatives?index_code=990100&computation_date=20181018&settlement_date=20181018


```
{
        "securities": [{
        "msci_security_code": 1000801,
        "DESCRIPTION": {
                "computation_date: "20181018"
                "settlement_date : "20181018"
                "msci_security_code": 1000801,
                "msci_timeseries_code": 10,
                "msci_issuer_code": 10008,
                "security_name": "ABBOTT LABORATORIES",
                "msci_group_entity_code": 291,
                "share_class": "COMMON",
                "share_type": null,
                "alternate_listing": null,
                "ISO_country_symbol": "US",
                "ISO_country_symbol_next_day": "US",
                "non_local_listing_flag": 0
        },
        "IDENTIFIERS": {
                "isin": "US0028241000",
                "ticker": "ABT UN Equity",
                "barra_id": "USAA5F1",
                "RIC": "ABT.N",
                "cusip": "002824100", // may be null if client does not have CUSIP
license
                "sedol": "2002305", // may be null if client does not have SEDOL license
                "mic": "XNYS",
                "china_stock_code": null,
        },
        "GICS": {
                "sector": 35,
                "industry_group": 3510,
                "industry": 351010,
                "sub_industry": 35101010,
        },

        "PRICE_NOS": {
                        "price_ISO_currency_symbol": "USD", // null when Market is
disrupted
                        "price": 71.44000, // null when Market is disrupted
```


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```
                        "price_ISO_curr_symbol_prev": null,
                        "price_prev_day": null,
                        "value_of_quotation": 1, // null when Market is disrupted
                        "value_of_quotation_prev_day": null,
                        "spot_fx": 1.000000000000000, // null when Market is disrupted
                        "spot_fx_prev": null,

                        "price_adjustment_factor": null,
                        "adjustment_comments": null,
                        "number_of_shares_comment": null,
                        "paf_formula": null,


                        "closing_number_of_shares": null,
                        "eod_number_of_shares_today": 1753187766.0000,
                        "events": [ //null for this release may be populated as shown
below in future releases
                                {
                                        "event_id": 126692,
                                        "event_type": "SPIN",
                                        "event_description": "Spun off trading on the ex-
date."
                                }
                        ]
                },
        "MARKET_CAP": [{
                        "ISO_currency_symbol": "USD", // null when Market is disrupted
                        "initial_mkt_cap": 125493180290.280000, // null when Market is
disrupted
                        "adj_market_cap": 125247734003.040000, // null when Market is
disrupted
                        "unadj_market_cap_today": null,
                        //"company_full_mktcap": 125247734003.040000,
                        "price_performance_index": null,
                        "prev_price_performance_index": null,

                }, {
                        "ISO_currency_symbol": "LOC",
                        "initial_mkt_cap": 125493180290.280000,
                        "price_performance_index": null,
                        "prev_price_performance_index": null
                }
        ],

        "RETURNS": [ //null for this release may be populated as shown below in future
releases
                {
                        "return_type": "STRD", // "GDTR",
                        "methodology": "NONE",
                        "returns": -0.1955853590388,
                        "period": "1D",
                        "ISO_currency_symbol": "USD" // "LOC"
                },
```


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```
                {
                        "return_type": "NDTR",
                        "tax_profile": "INTL", //"DOM"
                        "methodology": "NONE",
                        "returns": -0.1955853590388,
                        "period": "1D",
                        "ISO_currency_symbol": "USD" //"LOC"
                }
        ],


        "INCLUSION_FACTORS": {
                "foreign_ownership_limit": 1.0000,
                "foreign_inclusion_factor": 1.0000,
        }
        } ] ..,
}
```


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APPENDIX III: API PRODUCT DETAILS

Below you will find the product files description.

For details on the description of the fields please consult the MSCI Global Equity Products Technical Documentation.

The document is available via:
https://support.msci.com/

Index Level Data Set:

#	Data Points in Index Level Data Set	Data Points in Disruption Indexes - Sample File
1	Calculation Date	Yes
2	MSCI Index Code	Yes
3	Index Variant Type	Yes (Underlying index variant)
4	MSCI Index Name	Yes
5	Number of Securities in Index	Yes
6	Number of Issuers in Index	Yes
7	Adjusted Mkt Cap in MM (USD)	Yes
8	Base Currency ISO Symbol	Yes
9	Index level in Base Curr (today)	Yes
10	Index Level in Base Curr (prev)	Yes
11	Daily perf in Base Curr (pct)	Yes
12	Currency 1 ISO Symbol	Yes
13	Index level in Curr 1 (today)	Yes
14	Currency 2 ISO Symbol	Yes
15	Index level in Curr 2 (today)	Yes

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Security Level Data Set:

#	Data Points in Security Level Data Set	Data Points in Disruption Indexes
1	Calculation Date	Yes
2	As Of Date	Yes
3	MSCI Security Code	Yes
4	MSCI Time series Code	Yes
5	Security Name	Yes
6	Share Class	Yes
7	Share Type	Yes
8	ISO Country Symbol	Yes
9	Alternate Listing	Yes
9	Sector	Yes
10	ISO Country Symbol	Yes
11	Industry Group	Yes
12	Industry	Yes
13	Sub-industry	Yes
14	Price	Yes
15	Price previous	Blank
16	ISO Currency Symbol of Price	Yes
17	ISO Currency Symbol of Price prev	Blank
18	Value of Quotation	Yes
19	Value of Quotation previous	Blank
20	Spot FX Rate	Yes
21	Spot FX Rate Previous	Blank
22	Daily Price Return in Local	Blank
23	Daily Price Return in USD	Blank
24	Daily Gross Total Return in Local	Blank
25	Daily Gross Total Return in USD	Blank
26	International Net DTR in Local	Blank
27	International Net DTR in USD	Blank
28	Domestic Net DTR in Local	Blank
28	Domestic Net DTR in USD	Blank
29	Index of Price in Local	Blank
30	Index of Price in Local Previous	Blank
25	Sec Initial Full Mkt Cap (USD)	Yes
26	Sec Adjusted Mkt Cap (USD)	Yes
27	Sec Init Full Mkt Cap (price curr)	Yes
28	Sec Closing mkt Cap (USD)	Blank
29	Sec Init Full Mkt Cap (price)	Blank
28	Event Type	Blank

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29	Event description	Blank
30	NOS comment	Blank
31	External Event ID	Blank
32	PAF formula	Blank
33	Price Adjustment Factor	Blank
34	Foreign Inclusion Factor	Yes
35	Domestic Inclusion Factor	Yes
36	Number of Shares (Today Index)	Yes
37	Closing Number of Shares	Blank

Security Future Data Points:

#	Security Future Data Points (Covering the disruption period)	
1	Calculation Date	D 80
2	As Of Date	D80
3	MSCI Security Code	N 70
4	MSCI Timeseries Code	N 80
5	Security Name	S 25 0
6	Share Class	S 20 0
7	Share Type	S 15 0
8	Alternate Listing	S 10 0
9	ISO Country Symbol	S 20
10	Sector	N 20
11	Industry Group	N 40
12	Industry	N 60
13	Sub-industry	N 90
14	ISO Country Symbol of Prices prev	S 30
15	Value of Quotation previous	N 10 0
16	Event Type	S 60 0
17	Event Description	S 254 0
18	NOS Comments	S 254 0
19	PAF formula	S 800 0
20	Foreign Inclusion Factor	N 64
21	External Event ID	N 10 0
22	Domestic Inclusion Factor	N 64

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Security Constituents Data Set:

#	Data Points in Constituent Level Data Set	Data Points in Disruption Indexes
1	MSCI Index Code	Yes
2	MSCI Security Code	Yes
3	MSCI Timeseries Code	Yes
4	Full Mkt Cap Index Adj Factor	Yes
5	Sec Initial Index Market Cap	Yes
6	Sec Closing Index Market Cap	No
7	Initial Weight in percentage	No
8	Closing Weight in percentage	No

Security Dividend Data Set:

#	Dividend Data Points	
1	Calculation Date	D 80
2	As Of Date	D 80
3	Reinvestment in index date	D 8 0
4	MSCI Security Code	N 7 0
5	MSCI Timeseries Code	N 70
6	Security Name	S 25 0
7	MSCI Dividend code	N 90
8	Xd-date	D 80
9	Dividend description	S 15 0
10	Correction flag	N 10
11	Gross dividend amount	N 15 5
12	Net dividend amount international	N 15 5
13	Net dividend amount domestic	N 15 5
14	Dividend ISO currency symbol	S 30
15	Dividend sub-unit	N 53
16	Dividend adjustment factor	N 10 5
17	DTR Number of Shares	N 16 4

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Security Code Map Data Set:

#	Data Points	
1	Calculation Date	D 80
2	As Of Date	D 80
3	Security Name	S 25 0
4	MSCI Security Code	N 7 0
5	MSCI Timeseries Code	N 80
6	MSCI Issuer Code	N 50
6	Sedol	S 70
7	Cusip	S 12 0
8	Isin	S 12 0
9	Reuters Code (RIC)	S 20 0
10	Security Ticker	S 20 0
11	Barra ID	S 80
12	MIC	S 50

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APPENDIX IV: DISTRIBUTION CYCLES

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Index Distribution Cycle	Expected Distribution Time (in ET)
Asia Pacific	12:30 - 1:00 PM
Europe	2:30 - 3:00 PM
World (DM + EM Modules)	5:30 - 6:00 PM

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