

Global Equity Futures Watch

Dec-23 Global Equity Index Futures Roll Cost Chartbook

Equity index futures roll costs for 34 global futures rolls

Data through **December 2023**, futures implied financing spreads calculated using forecasted gross dividends except for MSCI EAFE, MSCI EM, KOSPI 200, ASX 200, TWSE, CSI 500, CSI 300, FTSE China A50, Heng Seng, HSCEI, Nifty, and FTSE 100 which use net dividends.

Exhibit 1: Equity index futures roll financing spreads for various indices globally

Data through Dec-2023, base rate for each equity index future's financing spread provided as well

Index name	Region	Roll frequency	Base Rate	Most recent roll cost	1-year avg. roll cost
MSCI EAFE	Global	Quarterly	Fed Funds	0.59%	0.19%
MSCI Emerging Markets	Global	Quarterly	Fed Funds	0.42%	0.31%
KOSPI 200*	Asia Pacific	Quarterly	USD SOFR	-0.17%	-0.36%
S&P ASX 200	Asia Pacific	Quarterly	AUD 3M Deposit	0.36%	0.08%
TOPIX	Asia Pacific	Quarterly	TONAR	0.04%	0.03%
Nikkei 225	Asia Pacific	Quarterly	TONAR	0.03%	0.01%
Hang Seng	Asia Pacific	Monthly	HIBOR 1M	1.54%	0.37%
Nifty (Local)	Asia Pacific	Monthly	INR 1M Swap	3.03%	0.81%
Nifty (IFSC)	Asia Pacific	Monthly	INR 1M Swap	4.03%	1.24%
Hang Seng China Enterprises	Asia Pacific	Monthly	HIBOR 1M	1.83%	0.84%
MSCI Singapore	Asia Pacific	Monthly	SGD 1M Deposit	1.22%	-0.34%
TWSE*	Asia Pacific	Monthly	USD SOFR	3.28%	-1.24%
FTSE China A50*	Asia Pacific	Monthly	USD SOFR	-1.03%	-0.13%
FTSE Bursa Malaysia KLCI	Asia Pacific	Monthly	Malaysia Klibor 1M	-1.22%	-1.62%
CSI300*	Asia Pacific	Monthly	USD SOFR	-5.74%	-0.16%
CSI500*	Asia Pacific	Monthly	USD SOFR	-9.39%	-6.34%
S&P 500	Americas	Quarterly	Fed Funds	0.60%	0.42%
Russell 2000	Americas	Quarterly	Fed Funds	0.47%	0.14%
Russell 1000	Americas	Quarterly	Fed Funds	0.64%	0.44%
Dow Jones Ind. Avg.	Americas	Quarterly	Fed Funds	0.63%	0.48%
S&P MidCap	Americas	Quarterly	Fed Funds	0.38%	0.15%
NASDAQ-100	Americas	Quarterly	Fed Funds	0.58%	0.41%
S&P 500 ESG	Americas	Quarterly	Fed Funds	0.57%	0.45%
S&P/TSX 60	Americas	Quarterly	Canada Bankers 3M	-0.50%	-0.66%
Bovespa	Americas	Bi-monthly	ODA	-0.96%	-1.20%
EURO STOXX 50	Europe	Quarterly	EUR 3M Deposit	0.41%	0.29%
FTSE 100	Europe	Quarterly	GBP 3M Deposit	0.95%	0.38%
DAX-30	Europe	Quarterly	EUR 3M Deposit	0.43%	0.34%
S&PMIB	Europe	Quarterly	EUR 3M Deposit	0.07%	1.03%
OMX	Europe	Monthly	SEK 1M Deposit	0.22%	0.19%
CAC-40	Europe	Monthly	EUR 1M Deposit	0.21%	0.08%
AEX	Europe	Monthly	EUR 1M Deposit	0.29%	0.22%
IBEX-35	Europe	Monthly	EUR 1M Deposit	0.57%	0.32%
SMI	Europe	Quarterly	CHF 3M Deposit	1.68%	0.90%

Source: BofA Global Research. Implied financing spreads calculated using forecasted gross dividends except for MSCI EAFE, MSCI EM, KOSPI 200, ASX 200, TWSE, CSI 500, CSI 300, FTSE China A50, Heng Seng, HSCEI, Nifty, and FTSE 100 which use net divs. Nifty (IFSC) roll costs before Jun-23 are for the Nifty futures previously listed on SGX. *From the perspective of an offshore investor whose USD is converted using FX forwards.

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08 January 2024

Futures
Global

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Refer to important disclosures on page 15 to 16.

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Timestamp: 08 January 2024 11:35AM EST

How we derive our roll cost analysis

Each day, we compute the spread between the futures implied financing rate for the period of time between front and second month futures expiry versus the respective risk-free rate noted in Exhibit 2. We use traded spread prices where available, otherwise we use the closing front-month and next near-month futures price to compute the closing spread level. For each roll, we then compute the VWAP of the implied financing spread over that period using the traded roll volume if we have a market for the spread, otherwise we use 75% of the next near-month futures volume as an estimate. Our analysis is calculated based on **gross forecasted dividends**, except where noted. Gross forecasted dividends may differ from the amount realized. All roll cost data are calculated on an annualized basis and are reported monthly or quarterly as applicable.

Special considerations for MSCI EAFE & EM quarterly futures roll costs

Special considerations are taken into account for MSCI EAFE & EM quarterly futures roll costs. First, their roll costs are calculated based on **realized dividends**, except for the most recent quarter's costs as its realized divs are not yet available. For the most recent quarter, realized dividends to-date will be used along with forecasts for the remainder of the quarter. Second, we calculate MSCI EAFE & EM roll costs using both **realized gross and net MSCI dividends**.

Exhibit 2: Equity index futures roll financing spread statistics for various indices globally

Data through Dec-2023, base rate for each equity index future's financing spread provided as well.

Index name	Base ticker	Region	Roll frequency	Roll cost history start	# of rolls	Base Rate	Prior Roll Cost	Current roll std. deviation	1-year avg. roll cost	Avg. roll cost since 2013
MSCI EAFE	MFS	Global	Quarterly	Jun-14	39	Fed Funds	0.59%	--	0.19%	0.31%
MSCI Emerging Markets	MES	Global	Quarterly	Jun-14	39	Fed Funds	0.42%	--	0.31%	0.44%
KOSPI 200*	KM	Asia Pacific	Quarterly	Mar-98	104	USD SOFR	-0.17%	0.28%	-0.36%	-0.18%
S&P ASX 200	XP	Asia Pacific	Quarterly	Mar-04	80	AUD 3M Deposit	0.36%	0.08%	0.08%	0.11%
TOPIX	TP	Asia Pacific	Quarterly	Sep-00	94	TONAR	0.04%	0.01%	0.03%	0.07%
Nikkei 225	NK	Asia Pacific	Quarterly	Sep-00	94	TONAR	0.03%	0.03%	0.01%	0.04%
Hang Seng	HI	Asia Pacific	Monthly	Jan-97	324	HIBOR 1M	1.54%	0.30%	0.37%	-0.31%
Nifty (Local)	NZ	Asia Pacific	Monthly	Aug-02	257	INR 1M Swap	3.03%	0.40%	0.81%	-0.36%
Nifty (IFSC)	JGS	Asia Pacific	Monthly	Aug-02	257	INR 1M Swap	4.03%	0.65%	1.24%	0.21%
Hang Seng China Enterprises	HC	Asia Pacific	Monthly	Dec-03	241	HIBOR 1M	1.83%	0.24%	0.84%	0.21%
MSCI Singapore	QZ	Asia Pacific	Monthly	Jan-99	300	SGD 1M Deposit	1.22%	0.30%	-0.34%	0.33%
TWSE*	FT	Asia Pacific	Monthly	Jun-05	223	USD SOFR	3.28%	0.95%	-1.24%	-1.18%
FTSE China A50*	XU	Asia Pacific	Monthly	Aug-10	161	USD SOFR	-1.03%	0.66%	-0.13%	-1.11%
FTSE Bursa Malaysia KLCI	IK	Asia Pacific	Monthly	Jan-00	288	Malaysia Klibor 1M	-1.22%	0.55%	-1.62%	-0.77%
CSI300*	IFB	Asia Pacific	Monthly	May-10	164	USD SOFR	-5.74%	1.10%	-0.16%	-1.22%
CSI500*	FFD	Asia Pacific	Monthly	May-21	32	USD SOFR	-9.39%	0.75%	-6.34%	-4.27%
S&P 500	ES	Americas	Quarterly	Mar-98	104	Fed Funds	0.60%	0.06%	0.42%	0.40%
Russell 2000	RTY	Americas	Quarterly	Mar-98	104	Fed Funds	0.47%	0.20%	0.14%	-0.06%
Russell 1000	RSY	Americas	Quarterly	Mar-02	88	Fed Funds	0.64%	0.08%	0.44%	0.44%
Dow Jones Ind. Avg.	DM	Americas	Quarterly	Mar-98	104	Fed Funds	0.63%	0.05%	0.48%	0.46%
S&P MidCap	FA	Americas	Quarterly	Mar-98	104	Fed Funds	0.38%	0.05%	0.15%	0.20%
NASDAQ-100	NQ	Americas	Quarterly	Mar-98	104	Fed Funds	0.58%	0.06%	0.41%	0.40%
S&P 500 ESG	SLB	Americas	Quarterly	Sep-20	14	Fed Funds	0.57%	--	0.45%	0.45%
S&P/TSX 60	PT	Americas	Quarterly	Dec-99	97	Canada Bankers 3M	-0.50%	0.05%	-0.66%	-0.35%
Bovespa	BZ	Americas	Bi-monthly	Aug-04	116	ODA	-0.96%	--	-1.20%	-1.67%
EURO STOXX 50	VG	Europe	Quarterly	Sep-98	102	EUR 3M Deposit	0.41%	0.09%	0.29%	0.37%
FTSE 100	Z	Europe	Quarterly	Sep-96	110	GBP 3M Deposit	0.95%	0.05%	0.38%	0.43%
DAX-30	GX	Europe	Quarterly	Sep-96	110	EUR 3M Deposit	0.43%	0.07%	0.34%	0.24%
S&PMIB	ST	Europe	Quarterly	Sep-96	110	EUR 3M Deposit	0.07%	0.90%	1.03%	0.75%
OMX	QC	Europe	Monthly	Jul-96	330	SEK 1M Deposit	0.22%	0.05%	0.19%	0.19%
CAC-40	CF	Europe	Monthly	Aug-96	329	EUR 1M Deposit	0.21%	0.05%	0.08%	0.09%
AEX	EO	Europe	Monthly	Mar-97	322	EUR 1M Deposit	0.29%	0.17%	0.22%	0.19%
IBEX-35	IB	Europe	Monthly	Sep-96	328	EUR 1M Deposit	0.57%	0.24%	0.32%	0.19%
SMI	SM	Europe	Quarterly	Sep-98	101	CHF 3M Deposit	1.68%	0.10%	0.90%	0.65%

Source: BofA Global Research. Implied financing spreads calculated using forecasted gross dividends except for MSCI EAFE, MSCI EM, KOSPI 200, ASX 200, TWSE, CSI 500, CSI 300, FTSE China A50, Hang Seng, HSCEI, Nifty, and FTSE 100 which use net divs. Nifty (IFSC) roll costs before Jun-23 are for the Nifty futures previously listed on SGX. KOSPI 200 average roll cost since Q1-2019. Hang Seng, Hang Seng China Enterprises, Nifty, and MSCI Singapore average roll costs since Jan 2020. TWSE, FTSE China A50, CSI 300, and CSI500 average roll costs since Jan 2022. *From the perspective of an offshore investor whose USD is converted using FX forwards.

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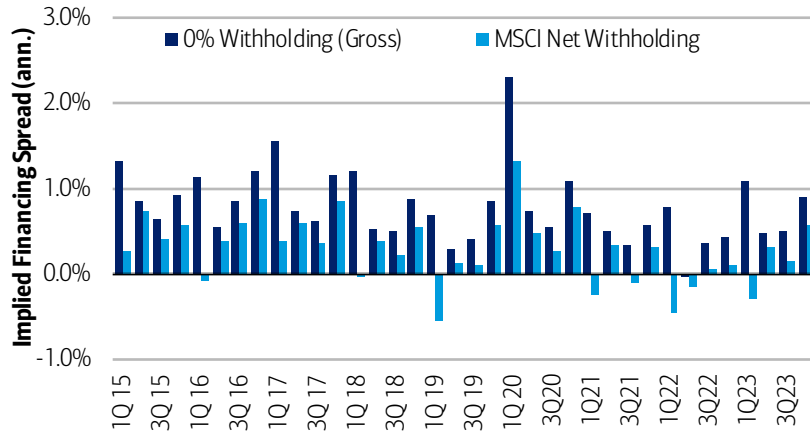




MSCI EAFE

Exhibit 3: MSCI EAFE - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was 91bps using gross dividends and 59bps using MSCI net dividends. Most recent quarter uses realized divs through 5-Jan-24.

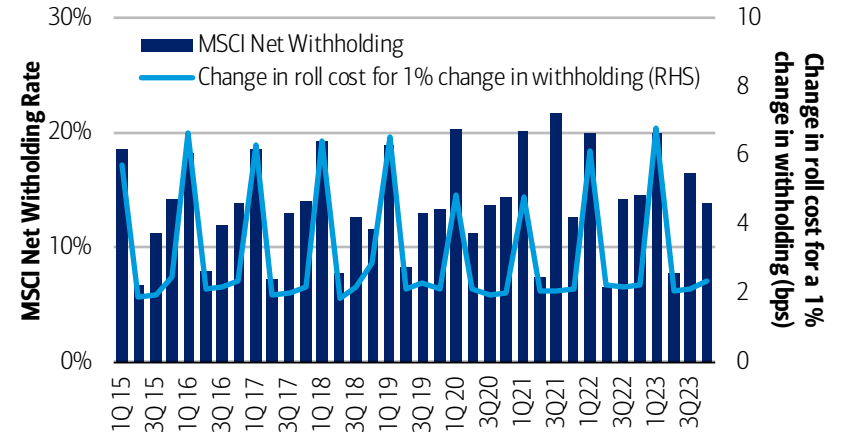


Source: BofA Global Research

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Exhibit 4: MSCI EAFE net dividend withholding rates from Mar 2015 to Dec 2023

For the most recent quarter's roll (4Q 23) we use the average withholding of the prior 4Q roll periods. The last quarter's roll cost would decrease 2.4bps for a 1% increase in withholding.



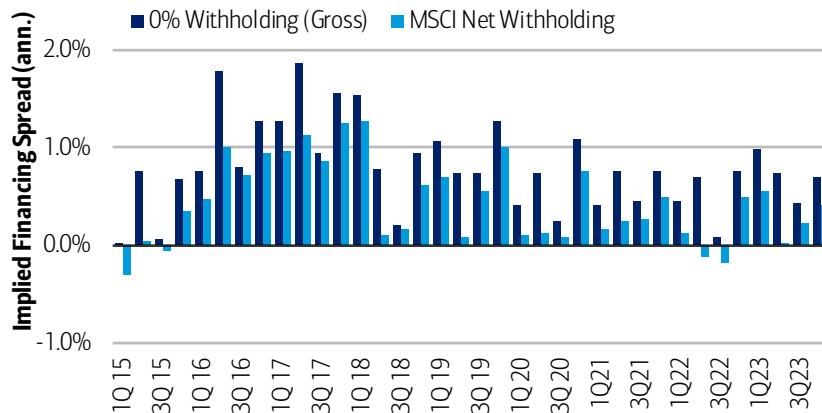
Source: BofA Global Research

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MSCI Emerging Markets

Exhibit 5: MSCI EM - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was 70bps using gross dividends & 42bps using MSCI net dividends. Most recent quarter uses realized divs through 5-Jan-24.

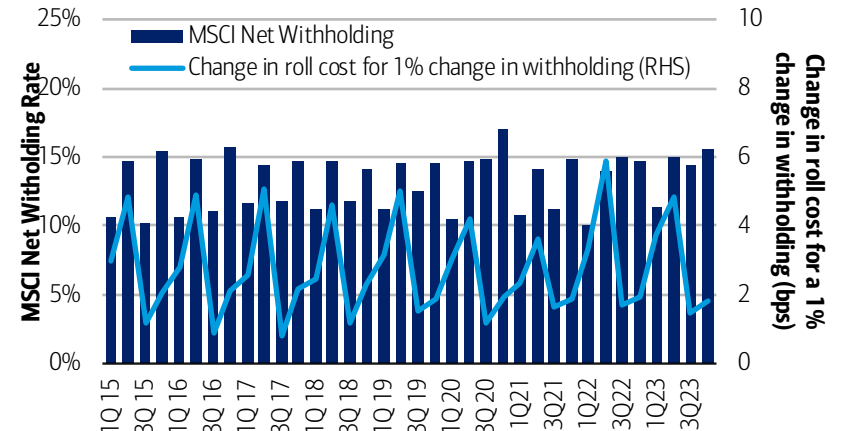


Source: BofA Global Research

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Exhibit 6: MSCI EM net dividend withholding rates from Mar 2015 to Dec 2023

For the most recent quarter's roll (4Q 23) we use the average withholding of the prior 4Q roll periods. The last quarter's roll cost would decrease 1.8bps for a 1% increase in withholding.



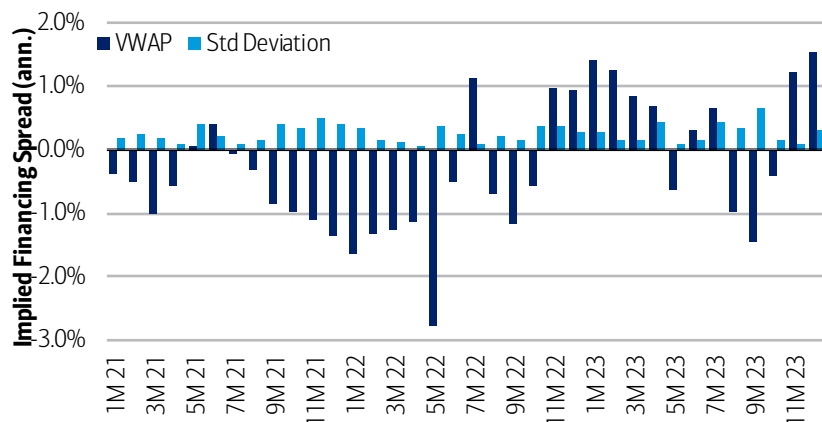
Source: BofA Global Research

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Asia Pacific

Exhibit 7: Hang Seng - Monthly data from Jan 2021 to Dec 2023

The VWAP of the Dec 23/Jan 24 roll was approximately 154bps with a standard deviation of 30bps. The 1-year average is 37bps and the 1-year standard deviation is 100bps.

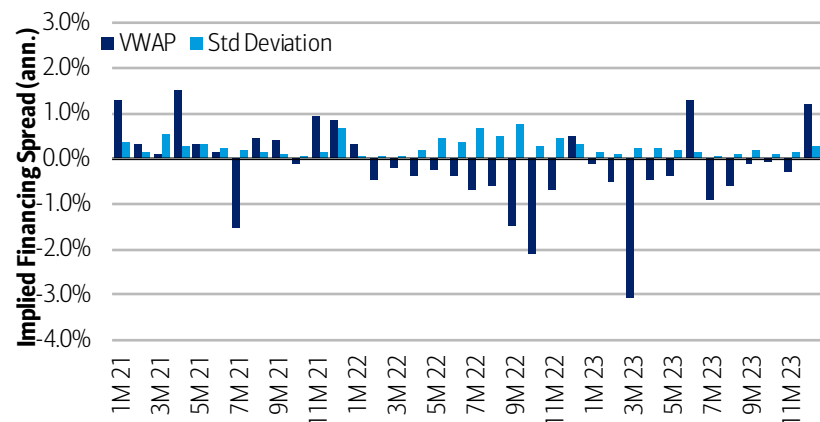


Source: BofA Global Research

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Exhibit 8: MSCI Singapore - Monthly data from Jan 2021 to Dec 2023

The VWAP of the Dec 23/Jan 24 roll was approximately 122bps with a standard deviation of 30bps. The 1-year average is -34bps and the 1-year standard deviation is 109bps.

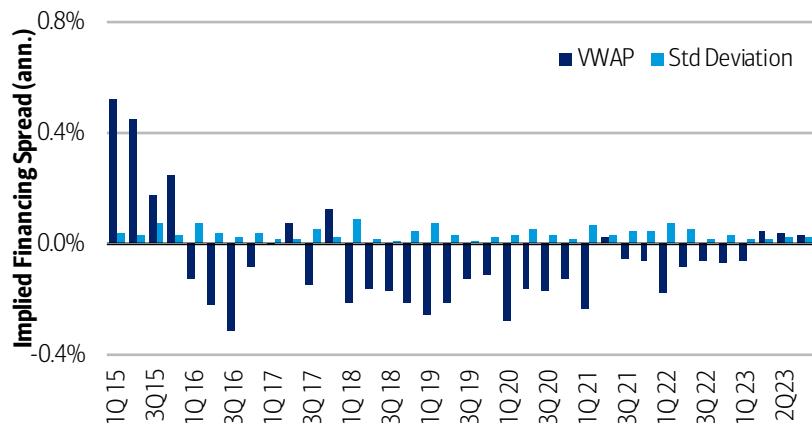


Source: BofA Global Research

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Exhibit 9: Nikkei 225 - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately 3bps with a standard deviation of 3bps. The 1-year average is 1bps and the 1-year standard deviation is 5bps.

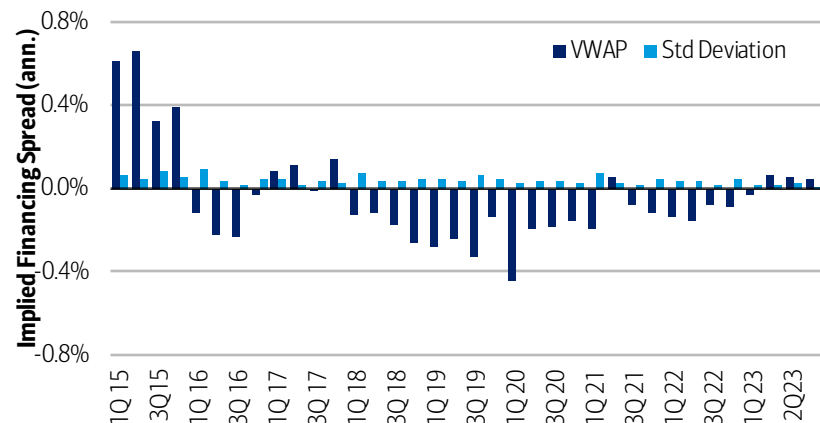


Source: BofA Global Research

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Exhibit 10: TOPIX - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately 4bps with a standard deviation of 1bps. The 1-year average is 3bps and the 1-year standard deviation is 5bps.



Source: BofA Global Research

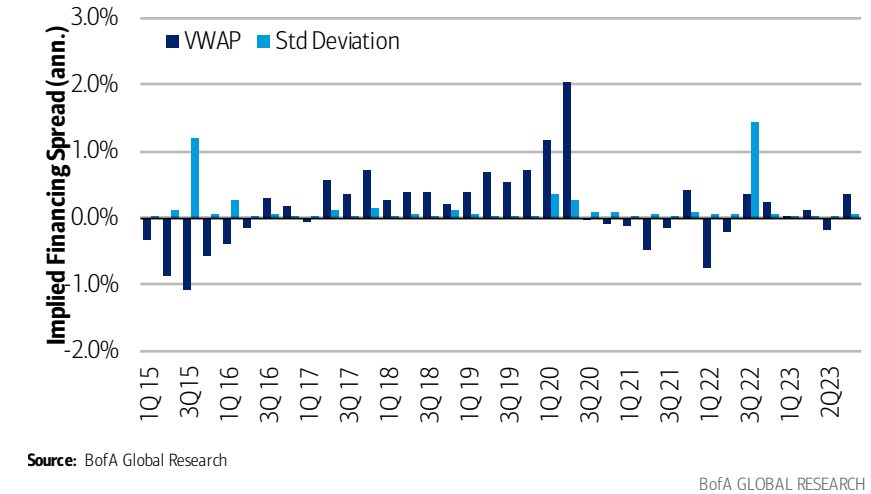
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Asia Pacific (continued)

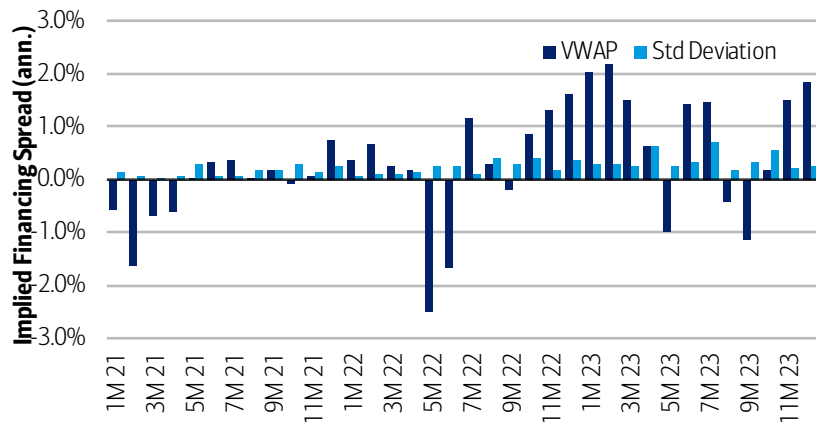
Exhibit 11: S&P ASX 200 - Quarterly data from Mar 2015 to Dec 2023
The VWAP of the Dec 23/Mar 24 roll was approximately 36bps with a standard deviation of 8bps.
The 1-year average is 8bps and the 1-year standard deviation is 22bps.



Asia Pacific Emerging Markets

Exhibit 12: Hang Seng China Enterprises - Monthly data from Jan 2021 to Dec 2023

The VWAP of the Dec 23/Jan 24 roll was approximately 183bps with a standard deviation of 24bps. The 1-year average is 84bps and the 1-year standard deviation is 118bps.

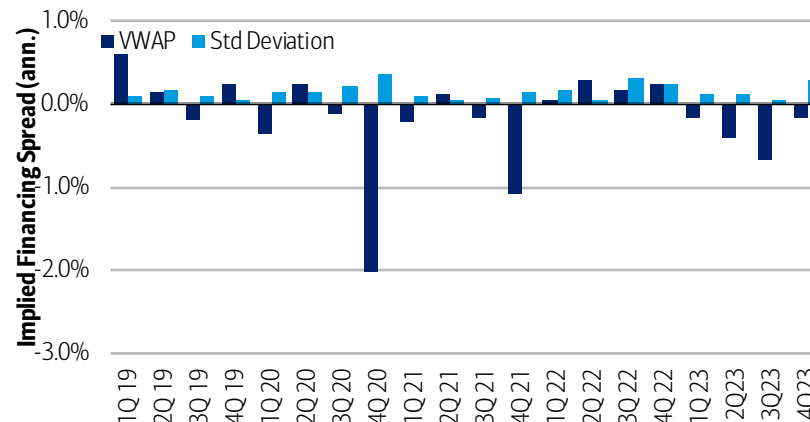


Source: BofA Global Research

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Exhibit 13: KOSPI 200 - Quarterly data from Mar 2019 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately -17bps with a standard deviation of 28bps. The 1-year average is -36bps and the 1-year standard deviation is 24bps.

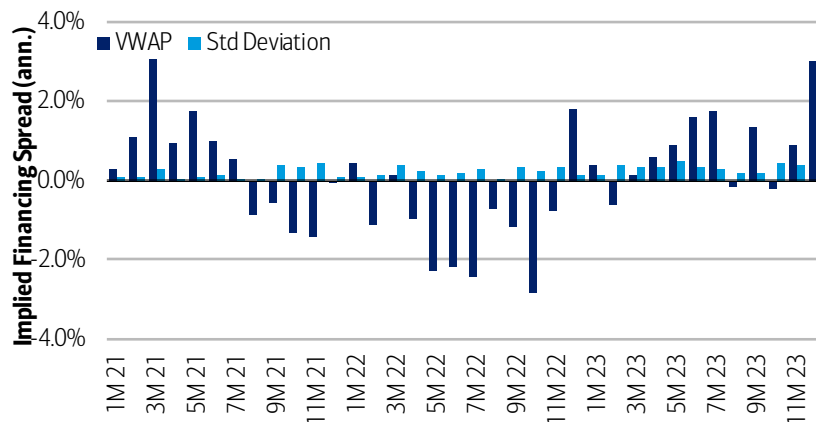


Source: BofA Global Research

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Exhibit 14: Nifty (Local) - Monthly data from Jan 2021 to Dec 2023

The VWAP of the Dec 23/Jan 24 roll was approximately 303bps with a standard deviation of 40bps. The 1-year average is 81bps and the 1-year standard deviation is 102bps.

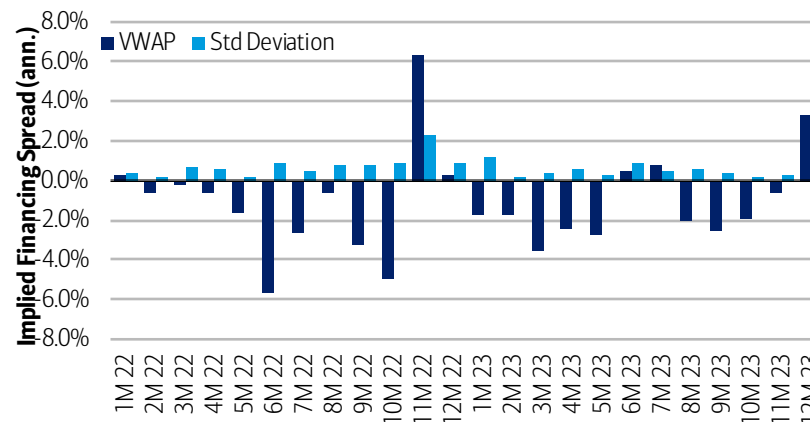


Source: BofA Global Research

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Exhibit 15: TWSE - Monthly data from Jan 2022 to Dec 2023

The VWAP of the Dec 23/Jan 24 roll was approximately 328bps with a standard deviation of 95bps. The 1-year average is -124bps and the 1-year standard deviation is 192bps.



Source: BofA Global Research

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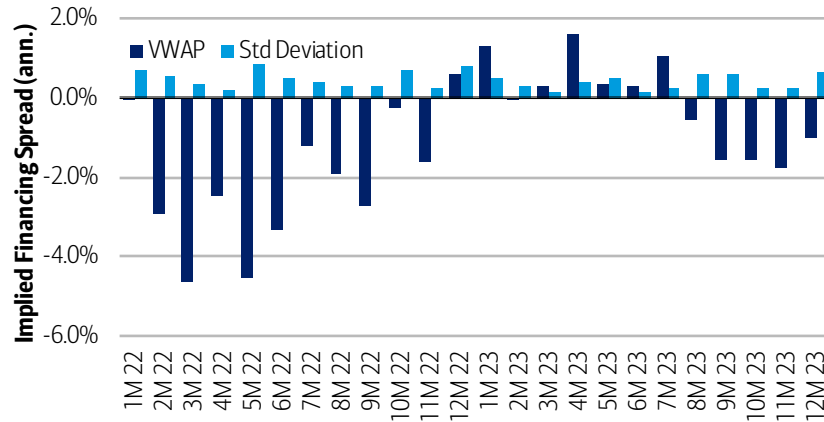




Asia Pacific Emerging Markets (continued)

Exhibit 16: FTSE China A50 - Monthly data from Jan 2022 to Dec 2023

The VWAP of the Dec 23/Jan 24 roll was approximately -103bps with a standard deviation of 66bps. The 1-year average is -13bps and the 1-year standard deviation is 116bps.

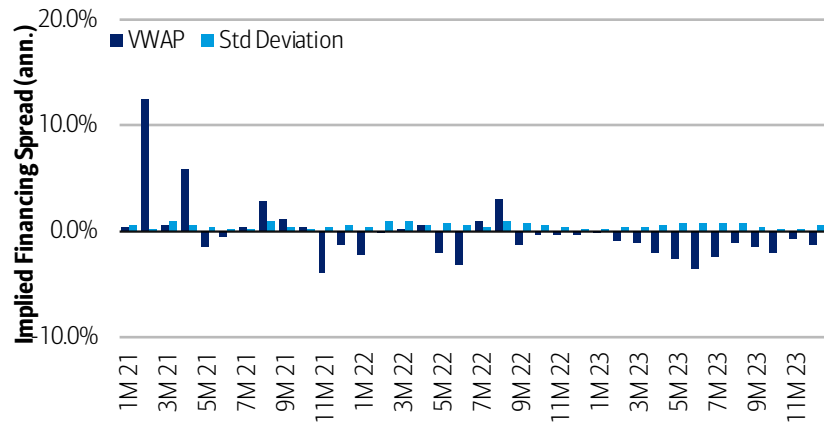


Source: BofA Global Research

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Exhibit 18: FTSE Bursa Malaysia KLCI - Monthly data from Jan 2021 to Dec 2023

The VWAP of the Dec 23/Jan 24 roll was approximately -122bps with a standard deviation of 55bps. The 1-year average is -162bps and the 1-year standard deviation is 94bps.

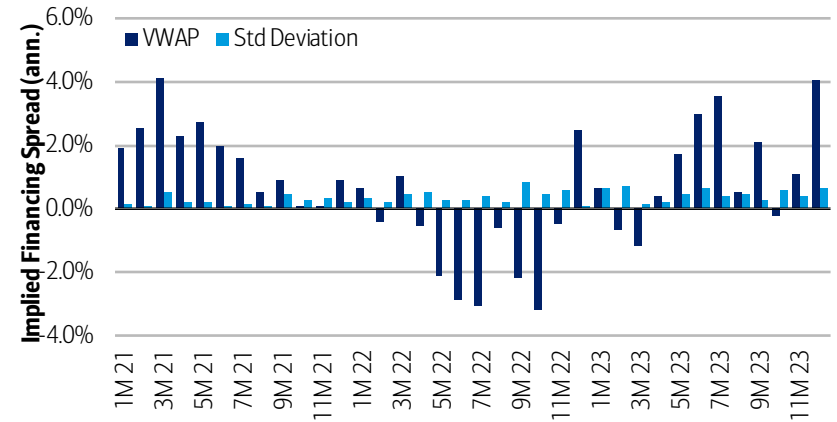


Source: BofA Global Research

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Exhibit 17: Nifty (IFSC) - Monthly data from Jan 2021 to Dec 2023

The VWAP of the Dec 23/Jan 24 roll was approximately 403bps with a standard deviation of 65bps. The 1-year average is 124bps and the 1-year standard deviation is 166bps.

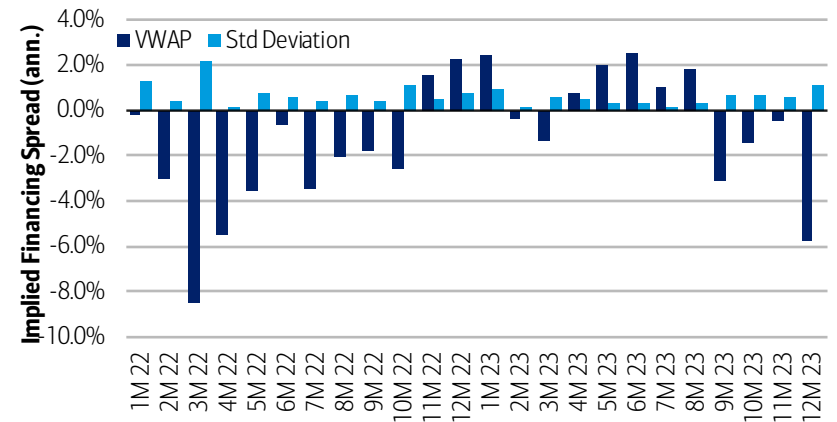


Source: BofA Global Research. Roll costs before Jun-23 are for the NIFTY futures previously listed on SGX

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Exhibit 19: CSI300 - Monthly data from Jan 2022 to Dec 2023

The VWAP of the Dec 23/Jan 24 roll was approximately -574bps with a standard deviation of 110bps. The 1-year average is -16bps and the 1-year standard deviation is 249bps.

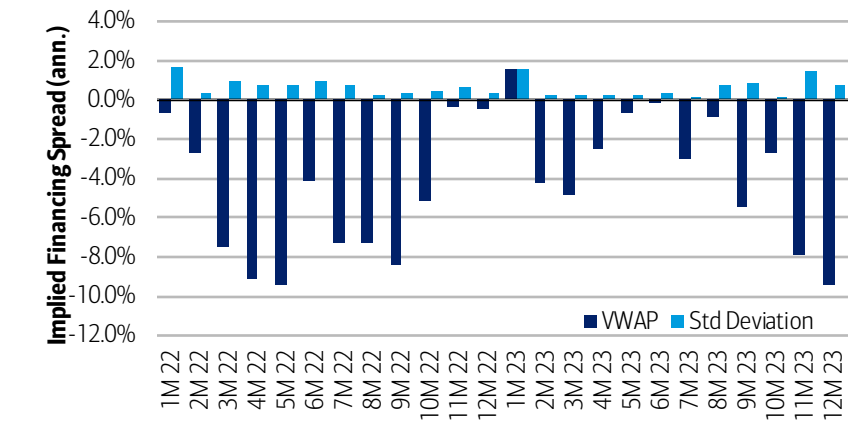


Source: BofA Global Research

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Asia Pacific Emerging Markets (continued)

Exhibit 20: CSI500 - Monthly data from Jan 2022 to Dec 2023 (based on net divs)
The VWAP of the Dec 23/Jan 24 roll was approximately -939bps with a standard deviation of 75bps. The 1-year average is -634bps and the 1-year standard deviation is 294bps.



Source: BofA Global Research

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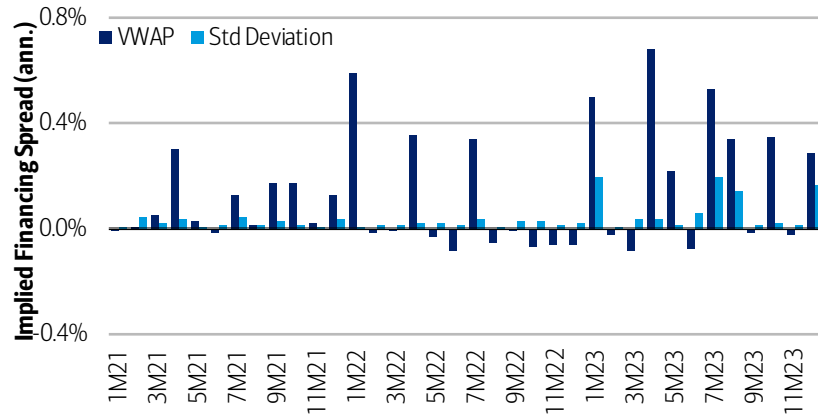




Europe

Exhibit 21: AEX - Monthly data from Jan 2021 to Dec 2023

The VWAP of the Dec 23/Jan 24 roll was approximately 29bps with a standard deviation of 17bps. The 1-year average is 22bps and the 1-year standard deviation is 27bps.

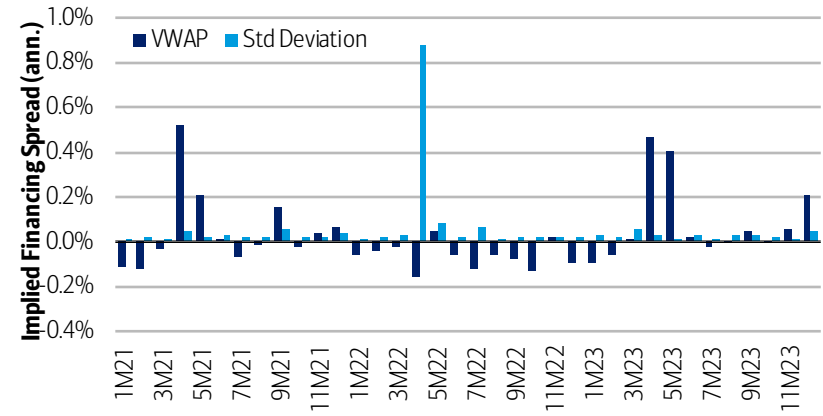


Source: BofA Global Research

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Exhibit 22: CAC-40 - Monthly data from Jan 2021 to Dec 2023

The VWAP of the Dec 23/Jan 24 roll was approximately 21bps with a standard deviation of 5bps. The 1-year average is 8bps and the 1-year standard deviation is 18bps.

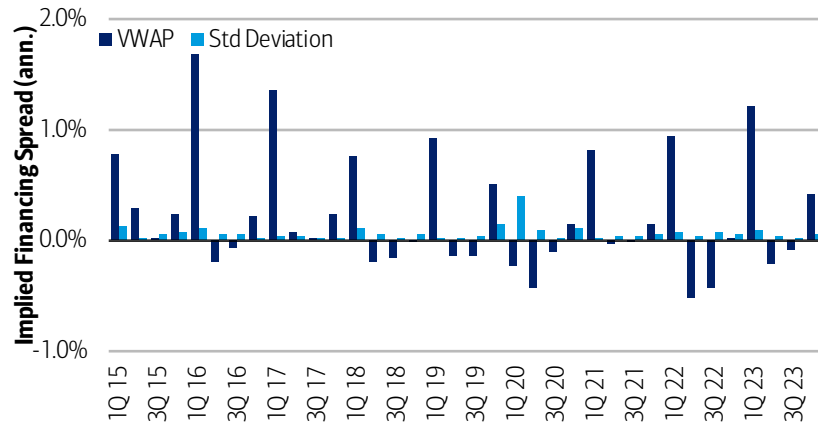


Source: BofA Global Research

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Exhibit 23: DAX-30 - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately 43bps with a standard deviation of 7bps. The 1-year average is 34bps and the 1-year standard deviation is 65bps.

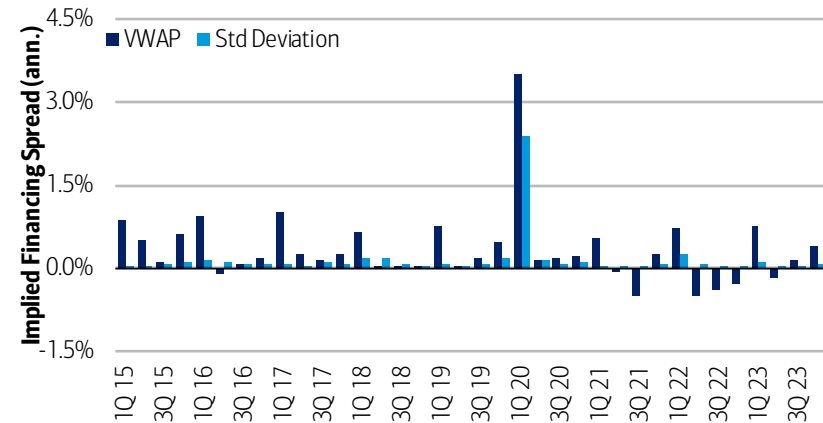


Source: BofA Global Research

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Exhibit 24: EURO STOXX 50 - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately 41bps with a standard deviation of 9bps. The 1-year average is 29bps and the 1-year standard deviation is 40bps.



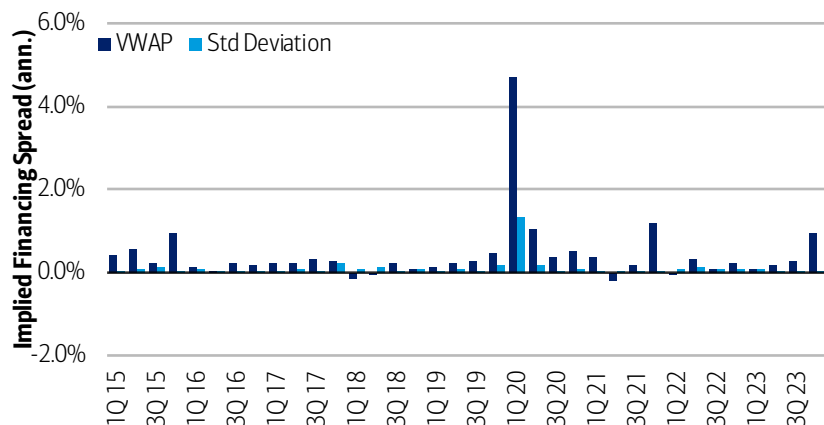
Source: BofA Global Research

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Europe (continued)

Exhibit 25: FTSE 100 - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately 95bps with a standard deviation of 5bps. The 1-year average is 38bps and the 1-year standard deviation is 39bps.

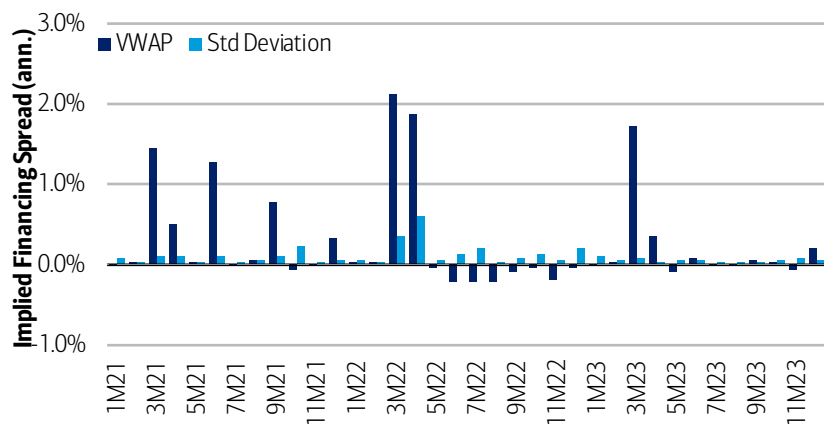


Source: BofA Global Research

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Exhibit 27: OMX - Monthly data from Jan 2021 to Dec 2023

The VWAP of the Dec 23/Jan 24 roll was approximately 22bps with a standard deviation of 5bps. The 1-year average is 19bps and the 1-year standard deviation is 50bps.

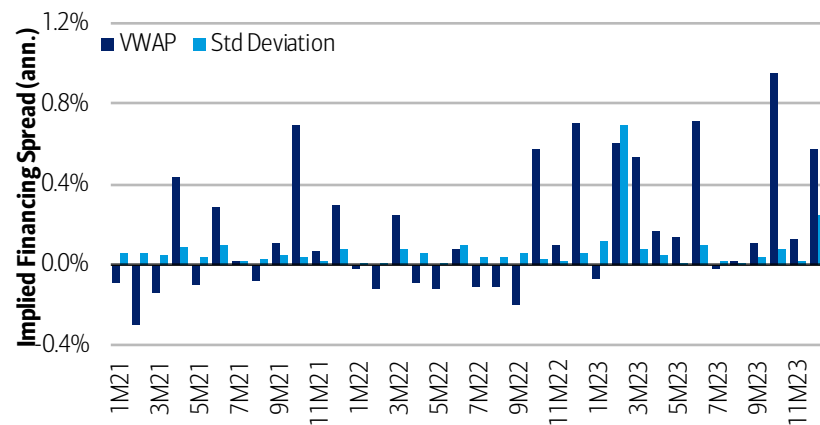


Source: BofA Global Research

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Exhibit 26: IBEX-35 - Monthly data from Jan 2021 to Dec 2023

The VWAP of the Dec 23/Jan 24 roll was approximately 57bps with a standard deviation of 24bps. The 1-year average is 32bps and the 1-year standard deviation is 34bps.

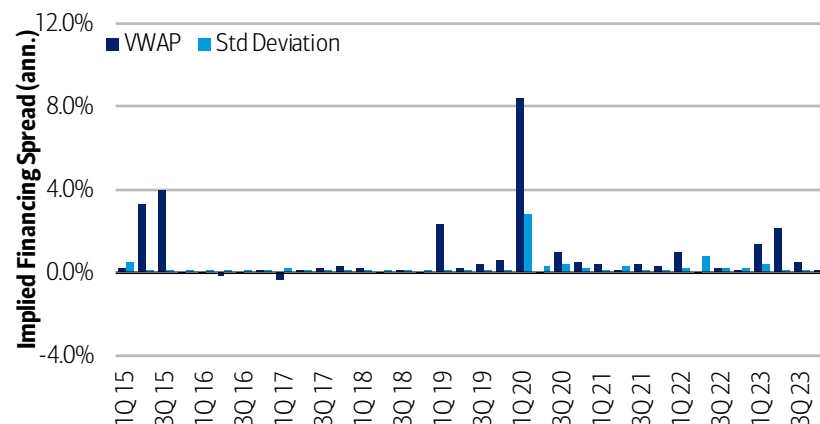


Source: BofA Global Research

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Exhibit 28: S&PMIB - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately 7bps with a standard deviation of 90bps. The 1-year average is 103bps and the 1-year standard deviation is 93bps.



Source: BofA Global Research

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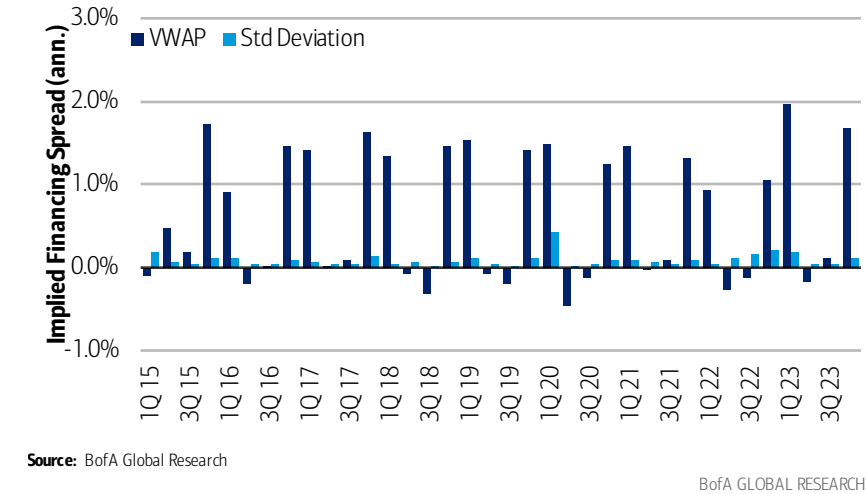




Europe (continued)

Exhibit 29: SMI - Quarterly data from Mar 2015 to Dec 2023

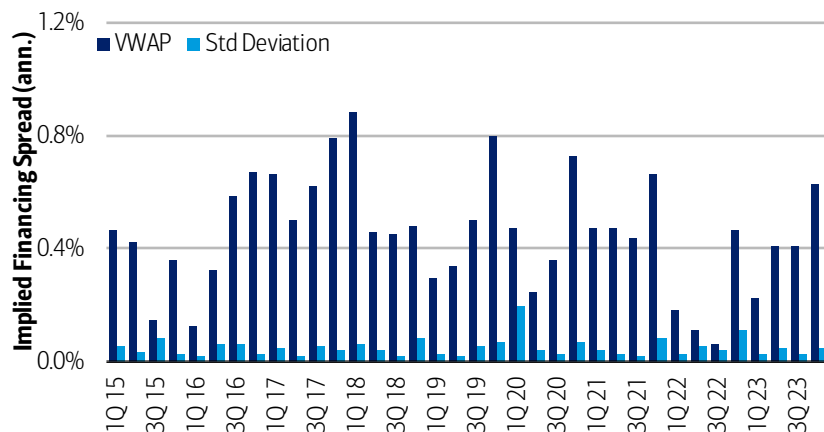
The VWAP of the Dec 23/Mar 24 roll was approximately 168bps with a standard deviation of 10bps. The 1-year average is 90bps and the 1-year standard deviation is 108bps.



Americas

Exhibit 30: Dow Jones Ind. Avg. - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately 63bps with a standard deviation of 5bps. The 1-year average is 48bps and the 1-year standard deviation is 13bps.

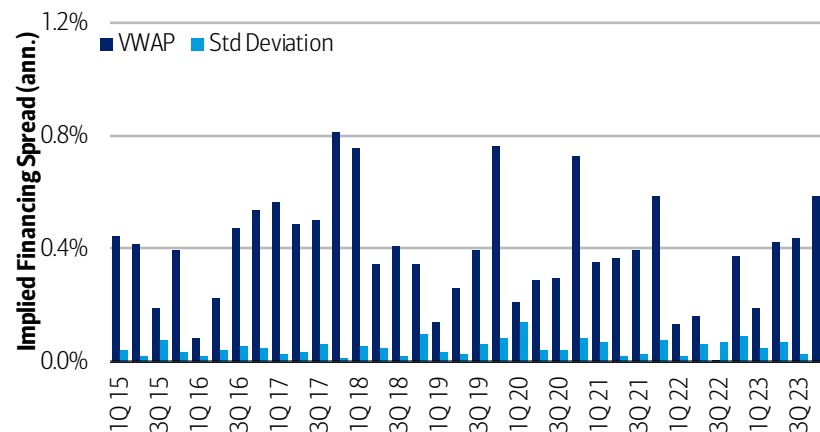


Source: BofA Global Research

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Exhibit 31: NASDAQ-100 - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately 58bps with a standard deviation of 6bps. The 1-year average is 41bps and the 1-year standard deviation is 16bps.

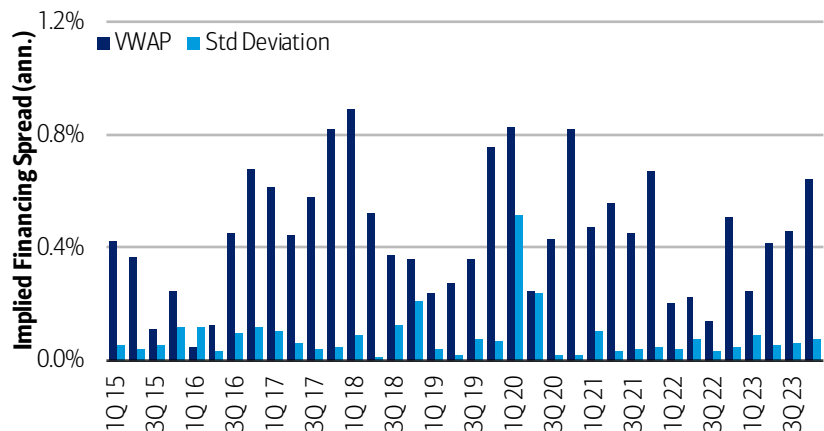


Source: BofA Global Research

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Exhibit 32: Russell 1000 - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately 64bps with a standard deviation of 8bps. The 1-year average is 44bps and the 1-year standard deviation is 16bps.

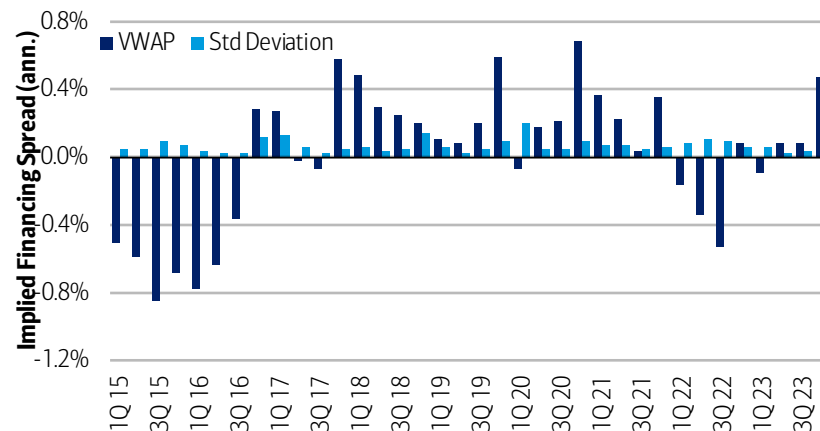


Source: BofA Global Research

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Exhibit 33: Russell 2000 - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately 47bps with a standard deviation of 20bps. The 1-year average is 14bps and the 1-year standard deviation is 24bps.



Source: BofA Global Research

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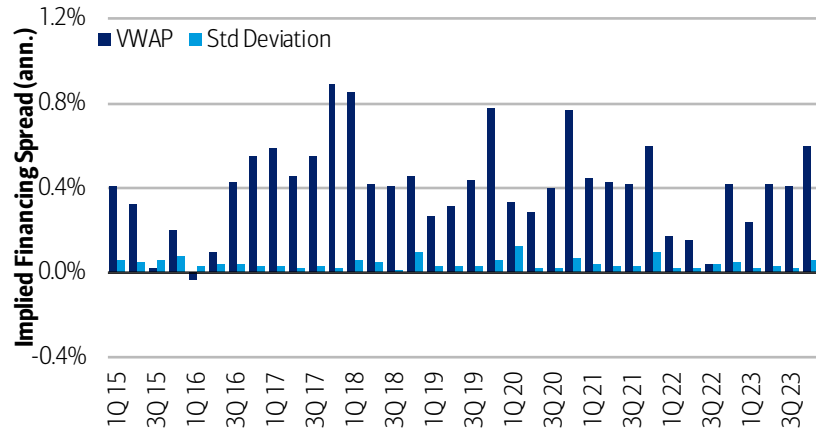




Americas (continued)

Exhibit 34: S&P 500 - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately 60bps with a standard deviation of 6bps. The 1-year average is 42bps and the 1-year standard deviation is 14bps.

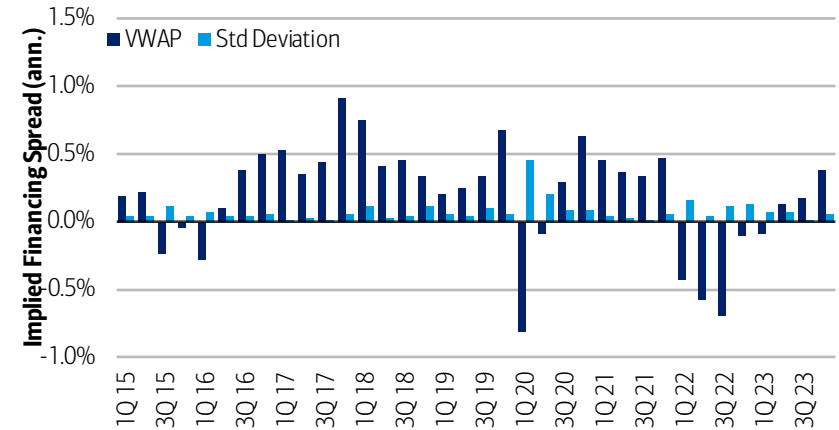


Source: BofA Global Research

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Exhibit 35: S&P MidCap - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately 38bps with a standard deviation of 5bps. The 1-year average is 15bps and the 1-year standard deviation is 19bps.

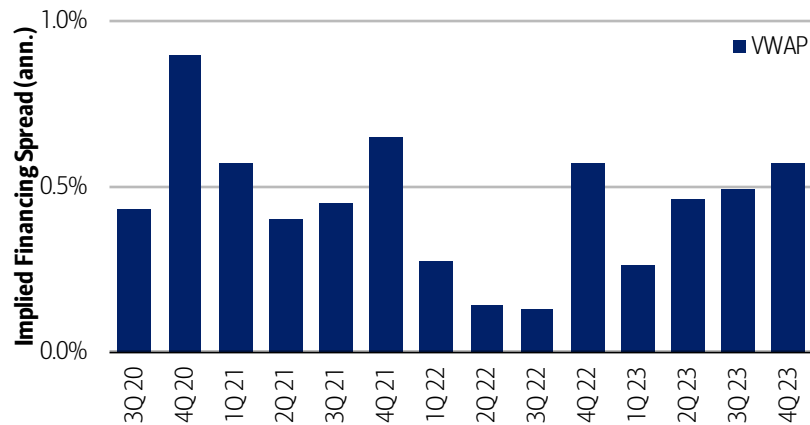


Source: BofA Global Research

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Exhibit 36: S&P 500 ESG - Quarterly data from Sep 2020 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately 57bps. The 1-year average is 45bps and the 1-year standard deviation is 13bps. Most recent quarter uses realized divs through 5-Jan-24.

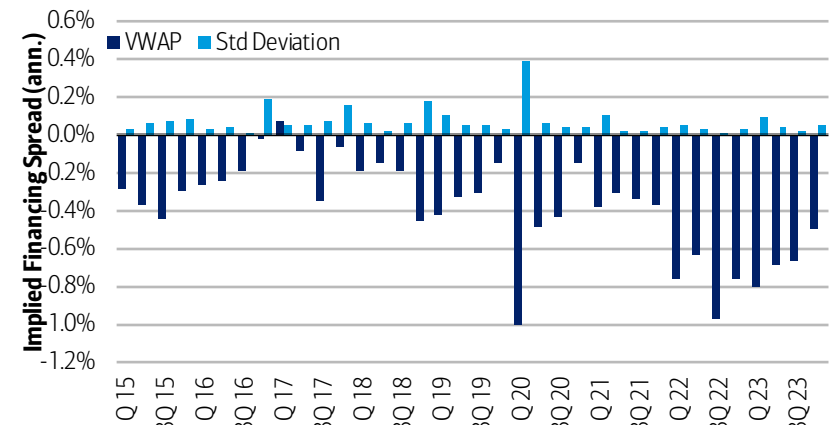


Source: BofA Global Research. Roll costs using realized gross total return dividends

BofA GLOBAL RESEARCH

Exhibit 37: S&P/TSX 60 - Quarterly data from Mar 2015 to Dec 2023

The VWAP of the Dec 23/Mar 24 roll was approximately -50bps with a standard deviation of 5bps. The 1-year average is -66bps and the 1-year standard deviation is 13bps.

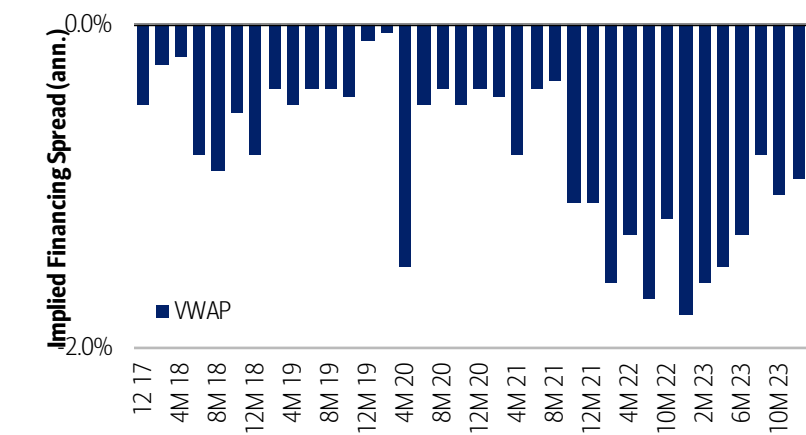


Source: BofA Global Research

BofA GLOBAL RESEARCH

Americas (continued)

Exhibit 38: Bovespa - Bi-Monthly data from Dec 2017 to Dec 2023
The VWAP of the Dec 23/Feb 24 roll was approximately -96bps. The 1-year average is -120bps and the 1-year standard deviation is 31bps.



Source: BofA Global Research

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