

17 Mar 2022 11:18:03 ET | 29 pages

# Equity Markets Positioning Model

## Update on Positioning

### CITI'S TAKE

Futures positioning remains bearish across world equity markets. Positioning is most bearish on China A50, Nasdaq 100 and the DAX and only moderately bearish S&P 500, ASX 200 and European Banks (SX7E). Note that futures activity in the past few days also will have been driven by roll activity ahead of the upcoming expiry on Friday.

Note: Futures trading involves substantial risk of loss

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## Current Equity Market Positioning

Figure 1. Ranking of Equity Market positioning

16/03/2022	By Position		By 1w change			By PnL		By Position	
	Pos	PnL	Change	Pos	PnL	PnL	Pos	Percentile	
FTSE	1.7	0.8	1.1	-0.3	2.9	5.0	-5.0	FTSE	70%
DM xUS	-0.3	2.9	1.1	-2.5	1.1	2.9	-0.3	DM xUS	28%
Eur Banks	-0.7	-1.5	1.0	1.7	0.8	1.1	-2.5	Eur Banks	26%
ASX 200	-1.2	-0.7	0.5	-0.7	-1.5	0.8	-2.8	EuroStoxx	8%
S&P Mini	-1.4	-0.7	0.4	-1.4	-0.7	0.8	1.7	ASX 200	6%
EuroStoxx	-2.3	-1.1	0.4	-1.2	-0.7	0.6	-3.8	MSCI EM	6%
Nikkei	-2.5	1.1	0.0	-5.0	5.0	-0.1	-3.7	Nikkei	4%
MSCI EM	-2.8	0.8	0.0	-3.7	-0.1	-0.7	-1.2	S&P Mini	2%
DAX	-3.7	-0.1	-0.1	-2.3	-1.1	-0.7	-1.4	DAX	2%
Nasdaq	-3.8	0.6	-0.7	-3.8	0.6	-1.1	-2.3	Nasdaq	1%
China A50	-5.0	5.0	-1.5	-2.8	0.8	-1.5	-0.7	China A50	0%

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Source: Citi Research

Figure 2. Summary

		S&P 500	Nasdaq	Estoxx 50	FTSE 100	DAX	Nikkei	MSCI World ex-US	S&P/ASX 200	Eur. Banks	China A50
(\$bn)	16/03/2022	ES	NQ	VG	Z	GX	NI	MFS	XP	CA	XU
Futures	Net Notional	-24.3	-15.9	-24.3	3.9	-6.3	-2.2	-0.6	-3.7	-0.3	-3.6
	Percentile	2%	1%	8%	70%	2%	4%	28%	6%	26%	0%
Shorts	Notional	-42.5	-16.2	-42.1	-0.3	-7.0	-2.9	-3.5	-4.9	-0.8	-4.3
	Percentile	98%	99%	97%	23%	98%	84%	80%	95%	69%	100%
	Avg. Entry	4,283	13,858	3,724	7,243	14,234	25,912	2,097	7,028	89.7	14,723
	% offside	68%	43%	65%	0%	64%	35%	48%	100%	45%	3%
Longs	Notional	18.2	0.3	17.8	4.2	0.7	0.7	2.9	1.1	0.6	0.7
	Percentile	8%	4%	67%	63%	11%	3%	34%	16%	39%	21%
	Avg. Entry	4,357	14,153	3,846	7,096	13,431	25,223	2,028	7,092	95.7	14,460
	% offside	57%	100%	72%	0%	8%	69%	0%	0%	53%	100%
Ref Price		4,308	13,720	3,787	7,217	14,353	25,295	2,092	7,114	91.6	12,906
Activity	1-day	1.4	-1.4	-3.0	-0.7	-1.0	0.5	0.0	-1.2	-0.2	0.1
	Type	longs	shorts	shorts	shorts	shorts	longs	longs	shorts	shorts	longs
	1-week	1.4	-2.9	-1.0	3.8	0.0	1.0	2.1	1.3	0.3	-0.7
Normalised Scores ( -5 / +5 )											
Positioning	Futures	-1.4	-3.8	-2.3	1.7	-3.7	-2.5	-0.3	-1.2	-0.7	-5.0
	ETF	2.3	-0.6	0.1	0.2	-0.4	-0.6			2.3	
	3m Net Pos	0.4	-2.2	-1.1	0.9	-2.1	-1.5	-0.3	-1.2	0.8	-5.0
	1w Change	0.1	-0.6	0.2	0.6	-0.0	0.7	1.1	0.2	0.3	-0.0
P&L	Futures	-0.7	0.6	-1.1	0.8	-0.1	1.1	2.9	-0.7	-1.5	5.0
	ETF	-2.0	0.9	0.2	-0.2	0.6	1.0			-5.0	
	3m Net PnL	-1.3	0.7	-0.5	0.3	0.2	1.0	2.9	-0.7	-3.3	5.0
	1w Change	0.6	-0.7	-1.1	1.0	-1.2	-1.8	-0.1	-0.4	0.0	0.0

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Source: Citi Research

Figure 3. Average Entry Price Levels and Profit Breakeven Levels

	16/03/2022	ES	NQ	VG	Z	GX	NI	XU	XP	CA
Notional	\$bn	-24.3	-15.9	-24.3	3.9	-6.3	-2.2	-3.6	-3.7	-0.3
	(-5/+5)	-1.4	-3.8	-2.3	1.7	-3.7	-2.5	-5.0	-1.2	-0.7
PnL	\$bn	-0.5	0.2	-1.0	0.1	-0.0	0.1	0.5	-0.1	-0.0
	(-5/+5)	-0.7	0.6	-1.1	0.8	-0.1	1.1	5.0	-0.7	-1.5
Ref Price		4,308	13,460	3,540	13,720	14,353	25,295	12,906	7,114	91.6
Shorts	Size (\$bn)	-42.5	-16.2	-42.1	-0.3	-7.0	-2.9	-4.3	-4.9	-0.8
	Avg Price	4,283	13,858	3,724	7,243	14,234	25,912	14,723	7,028	89.7
	Offside (%)	68%	43%	65%	0%	64%	35%	3%	100%	45%
- Offside price										
	100%	4,403	14,656	4,012	--	15,147	27,184	15,891	7,102	96.2
	75%	4,322	14,250	3,803	--	14,573	26,814	15,374	7,050	92.8
	50%	4,273	13,679	3,712	--	14,051	25,870	14,979	7,020	86.7
	25%	4,207	13,467	3,602	--	13,824	25,132	13,587	6,983	82.7
	0%	4,193	13,223	3,399	7,243	13,262	24,810	12,825	6,968	82.1
Longs	Size (\$bn)	18.2	0.3	17.8	4.2	0.7	0.7	0.7	1.1	0.6
	Avg Price	4,357	14,153	3,846	7,096	13,431	25,223	14,460	7,092	95.7
	Offside (%)	57%	100%	72%	0%	8%	69%	100%	0%	53%
- Offside price										
	100%	4,249	--	3,458	7,047	12,940	25,058	12,906	--	86.2
	75%	4,249	--	3,458	7,054	12,940	25,058	14,749	--	86.2
	50%	4,295	--	3,775	7,079	13,026	25,124	14,859	--	86.2
	25%	4,353	--	4,066	7,107	13,414	25,210	14,860	--	104.9
	0%	4,751	14,153	4,202	7,124	14,738	25,295	15,012	7,092	108.5
25% BE	Level	4,288	13,753	3,749	7,184	14,345	25,506	13,374	7,088	88.0
	Change	-20	33	-38	-33	-8	212	468	-26	-4
	% Chg	-0.5	0.2	-1.0	-0.5	-0.1	0.8	3.6	-0.4	-4.0
100% BE	Level	4,228	13,853	3,635	7,084	14,322	26,141	14,778	7,009	77.1
	Change	-80	133	-153	-133	-31	--	--	-106	-15
	% Chg	-1.9	1.0	-4.0	-1.8	-0.2	--	--	-1.5	--

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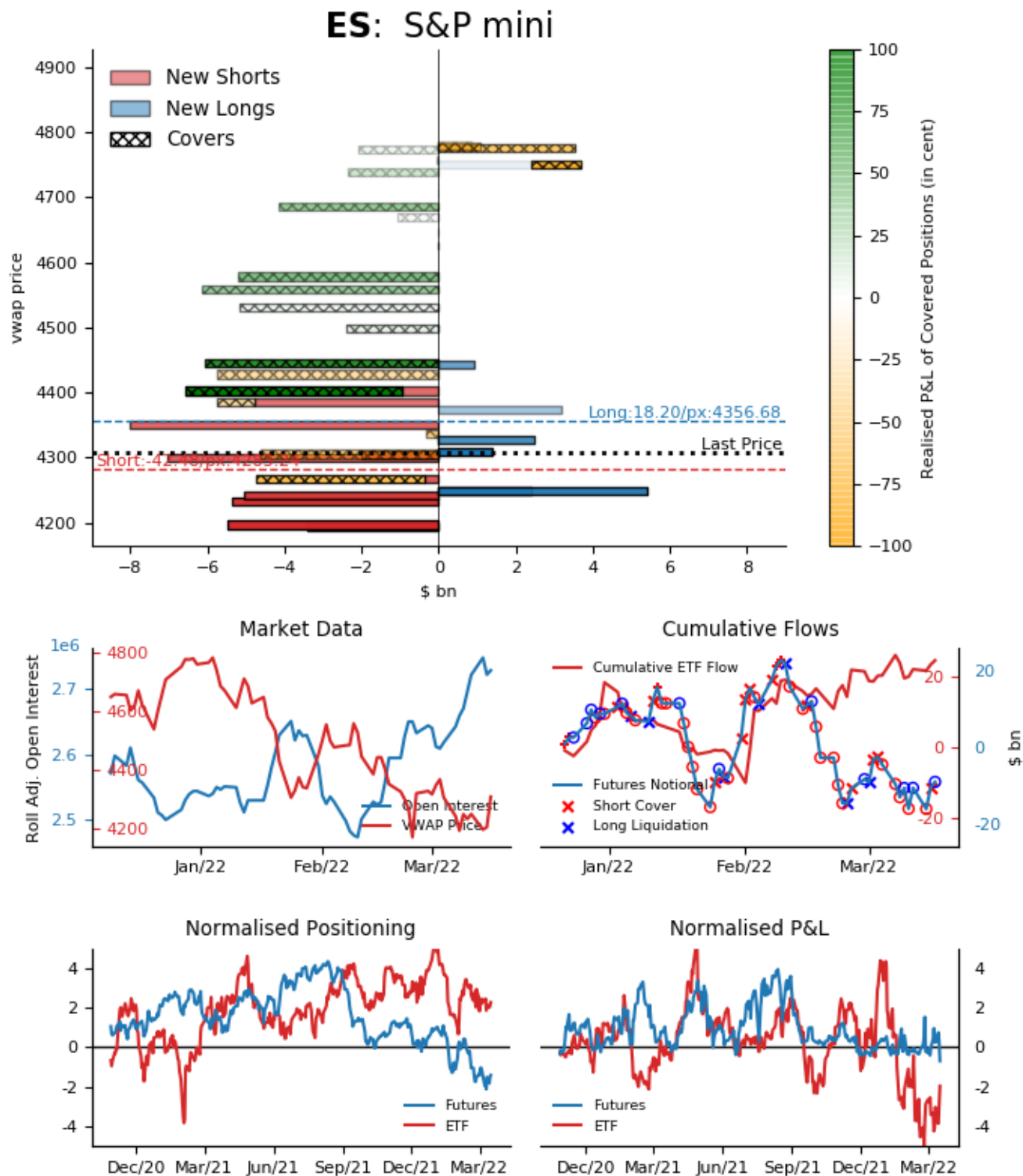
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# Equity Markets Positioning Charts

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## S&P 500

Figure 4. S&P 500 mini contract (ES) - position snapshot and time-series

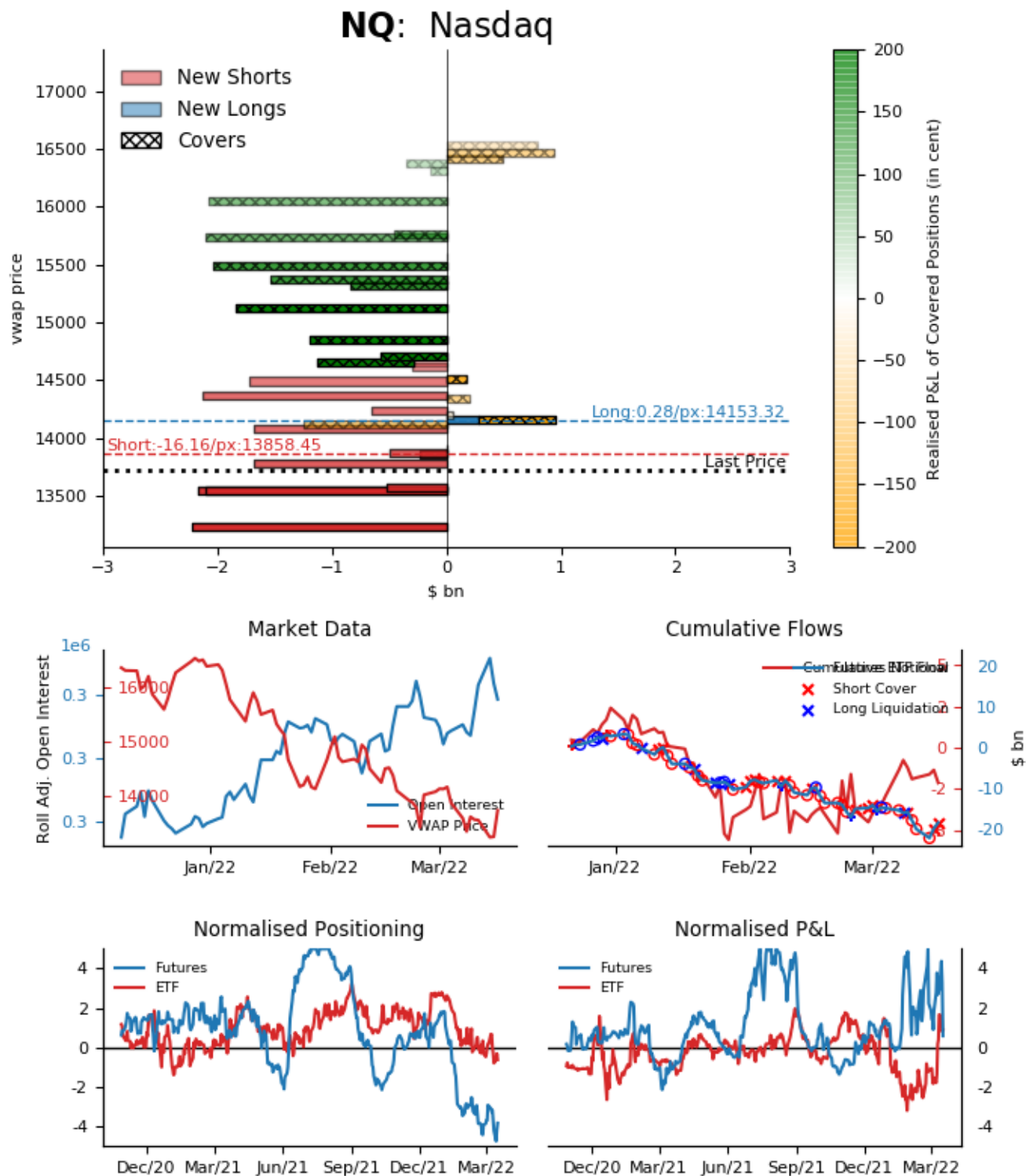


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## NASDAQ 100

Figure 5. Nasdaq 100 contracts (NQ) - position snapshot and time-series

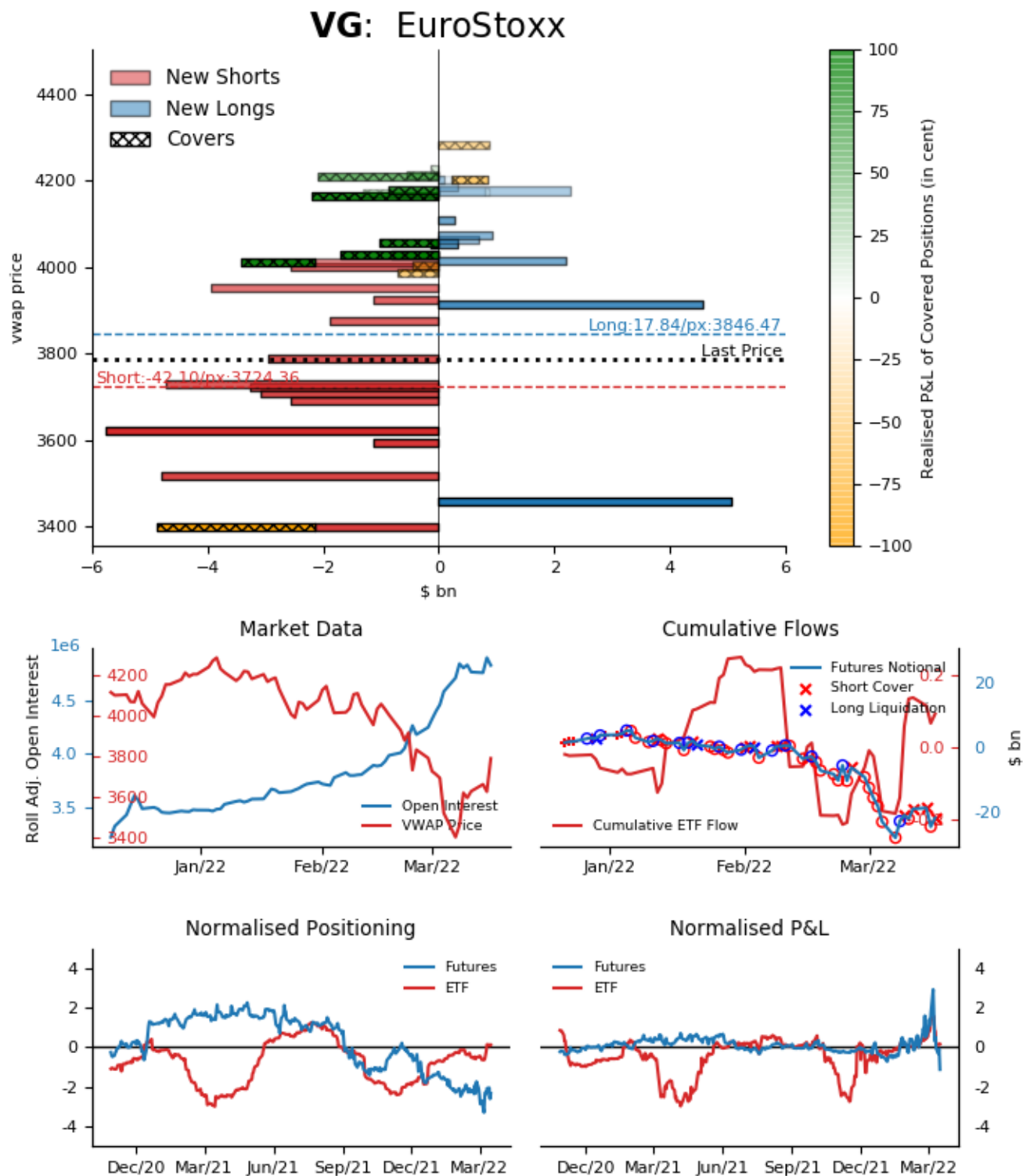


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## Eurostoxx 50

Figure 6. Eurostoxx 50 contracts (VG) - position snapshot and time-series

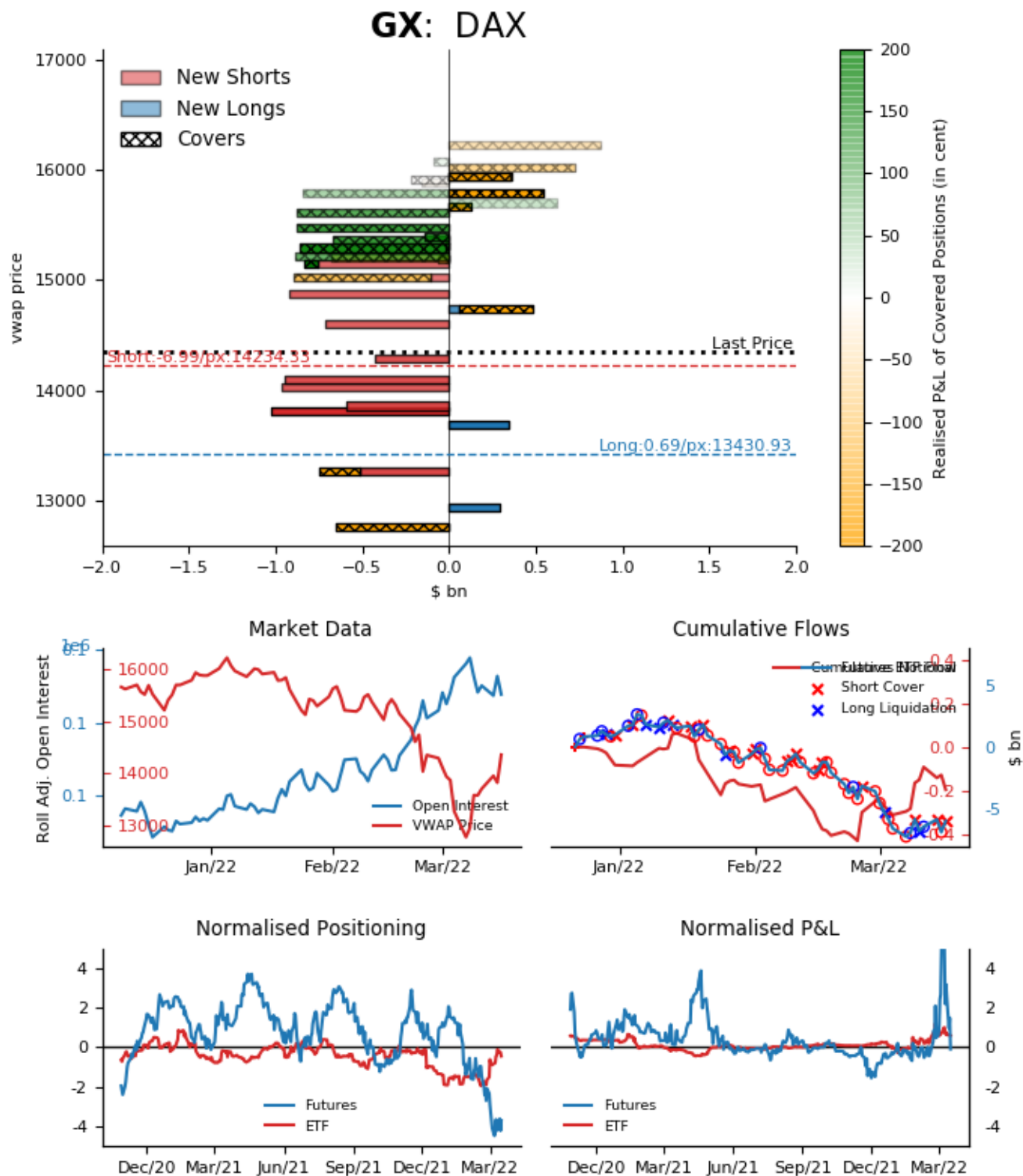


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## DAX

Figure 7. DAX contracts (GX) - position snapshot and time-series



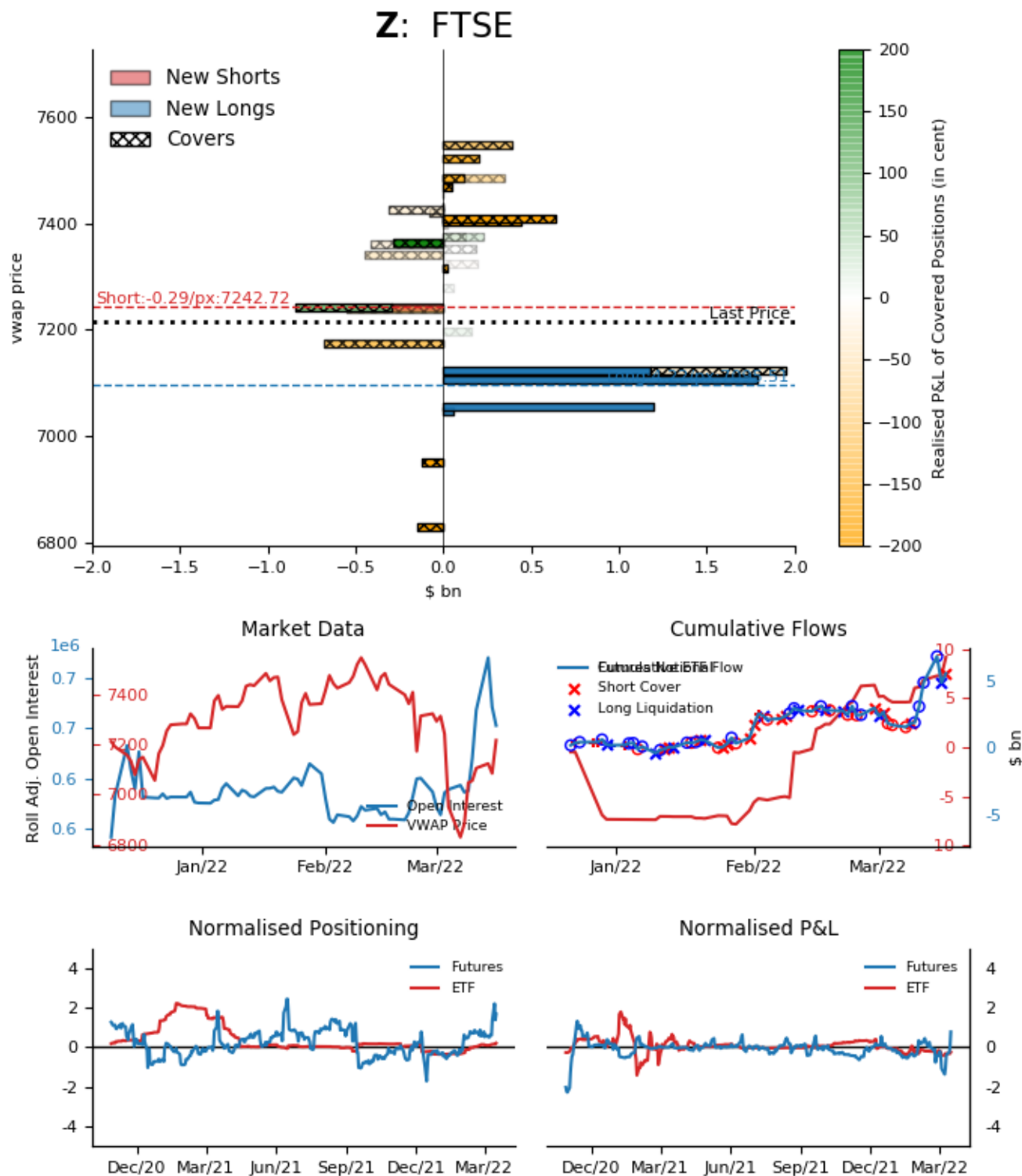
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## FTSE 100

Figure 8. FTSE 100 contracts (Z) - position snapshot and time-series

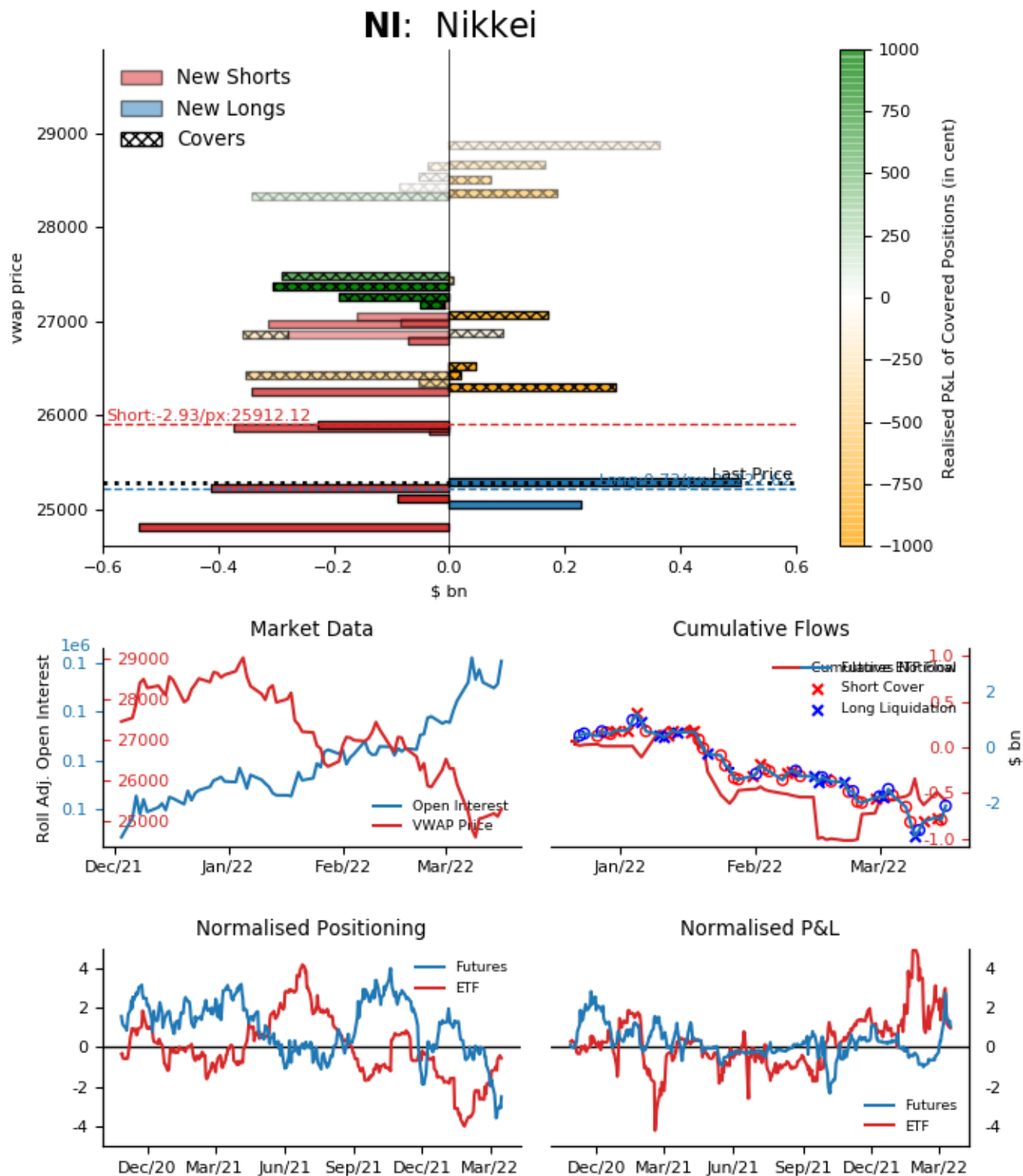


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Source: Citi Research, Bloomberg; Note: Futures trading involves substantial risk of loss

## Nikkei 225

Figure 9. Nikkei contracts (NI) - position snapshot and time-series

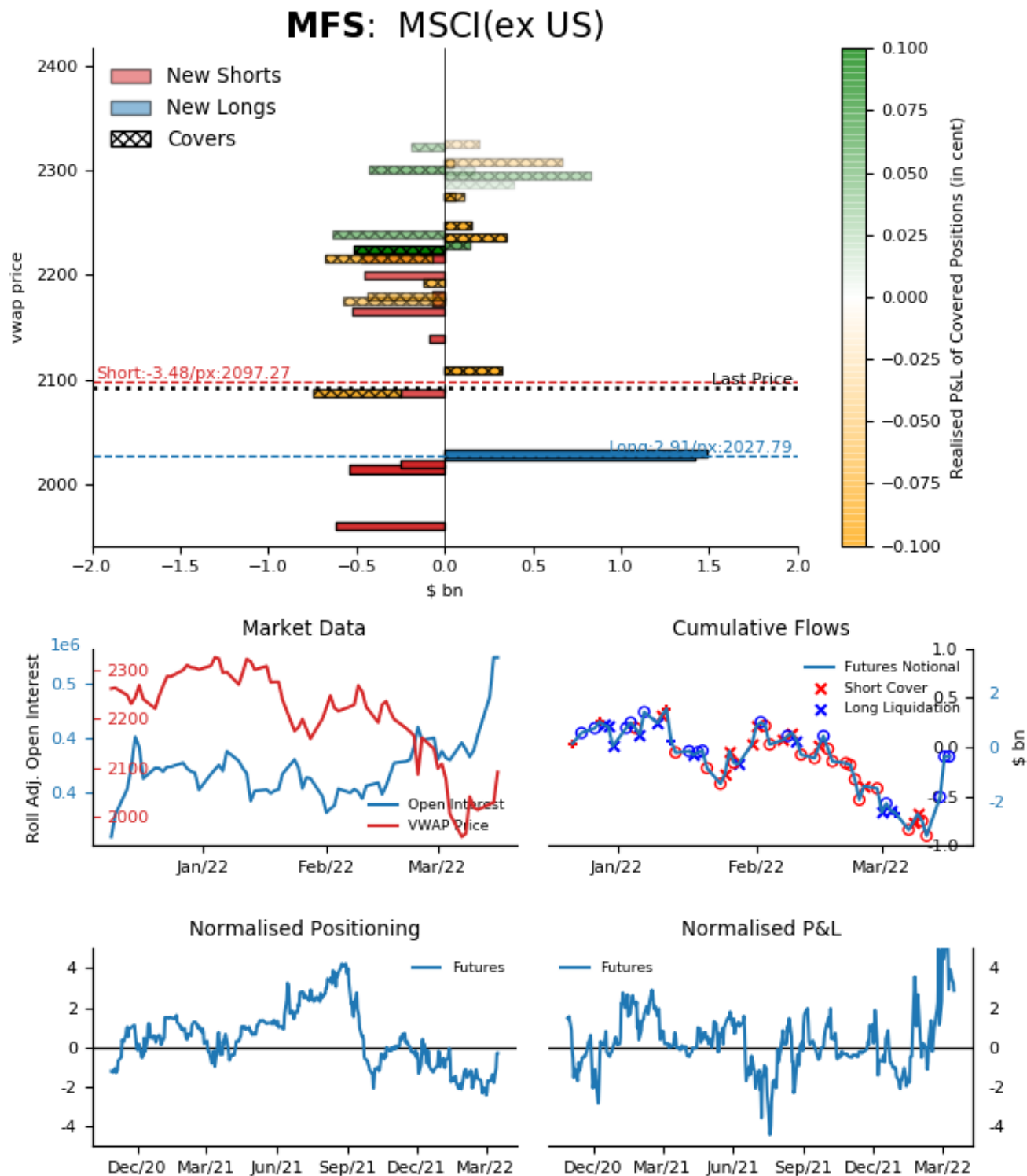


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## MSCI Dev World

Figure 10. MSCI DM ex-US Futures (MFS) - position snapshot and time-series

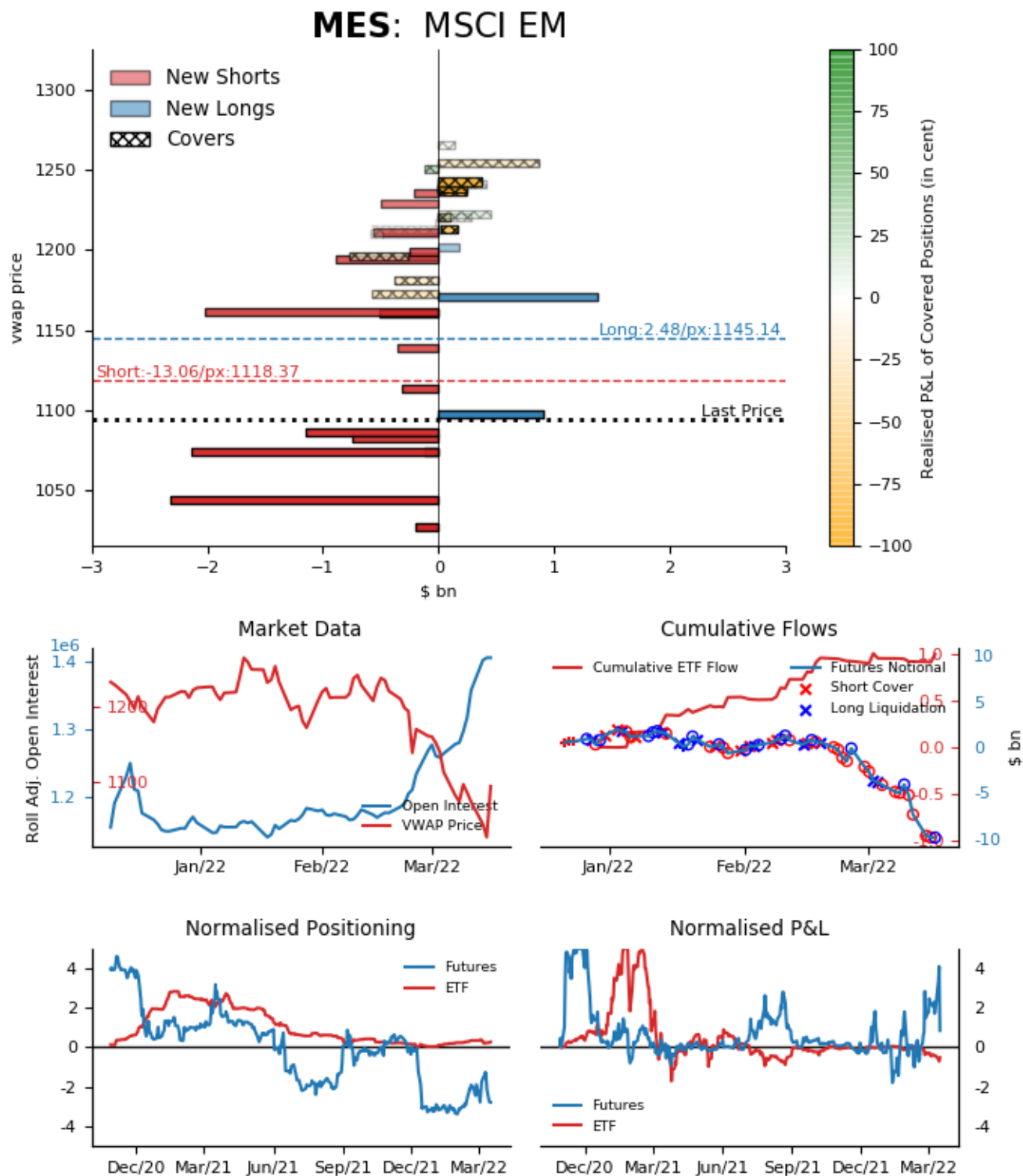


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## MSCI EM

Figure 11. MSCI EM Equity contracts (MES) - position snapshot and time-series

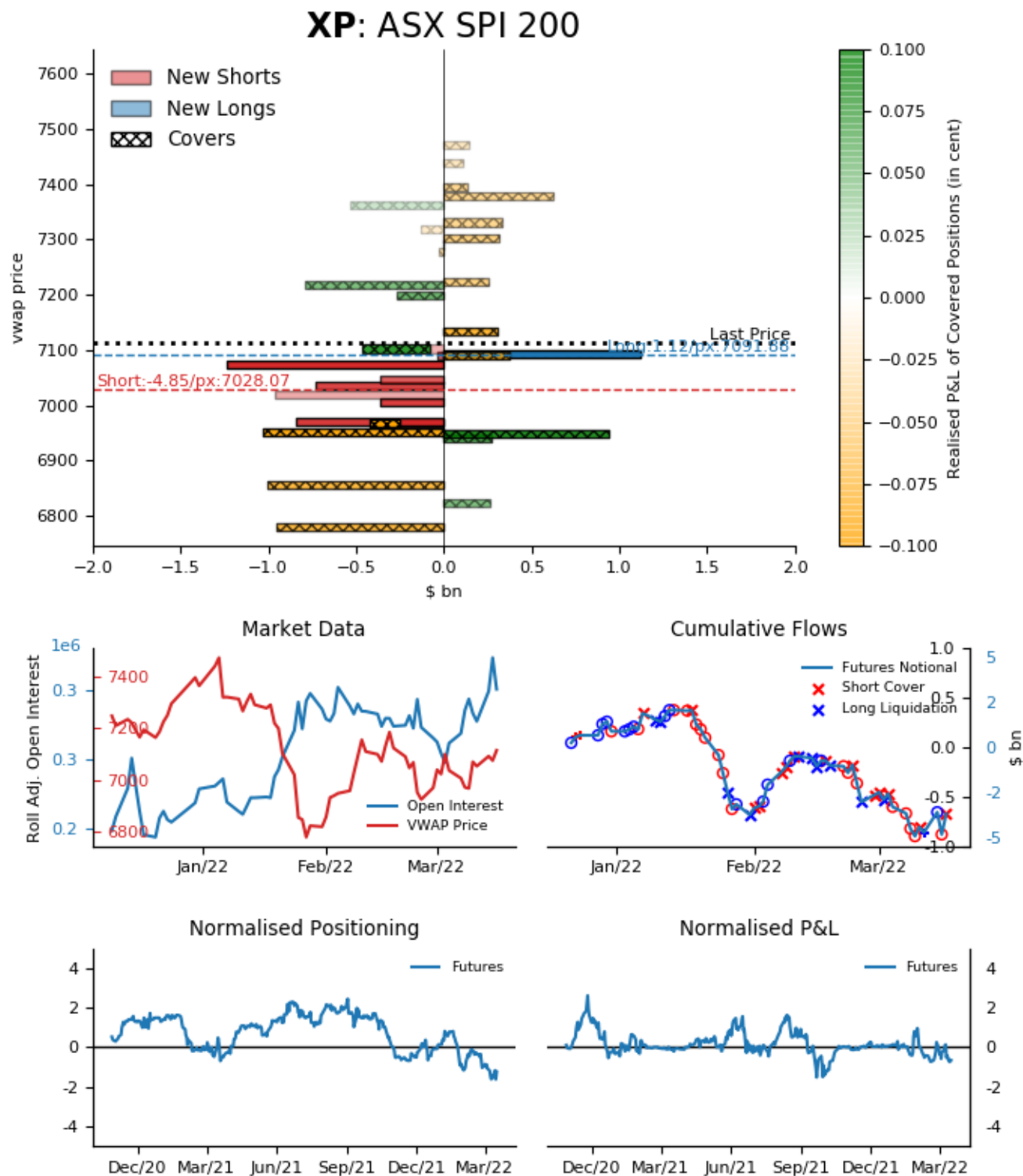


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## S&P ASX 200

Figure 12. S&P ASX 200 Equity contracts (XP) - position snapshot and time-series



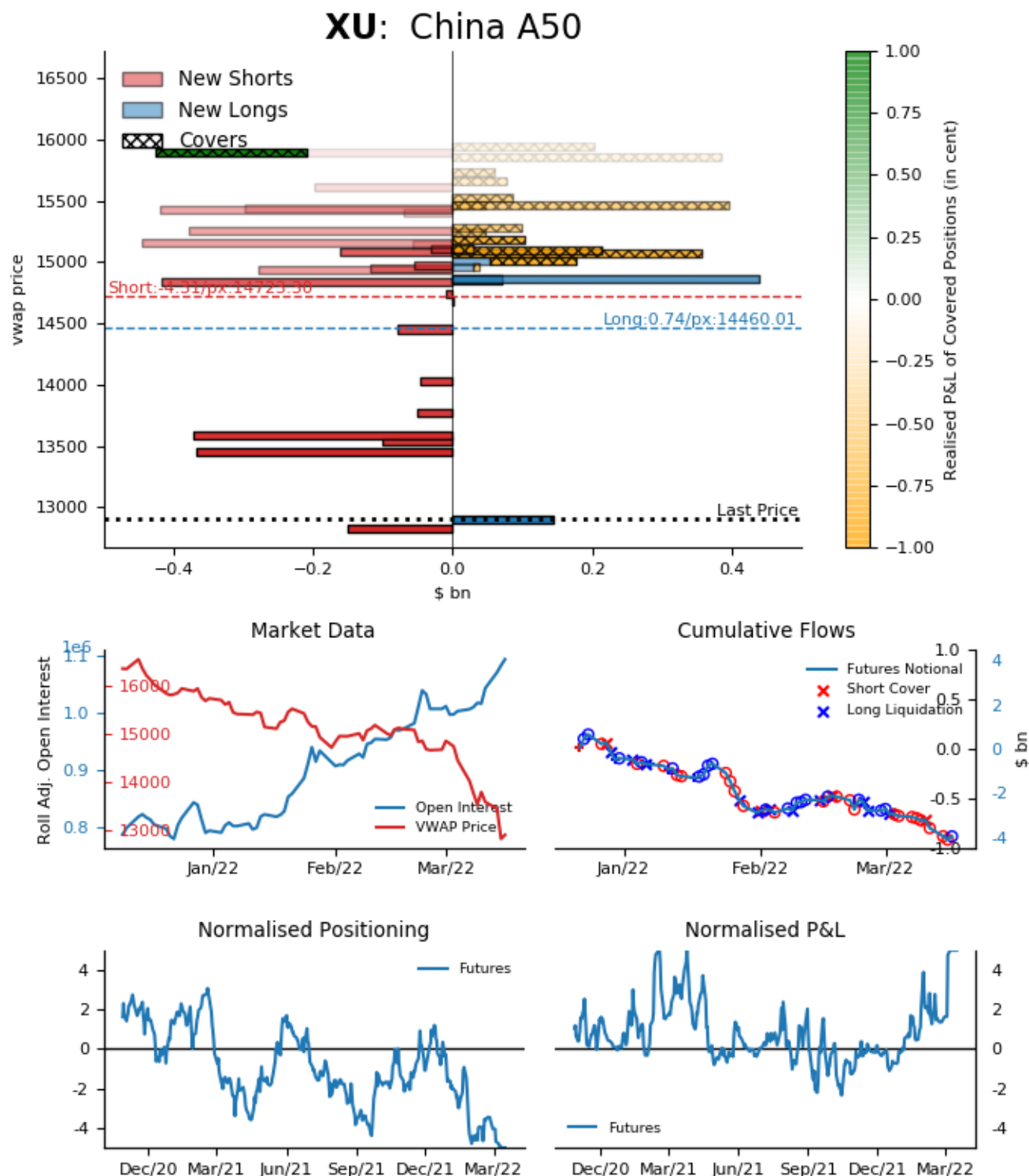
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Source: Citi Research, Bloomberg

## China A50

Figure 13. A50 contracts (XU) - position snapshot and time-series



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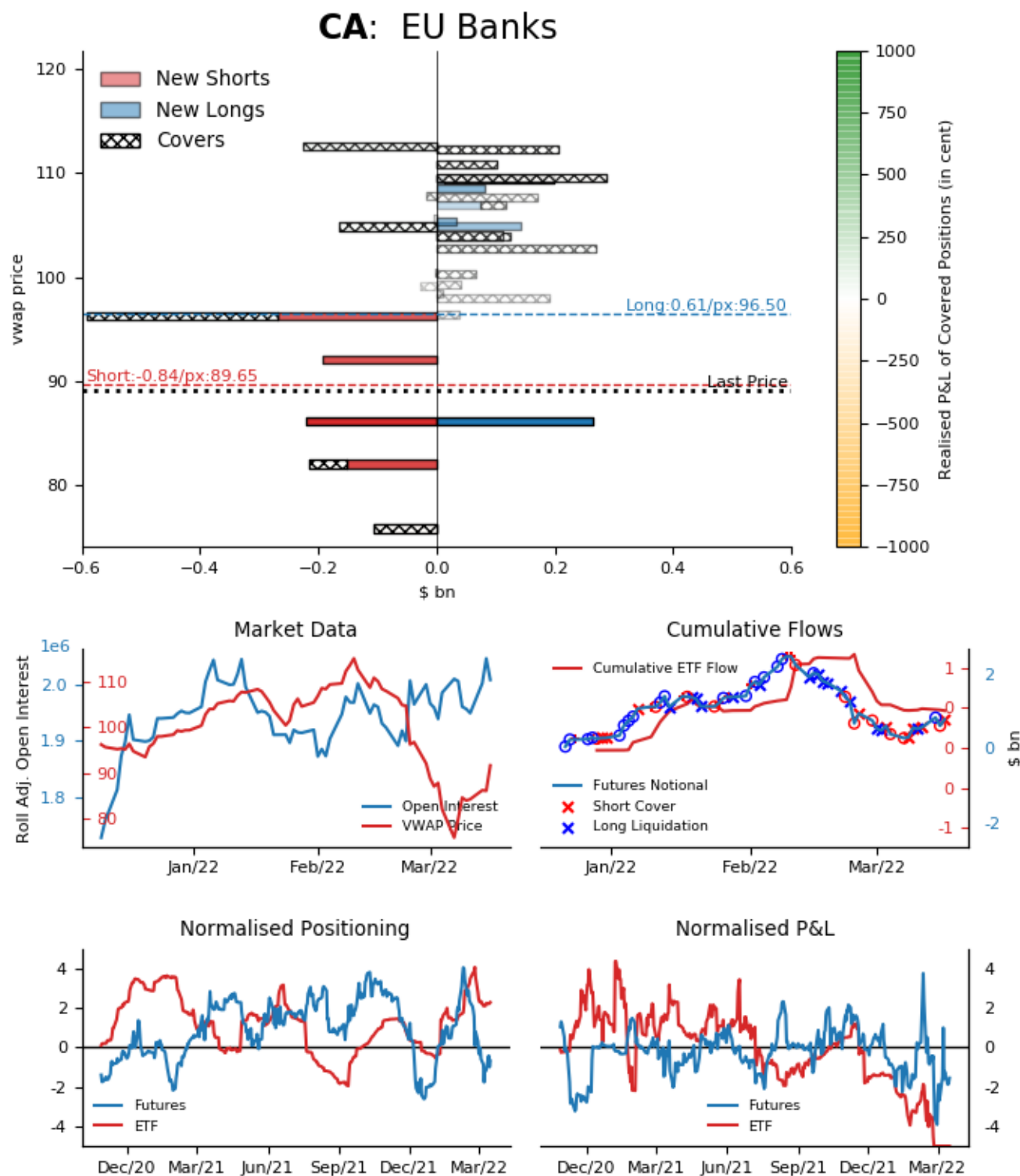
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Source: Citi Research, Bloomberg

## European Banks (SX7E)

Figure 14. Eurostoxx Banks (SX7E) Equity contracts (CA) - position snapshot and time-series



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Source: Citi Research, Bloomberg



## The Equity Markets Positioning Model - Methodology

The aim of the Equity Markets Positioning Model (EMP) is to provide information on current equity market positioning and how this might influence subsequent price action. It allows readers to 'visualize' the investor exposures in equity futures across multiple markets in order to:

- Quantify the current market positioning and profitability;
- Identify extreme market positions;
- Categorize periods in which price action will be dominated by positioning;

The model calculates a 'headline' positioning score between -5 to 5 and provides a visualization of the current and past market.

### How does the model work?

At a micro scale, price action is dominated by the size, level and speed at which investors choose to execute trades with other financial intermediaries. Buy/sell orders can clearly drive prices higher or lower and the EMP attempts to quantify these flows in order to understand the market direction and motivation.

This is a grand ambition, since there is no one market participant who holds a complete view of all market flows and we are only analyzing and aggregating futures trading to extrapolate the positioning across the whole market (i.e. including all cash trading). Based on this information we estimate:

- Market positioning: What is the outstanding market positioning (i.e. has there been net buying or selling recent history)? At what price and size were these trades executed?
- Market P&L: What is the unrealized profit or loss within the market (given the current outstanding market positioning)? When is this a motivation for investors to risk manage their positions?

We recognize that there are limits to this analysis – incomplete trade visibility, opaque instruments and unknown investor trading strategies create uncertainty in the 'true' picture of high-level equity market positioning.

The EMP model calculates the historical equity market positioning (over the last 3mths) and the associated unrealized P&L for the main markets around the world. A breakdown of the assets and contracts used in the EMP are presented in Figure 15 and calculation methodologies are outlined below.

Figure 15. Equity Markets covered by EMP Model

	US	Germany	UK	Europe (€)	US Tech	Japan	Developed World	Emerging Markets
Index	S&P 500	DAX	FTSE 100	ESTOXX50	Nasdaq	Nikkei	MSCI World ex US	MSCI EM
Code	ES	GX	Z	VG	NQ	NI	MFS	MES

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Source: Citi Research



## Positioning Calculations

The model identifies an objective subset of positions entered into (or closed) on a given day and classify these as being the relevant marginal long or short positions that determined (being the 'aggressor') the price move that day. In the report and in our analysis we will simply refer to these positions as longs, shorts and net position but they will always be a reference to this concept of a marginal positioning. This presumption then is that this subset of marginal positions are the most price sensitive, i.e. more likely to generate new flows (e.g. profit taking or squeezes) in response to future price moves.

In practice the model uses public trade activity data on the exchange traded futures contracts which is available daily. Naturally, net positioning is always zero for futures, since the exchange matches buyers and sellers and creates and cancels contracts as necessary. However, by tracking the daily changes in overall open interest (the number of contracts after the exchange create or cancels contracts) and combining that measure with the change in price we can make a classification for the marginal positioning change on that day as set out in Figure 16.

The change in open interest is taken to be the relevant marginal subset of positions that day and together with the change in price we determine whether to consider it a change in long or short positions.

Figure 16. Positioning Matrix for Futures Markets

		Open Interest			
		Increasing		Decreasing	
Daily Prices	Increasing	New Longs	Rising prices and increasing open interest implies the 'aggressor' is the buyer pushing the market higher	Cover Shorts	Rising prices and decreasing open interest implies the 'aggressor' is covering shorts (i.e. buying into the rally)
	Decreasing	New Shorts	Falling prices and increasing open interest implies the 'aggressor' is the seller pushing the market lower	Cover Longs	Falling prices and decreasing open interest implies the 'aggressor' is covering longs (i.e. selling into the sell-off)

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Source: Citi Research

Performing this analysis on a day by day basis creates a 'trade activity' history over a three month period which can be converted into a snap shot of cumulative positioning and unrealized P&L. To illustrate the methodology, it is useful to look at a worked example. In Figure 17, we present these calculations for S&P 500 futures in early March 2020.

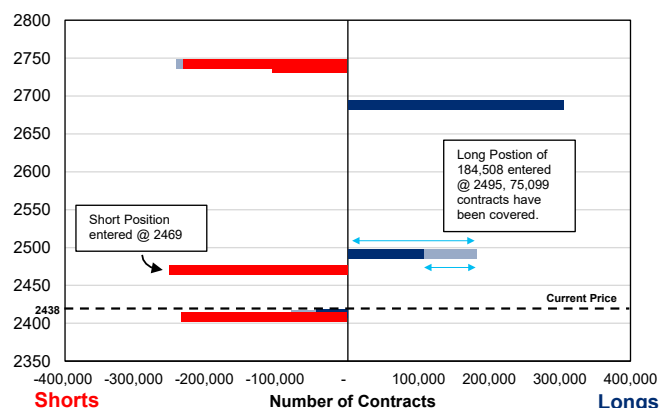
In this period, open interest increased and prices fell, suggesting an increase in the short investor base. The model shows numerous days where new short positions have been opened and relatively few where longs positions have been established, in addition to covering for some long and short positions. At the end of the period the cumulative uncovered positions and P&L is a simple the sum of the outstanding positions / P&L (see "total" in Figure 17– cumulative positions equate to -459,041 contracts and 868mln of unrealized P&L).

This positioning can be visualized as a horizontal bar graph ordered by price (see Figure 17). It can be clearly seen that the shorts were centered around 2740-2750 and the positions were significantly in the money. This contrasts with the big long position at 2696 which with a falling market was losing position. This snap shot of positioning can be summarized by the cumulative position unrealized P&L levels.

Figure 17. Example of positioning for S&P500 during March 2020.

Date	Trade Price	Open Interest	Delta Price	Delta Interest	Trade Activity	Contract Buy/Sell	Cum. Pos.	P&L Snapshot (\$ mil)
06-Mar	2964.0	3,213,000						
09-Mar	2747.8	3,442,251	-7.3%	229,251	New Short	-229,251	-229,251	3,551
10-Mar	2865.8	3,438,501	4.3%	-3,750	Cover Short	3,750	-225,501	-58
11-Mar	2740.3	3,549,717	-4.4%	111,216	New Short	-111,216	-336,717	1,681
12-Mar	2469.0	3,808,784	-9.9%	259,067	New Short	-259,067	-595,784	402
13-Mar	2696.0	4,124,586	9.2%	315,802	New Long	315,802	-279,982	-4,074
16-Mar	2416.3	4,369,586	-10.4%	245,000	New Short	-245,000	-524,982	-266
17-Mar	2495.5	4,554,094	3.3%	184,508	New Long	184,508	-340,474	-531
18-Mar	2414.0	4,628,421	-3.3%	74,327	New Short	-74,327	-414,801	-89
19-Mar	2403.3	4,553,322	-0.4%	-75,099	Cover Long	-75,099	-489,900	216
20-Mar	2438.0	4,522,463	1.4%	-30,859	Cover Short	30,859	-459,041	37
<b>Total</b>							<b>-459,041</b>	<b>868</b>

Figure 18. Example visualization of positioning.



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In EMP, the daily volume weighted average price (VWAP) is used in the calculations (rather than closing prices), since it creates more robust results. In addition, the EMP model chooses to cover trades that have the maximum economic impact (i.e. trades with the largest gains or losses are closed out first). However, in every other aspect, the methodology is identical to the one presented above.

Finally, the reported numbers in the EMP model are normalized into a range from -5 to +5 (representing large shorts / losses to large longs / profits) in order to compare across asset / instruments.

### What output is generated by EMP?

The EMP model provides a snapshot of the current positioning (see Figure 19 to Figure 21). These tables summarize the outstanding exposure and unrealized P&L (for a 3mth period in both futures and ETFs).

Typical output is shown in Figure 19 for cross equity market positioning in futures. In this illustration, investors are currently neutral to net short Eurostoxx 50 contracts, which has decreased from a net long position of the past 3 months. This is in contrast to MSCI EM futures where investors are sitting on profitable positions.

Figure 19. Example of Equity Market Positioning and PnL

All metrics in table are normalised between +5 and -5

Investors currently net long S&P 500 Emini futures

Investors currently neutral to net short EuroStoxx 50

(\$bn)		03/09/2020	S&P 500	DAX	FTSE 100	ESToxx50	Nasdaq	Nikkei	MSCI World x-US	MSCI EM
			ES	GX	Z	VG	NQ	NI	MFS	MES
<b>Normalised Scores ( -5 / +5 )</b>										
Positioning	Future		1.7	-0.1	1.0	-0.0	4.8	1.1	-0.7	2.0
	ETF		3.0	1.4	-0.6	0.9	3.6	1.0		1.1
	3m Net Pos		2.3	0.7	0.2	0.4	4.2	1.1	-0.7	1.6
	1w Change		0.4	0.2	0.3	0.3	-0.3	0.3	-0.4	-0.3
P&L	Future		1.2	-0.1	-0.7	-0.0	4.8	0.5	0.1	1.8
	ETF		3.7	1.9	-0.5	1.1	3.9	1.3		1.4
	3m Net PnL		2.5	0.9	-0.6	0.5	4.4	0.9	0.1	1.6
	1w Change		0.3	0.3	-0.0	0.3	-0.4	0.3	0.0	-1.1

Investors are sitting on profitable positions in MSCI EM.

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In addition we further breakdown market positioning by analyzing both long and short positions, the average entry price and the position relative to trading over the past three months (Figure 20).

Figure 20. Example of Breakdown of Market Positioning – Not Current

Net Notional = Longs minus Shorts (in \$blns)

Percentile refers to positioning relative to past 3 years

% Offside refers to what percentage of shorts are below Ref price – indicates risk of short squeeze if market rallies. Opposite for Longs

(\$bn)		03/09/2020	S&P 500	DAX	FTSE 100	ESToxx50	Nasdaq	Nikkei	MSCI World x-US	MSCI EM
			ES	GX	Z	VG	NQ	NI	MFS	MES
Futures	Net Notional		31.7	-0.1	2.4	-0.4	10.8	1.2	-1.1	6.4
	Percentile		67%	36%	53%	33%	99%	64%	11%	75%
Shorts	Notional		-7.5	-1.3	-3.9	-1.4	-1.6	-1.1	-2.7	-0.7
	Percentile		24%	37%	81%	24%	28%	20%	80%	21%
	Avg. Entry		3,246	12,994	6,116	3,316	10,993	22,959	1,890	1,089
	% offside		100%	100%	3%	100%	100%	100%	32%	89%
Longs	Notional		39.2	1.2	6.3	0.9	12.4	2.3	1.6	7.0
	Percentile		57%	18%	72%	10%	99%	25%	18%	67%
	Avg. Entry		3,337	13,068	6,096	3,311	11,166	22,889	1,893	1,051
	% offside		13%	0%	100%	0%	18%	0%	60%	38%
Ref Price			3,463	13,304	5,909	3,366	11,803	23,490	1,878	1,094
Activity	1-day		-2.6	-0.2	0.0	-0.1	-0.9	0.3	0.0	0.0
	Type		longs	shorts	longs	shorts	longs	longs	shorts	shorts
	1-week		4.2	0.1	0.1	-0.5	-0.4	0.1	-0.7	0.5

Average entry price over past 3 months

1 day trading activity in \$blns. Negative (positive) means risks is being cut (added)

Defines what side the risk is being traded

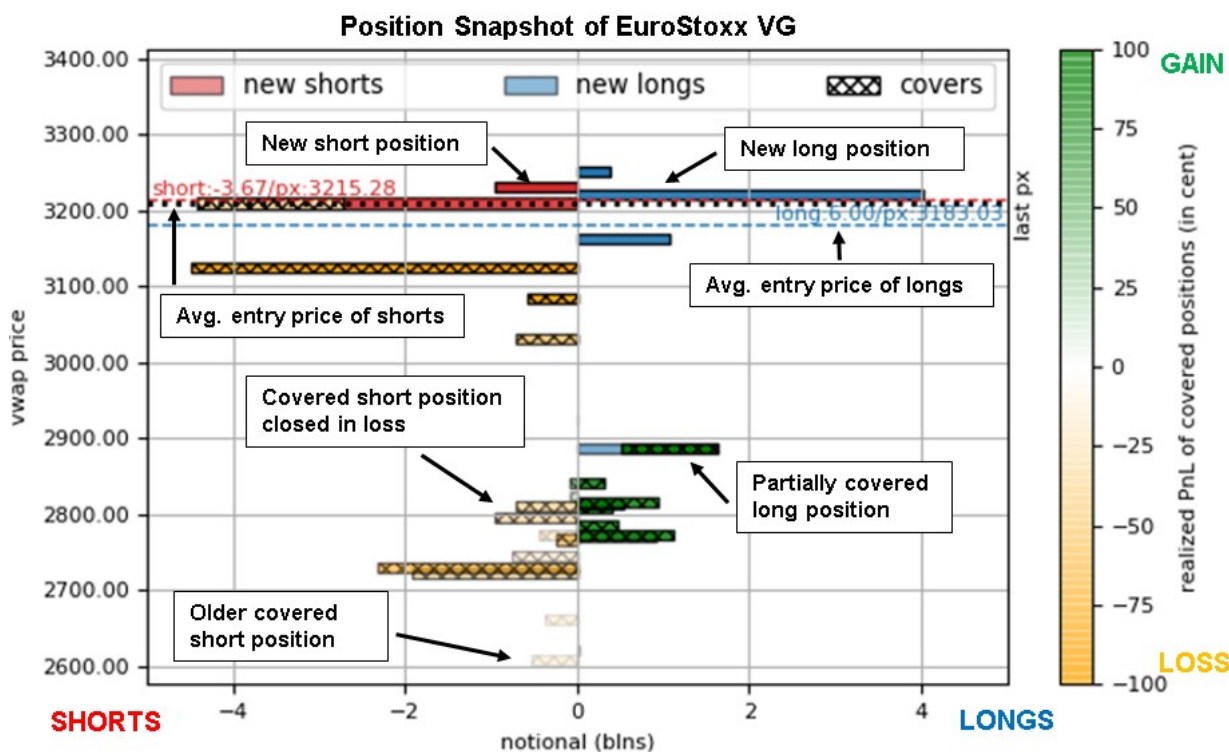
1 week cumulative trading flow

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Source: Citi Research. Note: Futures trading involves substantial risk of loss.

Lastly, a complete visualization of the positioning is presented in Figure 21. This shows the current positioning ordered by VWAP prices over a 3 month period. The bars in the chart illustrate the level at which trades were executed (red = short positions and blue = long positions). The lighter bars imply older trade activity. When a trade is covered the bar is hashed with XXX and the color of the shading represents if it was covered at a gain or loss (yellow=loss, green=gain). The horizontal red and blue dotted lines show the respective average entry price of contracts over the past three months.

Figure 21. Example Snapshot of Position in EuroStoxx Futures – Not Current



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Source: Citi Research. Futures trading involves substantial risk of loss.

### What it means for Cash Equities

Although traditionally used as a hedge, futures are also by investors for taking an outright view on markets. This becomes increasingly relevant when futures positioning is extended. We explore this content in greater detail in [Regime Modelling using Futures Positioning: Futures vs. Cash – A Distant but Meaningful Relationship](#), which explores the interplay between futures positioning and behavior seen in underlying cash markets.

## Previously Published Research

Figure 22. Research Reports (since 2009)

Date	Research Theme	Report Link
26-Jul-21	Machine Learning	<a href="#">Searching for Alpha: Practical Considerations in Building Neural Networks for Stock Selection</a>
22-Jul-21	ESG	<a href="#">ESG Insights: Indexed ESG Funds – A Widespread Implementation Choice</a>
22-Jun-21	Factor	<a href="#">Searching for Alpha: Go with the Stock Connect Flow, for a Sharpe of 4</a>
18-Jun-21	Factor	<a href="#">Searching for Alpha: Overlaying Price Mo. and Short Interest to avoid drawdowns and improve returns</a>
15-Jun-21	ESG	<a href="#">ESG Insights: ESG Fundamental Characteristics</a>
13-Apr-21	ESG	<a href="#">ESG Insights: Following the ESG Herd: Has ESG become a Crowded Trade?</a>
29-Mar-21	Machine Learning	<a href="#">Searching for Alpha: Pairs Trading: Applying Machine Learning to Pairs Trading</a>
09-Mar-21	Positioning	<a href="#">Regime Modelling using Futures Positioning: Futures vs. Cash – A Distant but Meaningful Relationship</a>
18-Feb-21	ESG	<a href="#">ESG Insights: The ESG 'Premium': How does ESG compare to other Factors?</a>
01-Feb-21	Event	<a href="#">Searching for Alpha: Asia Earnings Surprise: Predicting Asia Earnings Surprises</a>
14-Jan-21	ESG	<a href="#">ESG Insights: Where Machines do it Better: Inferred ESG Ratings Data</a>
30-Oct-20	Factor	<a href="#">Searching for Alpha: China A Alpha – Smoothing Price Momentum</a>
16-Oct-20	Factor	<a href="#">Under the Microscope: Overlapping Momentum</a>
14-Sep-20	Positioning	<a href="#">Equity Markets Positioning Model: Introducing the EMP</a>
11-Sep-20	Factor	<a href="#">Searching for Alpha: Combining ESG and Risk Premia Investment: A Double Screen Approach</a>
08-Sep-20	Factor	<a href="#">Searching for Alpha: Factoring Short Interest: Measuring and Profiting from Information in Shorts</a>
28-May-20	Machine Learning	<a href="#">Searching for Alpha: Machine Learning - SHAP Value as Factor Selection Criterion</a>
28-Feb-20	Machine Learning	<a href="#">Searching for Alpha: Machine Learning: Leveraging Return Forecasts</a>
21-Feb-20	Factor	<a href="#">Searching for Alpha: China A Alpha – Sector-rel. Value Is Powerful, Choose Sector Mappings Wisely</a>
03-Oct-19	Machine Learning	<a href="#">Searching for Alpha: Machine Learning: Beyond Random Forest for Stock Selection</a>
23-Sep-19	Event	<a href="#">Searching for Alpha: Earnings Surprise: Managing Expectations</a>
05-Mar-19	Machine Learning	<a href="#">Searching For Alpha: Machine Learning: Interpreting Machine Learning Predictions</a>
07-Feb-19	Misc	<a href="#">Searching for Alpha: GAAP vs. Non-GAAP: Which Earnings does the Market Price?</a>
21-Nov-18	Positioning	<a href="#">Searching for Alpha: Style Crowding in Asia: Getting Ahead of the Crowd</a>
17-Sep-18	Event	<a href="#">Searching for Alpha: Earnings Surprise: Using ML to Forecast Earnings Surprises &amp; Returns</a>
13-Sep-18	ESG	<a href="#">Searching for Alpha: The ESG Edge: ESG Investing – A Step Forward</a>
03-Sep-18	Machine Learning	<a href="#">Searching For Alpha: Machine Learning: Interacting Machine Learning and Factors</a>
03-May-18	Positioning	<a href="#">Measuring the Crowded Trade: Introduction to our Crowding Composite for individual stocks</a>
14-Mar-18	Factor	<a href="#">Searching for Alpha: Profiting from Capex: Look To Capex Announcements</a>
07-Sep-17	Rotation	<a href="#">Searching for Alpha: Tactical Style Rotation: Using Risk and Return to Manage Style Exposure</a>
10-Mar-17	Misc	<a href="#">Searching for Alpha: Big Data: Navigating New Alternative Datasets</a>
13-Feb-17	Factor	<a href="#">Searching for Alpha: Betting Against (Accurate) Beta</a>
19-Sep-16	Factor	<a href="#">Searching for Alpha: Competitive Advantage: Survival of the Fittest</a>
09-Sep-16	Factor	<a href="#">Searching for Alpha: Financial Strength Redux</a>
14-Apr-16	Rotation	<a href="#">Searching for Alpha: Dynamic Style Weighting: Risk-Based Equity Style Allocation</a>
04-Mar-16	Smart Beta	<a href="#">Long-Only Pure Style Portfolios: No Shorts Please</a>
18-Feb-16	Factor	<a href="#">Industry Alpha Insights: Banks: One Size Does Not Fit All</a>
21-Sep-15	Factor	<a href="#">Under the Microscope: Stock Momentum Conflation</a>
15-Sep-15	Allocation	<a href="#">Searching for Alpha: Macro Moves Markets: Economic Data, Expectations and Market Pricing</a>
23-Mar-15	Rotation	<a href="#">Searching for Alpha: Style Timing: Style Performance, Trading Volumes and Investor Agreement</a>
13-Mar-15	Misc	<a href="#">World Radar Screen: Refining Our Global Search for Alpha</a>
18-Feb-15	Factor	<a href="#">Searching for Alpha: Networking with Analysts: Modelling Analyst Forecast Dependence</a>
01-Oct-14	Smart Beta	<a href="#">The Rise of Low Risk Investing: Is It Getting Crowded Out There?</a>
27-Mar-14	Factor	<a href="#">Under the Microscope: Five Innovations In Momentum Investing</a>
07-Mar-14	Factor	<a href="#">Searching for Alpha: Timing Price Momentum: When Does Momentum Move?</a>
27-Nov-13	Smart Beta	<a href="#">Equity Risk Premia Investing: A New Methodology for Monitoring Style Performance</a>
23-Jul-13	Allocation	<a href="#">Stock Market Country Selection: Changes to a Well-Established Model</a>
02-Jul-13	Factor	<a href="#">Searching For Alpha: Digging For Dividends: QUARI - Quality with A Reliable Income</a>
24-Jun-13	Misc	<a href="#">Global Theme Machine: An Objective Way of Identifying Attractive Investment Themes</a>
25-Mar-13	Factor	<a href="#">Searching for Alpha: Purifying Analyst Recommendations: Removing Beta to get to the Alpha</a>
06-Nov-12	Factor	<a href="#">Searching for Alpha: Tangible Benefits of Intangibles: Brand, Respect &amp; Intellectual Capital</a>
09-Mar-12	Smart Beta	<a href="#">Low-Risk Portfolio Strategies: Sharpe Ratio Maximisation and Multi-Asset Applications</a>
28-Feb-12	Rotation	<a href="#">Macro Risk and Style Rotation: A Guide Rather than a Prescription</a>
14-Sep-11	Factor	<a href="#">Searching for Alpha: Accruals Volatility - A New Approach to Quality Investing</a>
24-Aug-11	Allocation	<a href="#">Industry Alpha Insights: Four Approaches to Tactical Industry Selection</a>
17-Mar-11	Misc	<a href="#">Industry Alpha Insights: Quantifying Industry-Specific Fundamentals</a>
18-Nov-10	Smart Beta	<a href="#">Low-Risk Equity Portfolios: More than just Minimum Variance</a>
15-Nov-10	Allocation	<a href="#">Under the Microscope: Measuring Systemic Risk - The Absorption Ratio</a>
14-Jun-10	Factor	<a href="#">Under the Microscope: Optionality in Valuation</a>
31-Mar-10	Event	<a href="#">Searching for Alpha: Earnings Surprise: Still Profiting from Surprises</a>
29-Jan-10	Factor	<a href="#">Momentum in Japan: Looking at Price, Trading Values and Earnings</a>
15-Oct-09	Rotation	<a href="#">Searching for Alpha: Style Rotation: Optimising Style Rotation Strategies</a>

## Citi Quant Research Team

Figure 23. Citi Quantitative Research Teams

(For Information Purposes Only)

### Global Quantitative Research

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## Appendix A-1

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Data current as of 31 Dec 2021	12 Month Rating			Catalyst Watch		
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% of companies in each rating category that are investment banking clients	65%	66%	57%	70%	63%	70%
Citi Research Quantitative World Radar Screen Model Coverage	30%	40%	30%			
% of companies in each rating category that are investment banking clients	42%	31%	28%			
Citi Research Quantitative Latam Radar Screen Model Coverage	20%	59%	21%			
% of companies in each rating category that are investment banking clients	80%	68%	72%			
Citi Research Quantitative Asia Radar Screen Model Coverage	20%	60%	20%			
% of companies in each rating category that are investment banking clients	34%	26%	20%			
Citi Research Quantitative Australia Radar Screen Model Coverage	60%	0%	40%			
% of companies in each rating category that are investment banking clients	36%	0%	54%			

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Citi Research Australia Quantitative Radar Screen model recommendations are based on a robust framework to measure relative value and momentum for a large number of stocks across the Australian market. Stocks with a ranking of 1 denotes a stock that is above average in terms of both value and momentum relative to the stocks in the Australian market. A ranking of 10 denotes a stock that is below average in terms of both value and momentum relative to the stocks in the Australian market.

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