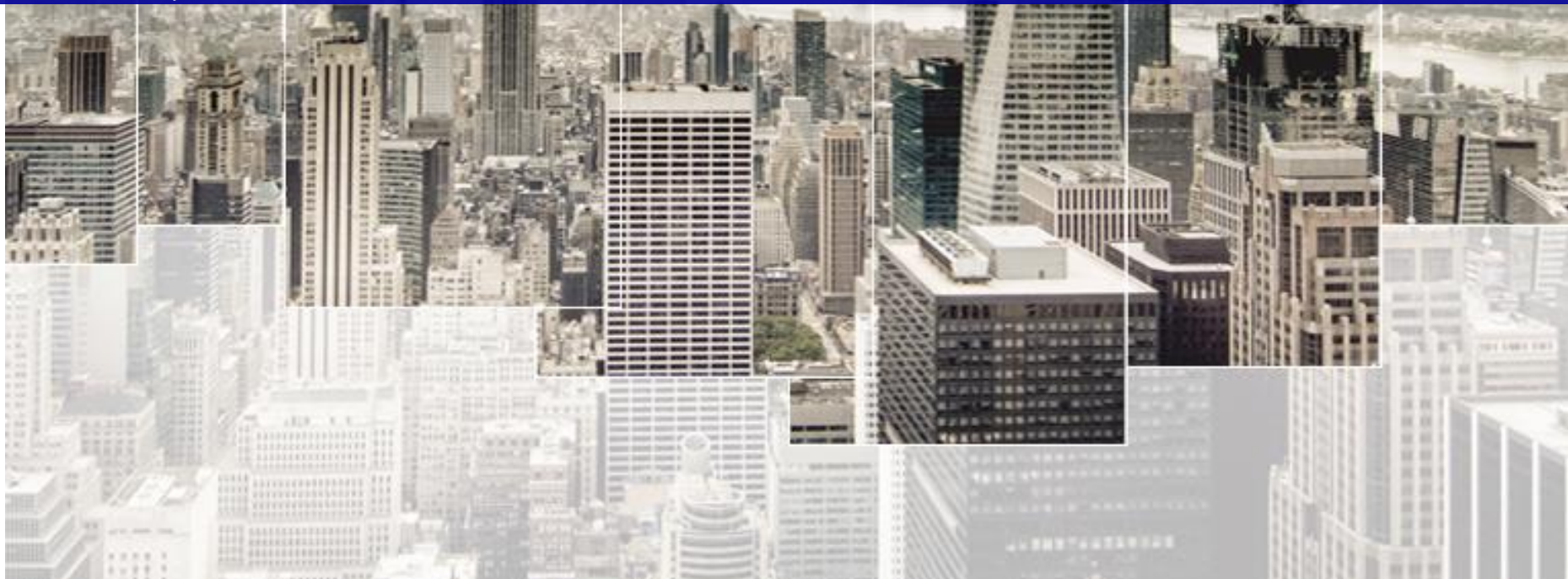**DEUTSCHE BÖRSE GROUP**

Deutsche Börse Indices – Market Consultation
Considered Methodology Change for MDAX, SDAX and TecDAX

26th January, 2018

1.

Introduction

# Deutsche Börse considers a methodology change to the MDAX, SDAX and TecDAX

Current methodology

- **Horizontal separation** between "Classic" and "Tech" companies for selection indices "below" the DAX[1]

  - MDAX/SDAX contain only firms classified as "Classic". Companies classified as "Tech" are currently not eligible

  - No dual membership allowed

- **Vertical separation** among Tech companies

  - TecDAX only includes tech companies "below" the DAX
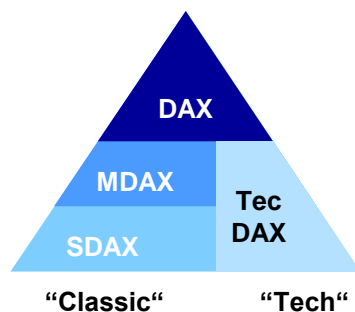
Considered future methodology

- **Removal of horizontal separation** to let „Tech" companies join the MDAX and SDAX in order to offer consistent, i.e. cross-industry mid and small cap indices

- **Removal of vertical separation** to let Tech companies as part of the DAX index join the TecDAX in order to offer a consistent tech index without small / mid cap bias

- **Extension of number of components** selected into the MDAX and SDAX from currently 50 to 60 (in order to account for the increased number of companies eligible for MDAX and SDAX)

"Classic"   "Tech"

"Classic" & "Tech", based on size   **"Tech" focus without size distinction**
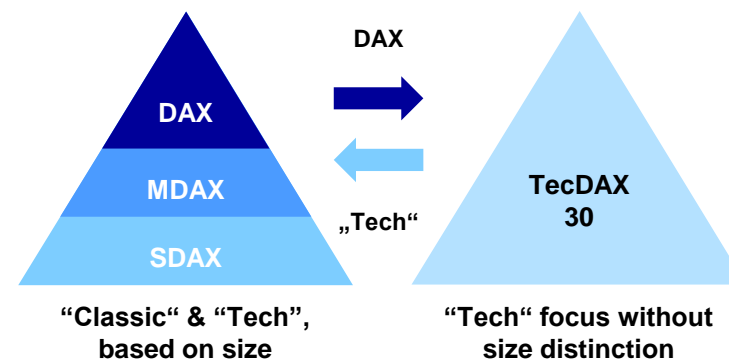
1) For the allocation of sectors to the segments "Classic" and "Tech", please refer to the Appendix or Chapter 9.5 in the "Guide to the Equity Indices of Deutsche Börse".

Rationale driving considered rule-change for MDAX, SDAX and TecDAX

Evaluation of removing the artificial separation between "Tech"/"Classic"

International standard

- Existing size indices typically do not distinguish between "Tech" and "Classic" (i.e. non-tech)

Increased coverage

- Due to extension of eligible universe, the coverage of MDAX and SDAX would be significantly increased (i.e. both indices would become broad size indices)

Higher Mcap

- The total and median free-float capitalization of the MDAX, SDAX and TecDAX tend to increase

2.

Potential changes in detail

Considered rule changes in detail

MDAX/SDAX:

- **Removal of horizontal separation:** include „Tech" companies in MDAX and SDAX

  - The underlying universe considered for the composition of the MDAX and SDAX would be extended to include all stocks listed in the Deutsche Börse Prime Standard, irrespective of whether they are classified as „Classic" or „Tech"

  - The selection process and review frequency would remain unchanged. Hence, companies would be selected based upon their free-float market capitalization and 12-month-turnover

  - In order to mitigate a crowding out effect of current MDAX and SDAX components due to the now extended universe (tech companies would push out MDAX/ SDAX members), the number of companies per index would be increased from currently 50 to 60

TecDAX:

- **Removal of vertical separation:** Include "Tech" companies from DAX in TecDAX

  - The underlying universe considered for the composition of the TecDAX would be extended to also include tech companies from the entire Prime Standard segment, which includes current DAX members

  - The selection process, review frequency and number of companies selected into the index would remain unchanged

Current regular and fast entry / exit rules (MDAX **50**, SDAX **50**, TecDAX **30**)[1]

MDAX® 50	Rank candidate FF-Mcap/ Trading Value	Rank alternate candidate FF-Mcap/ Trading Value	Mar.	Jun.	Sep.	Dec.
Fast Exit	65/65	55/55;55/60;55/65	X	X	X	X
Fast Entry	45/45	55/55	X	X	X	X
Regular Exit	60/60	55/55	X		X	
Regular Entry	50/50	55/55	X		X	
SDAX® 50						
Fast Exit	115/115	105/105;105/110;105/115	X	X	X	X
Fast Entry	95/95	105/105	X	X	X	X
Regular Exit	110/110	105/105	X		X	
Regular Entry	100/100	105/105	X		X	
TecDAX® 30						
Fast Exit	45/45	35/35;35/40;35/45	X	X	X	X
Fast Entry	25/25	35/35	X	X	X	X
Regular Exit	40/40	35/35	X		X	
Regular Entry	30/30	35/35	X		X	

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1) The stated ranks refer to the fast and regular entry and exit rules described in chapter 4.1.1.3 of the Guide to the Equity Indices of Deutsche Boerse available on www.dax-indices.com (hereinafter referred to as "Equity Indices Guide").

Considered regular and fast entry / exit rules (MDAX **60**, SDAX **60**, TecDAX **30**)

MDAX® 60	Rank candidate FF-Mcap/ Trading Value	Rank alternate candidate FF-Mcap/ Trading Value	Mar.	Jun.	Sep.	Dec.
Fast Exit	75/75	65/65;65/70;65/75	X	X	X	X
Fast Entry	55/55	65/65	X	X	X	X
Regular Exit	70/70	65/65	X		X	
Regular Entry	60/60	65/65	X		X	
SDAX® 60						
Fast Exit	135/135	125/125; 125/130;125/135	X	X	X	X
Fast Entry	115/115	125/125	X	X	X	X
Regular Exit	130/130	125/125	X		X	
Regular Entry	120/120	125/125	X		X	
TecDAX® 30						
Fast Exit	45/45	35/35;35/40;35/45	X	X	X	X
Fast Entry	25/25	35/35	X	X	X	X
Regular Exit	40/40	35/35	X		X	
Regular Entry	30/30	35/35	X		X	

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1) The stated ranks refer to the fast and regular entry and exit rules described in chapter 4.1.1.3 of the Equity Indices Guide.

3.

Impact on derived index concepts

Overview of indices derived from MDAX, SDAX or TecDAX (I)

Class	Index	Launch Date	Base Date	Underlying Index Universe	Impact
Benchmark	HDAX (PR) EUR	11.04.1994	30.12.1987	DAX, MDAX, TecDAX	Old: DAX 30 + MDAX 50 + TecDAX 30 New: DAX 30 + MDAX 60 + TecDAX 30 – overlap (TecDAX/MDAX)
Benchmark	HDAX (TR) EUR	11.04.1994	30.12.1987	DAX, MDAX, TecDAX	
Benchmark	HDAX (PR) USD	08.05.2015	03.01.2000	DAX, MDAX, TecDAX	
Benchmark	HDAX (TR) USD	19.08.2014	31.12.2002	DAX, MDAX, TecDAX	
Benchmark	HDAX (PR) CHF	08.05.2015	03.01.2000	DAX, MDAX, TecDAX	
Benchmark	HDAX (TR) CHF	08.05.2015	03.01.2000	DAX, MDAX, TecDAX	
Hedged	HDAX Monthly Hedged (PR) CHF	08.05.2015	30.12.1999	DAX, MDAX, TecDAX	
Hedged	HDAX Monthly Hedged (TR) CHF	08.05.2015	30.12.1999	DAX, MDAX, TecDAX	
Hedged	HDAX Monthly Hedged (PR) USD	08.05.2015	30.12.1999	DAX, MDAX, TecDAX	
Hedged	HDAX Hedged (TR) USD	19.08.2014	31.12.2002	DAX, MDAX, TecDAX	
Strategy	DAXplus® Maximum Dividend (PR) EUR	23.03.2009	21.05.1999	DAX, MDAX, TecDAX	
Strategy	DAXplus® Maximum Dividend (TR) EUR	23.03.2009	21.05.1999	DAX, MDAX, TecDAX	
Strategy	DAXplus® Export Strategy (PR) EUR	24.10.2005	18.03.2002	DAX, MDAX	Extension of universe by 10 firms (MDAX 60)
Strategy	DAXplus® Export Strategy (TR) EUR	24.10.2005	18.03.2002	DAX, MDAX	
Strategy	DivMSDAX (PR) EUR	16.05.2011	17.09.1999	MDAX, SDAX	Extension of universe by 20 firms (MDAX 60, SDAX 60)
Strategy	DivMSDAX (TR) EUR	16.05.2011	17.09.1999	MDAX, SDAX	
Strategy	Midcap Market Index (PR) EUR	24.03.2003	30.12.1997	MDAX, TecDAX	Reduction by overlap between MDAX and TecADX
Strategy	Midcap Market Index (TR) EUR	24.03.2003	30.12.1997	MDAX, TecDAX	

Overview of indices derived from MDAX, SDAX or TecDAX (II)

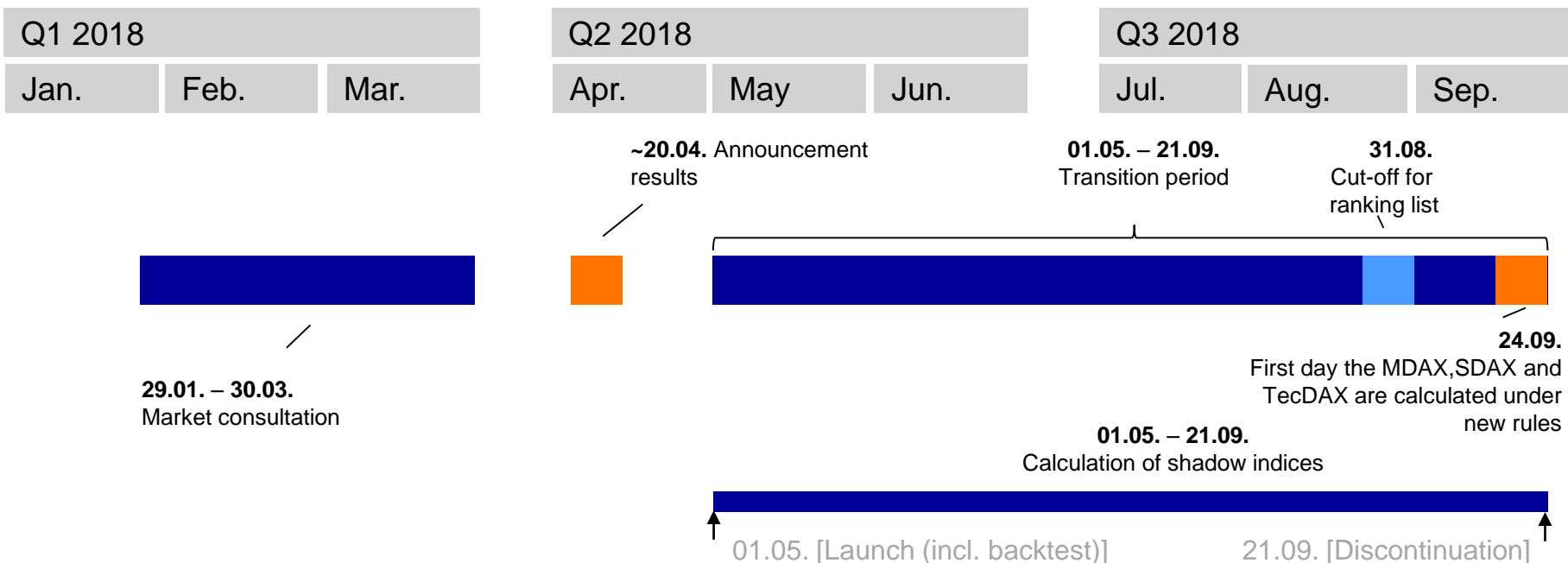| Class	Index	Launch Date	Base Date	Underlying Index Universe	Impact
Strategy	ShortMDAX (PR) EUR	28.08.2014	29.12.2006	MDAX	Addition of 10 firms (MDAX 60)
Strategy	ShortMDAX (TR) EUR	28.08.2014	29.12.2006	MDAX	Addition of 10 firms (MDAX 60)
Strategy	ShortTecDAX (TR) EUR	10.01.2010	29.12.2006	TecDAX	Change in TecDAX composition
Strategy	ShortTecDAX (PR) EUR	21.03.2011	29.12.2006	TecDAX	Change in TecDAX composition
Strategy	ShortTecDAX AR (PR) EUR	25.02.2013	30.12.2011	TecDAX	Change in TecDAX composition
Strategy	ShortTecDAX AR (TR) EUR	25.02.2013	30.12.2011	TecDAX	Change in TecDAX composition
Calculation hours	X-MDAX (TR) EUR	03.12.2007	30.12.1987	MDAX	Addition of 10 firms (MDAX 60)
Calculation hours	L/E-MDAX® (TR) EUR	03.11.2003	30.12.1987	MDAX	Addition of 10 firms (MDAX 60)
Calculation hours	X-TecDAX (TR) EUR	03.12.2007	30.12.1987	TecDAX	Change in TecDAX composition
Calculation hours	L/E-TecDAX® (TR) EUR	03.11.2003	30.12.1987	TecDAX	Change in TecDAX composition

- No shadow indices would be calculated for derived indices

4.

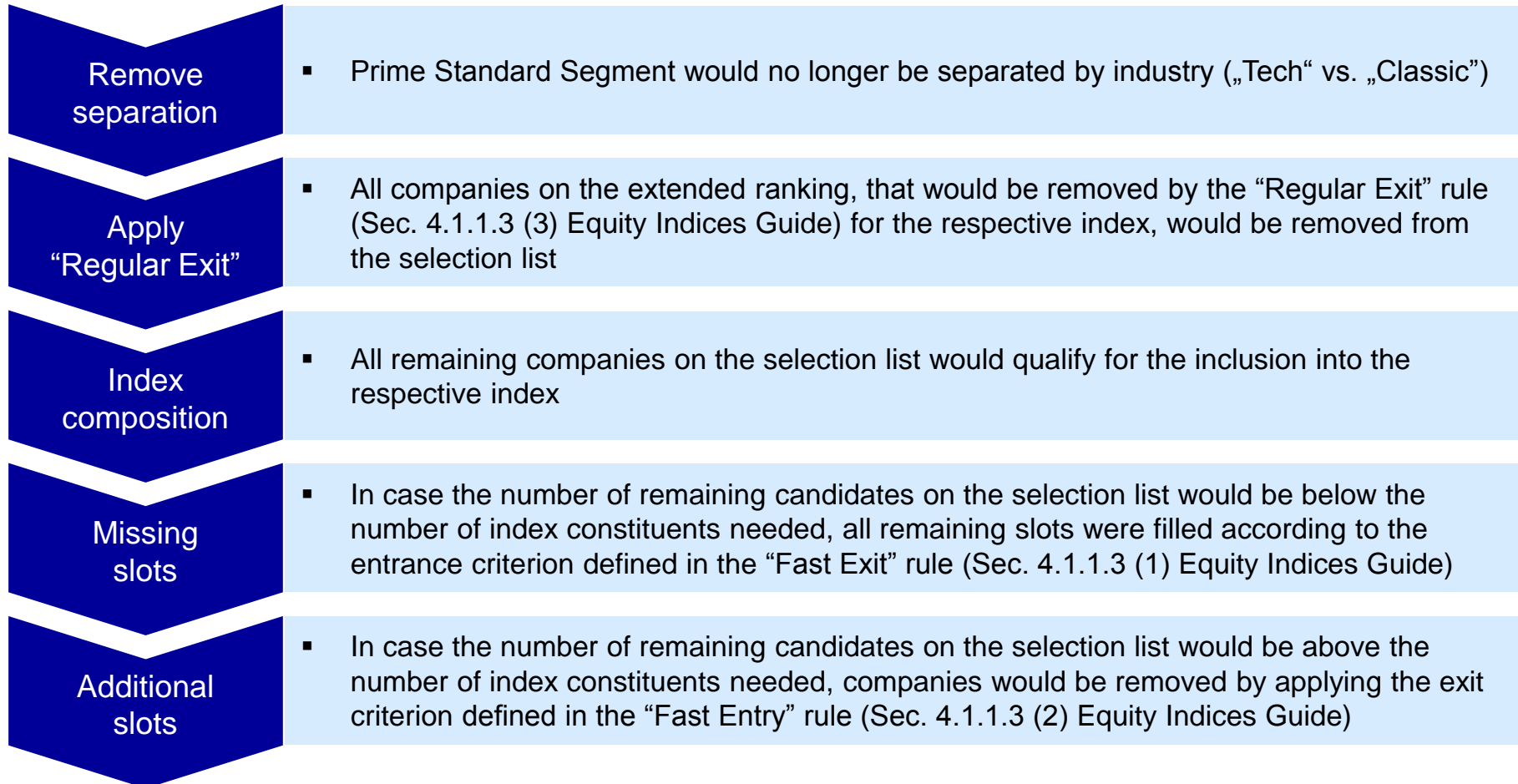## Potential transition period and procedure

The following implementation schedule is considered

Q1 2018			Q2 2018			Q3 2018		
Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.

~20.04. Announcement results

01.05. – 21.09.
Transition period

31.08.
Cut-off for ranking list

29.01. – 30.03.
Market consultation

24.09.
First day the MDAX, SDAX and TecDAX are calculated under new rules

01.05. – 21.09.
Calculation of shadow indices

01.05. [Launch (incl. backtest)]　　　　21.09. [Discontinuation]

→

- Shadow indices represent the MDAX, SDAX and TecDAX under the new rules framework
- Weighting files, ranking lists and historical index values would be provided via MD&S interactive and on dax-indices.com
- **Important:** the composition of the "shadow indices" at their launch date (May 1., 2018) would be the result of a backtest. Due to a consistent application of "buffer rules" throughout time, the composition of these indices would most likely deviate from the hypothetical composition, that would be in place if the transition from old to new rules would take place at that specific point in time (following the rules as stated on slide 13). Consequently, the hypothetical composition of the "shadow indices" on the date after their termination (Sept. 24., 2018) may deviate from the effective composition of the actual indices after the considered transition to the new methodology.
- → **For the avoidance of doubt, the respective index that would be launched as of Sept., 24 2018 may in its composition deviate from the respective shadow index which were calculated beforehand.**
- → **The shadow indices would only be calculated and published for informational purposes and would under no event be designed to serve as an underlying for financial instruments.**

Transition: After merging „Tech" and „Classic", the initial index composition would be determined strictly rules-based[1]

Remove separation	▪ Prime Standard Segment would no longer be separated by industry („Tech" vs. „Classic")
Apply "Regular Exit"	▪ All companies on the extended ranking, that would be removed by the "Regular Exit" rule (Sec. 4.1.1.3 (3) Equity Indices Guide) for the respective index, would be removed from the selection list
Index composition	▪ All remaining companies on the selection list would qualify for the inclusion into the respective index
Missing slots	▪ In case the number of remaining candidates on the selection list would be below the number of index constituents needed, all remaining slots were filled according to the entrance criterion defined in the "Fast Exit" rule (Sec. 4.1.1.3 (1) Equity Indices Guide)
Additional slots	▪ In case the number of remaining candidates on the selection list would be above the number of index constituents needed, companies would be removed by applying the exit criterion defined in the "Fast Entry" rule (Sec. 4.1.1.3 (2) Equity Indices Guide)

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1) Under the application of the considered rule framework stated on page 7.

5.

Evaluation

Sensitivity analysis:
Impact of considered rule change on risk and return of MDAX[1]

Historical Performance (TR)[1][2]

— MDAX 50[1] without Tech TR EUR

— MDAX 60[1] with Tech TR EUR

Risk and Return Figures[1][2]

Key figures[3]	MDAX 50[1] without Tech companies TR EUR	MDAX 60[1] with Tech companies TR EUR
Perf (1Y)	13.93%	16.10%
Perf (3Y)	13.59%	14.57%
Perf (5Y)	16.74%	17.34%
Overall	12.02%	11.62%
Vola (1Y)	10.95%	10.91%
Vola (3Y)	17.56%	17.75%
Vola (5Y)	15.90%	16.02%
Vola (10Y)	23.95%	23.91%
Div.Yield	2.50%	2.34%
Correl	1.0000	0.9941

1) As the rules underlying the MDAX have changed over time, the MDAX (50) has been recalculated based on the current rule set in order to show the difference arising from the considered rule change.
2) Risk and return and dividend figures are annualized. Time period: Mar. 2005 – Aug. 2017.
3) As of: 31.08.2017.

Sensitivity analysis:
Impact of considered rule change on risk and return of SDAX[1)]

Historical Performance (TR)[1)2)]
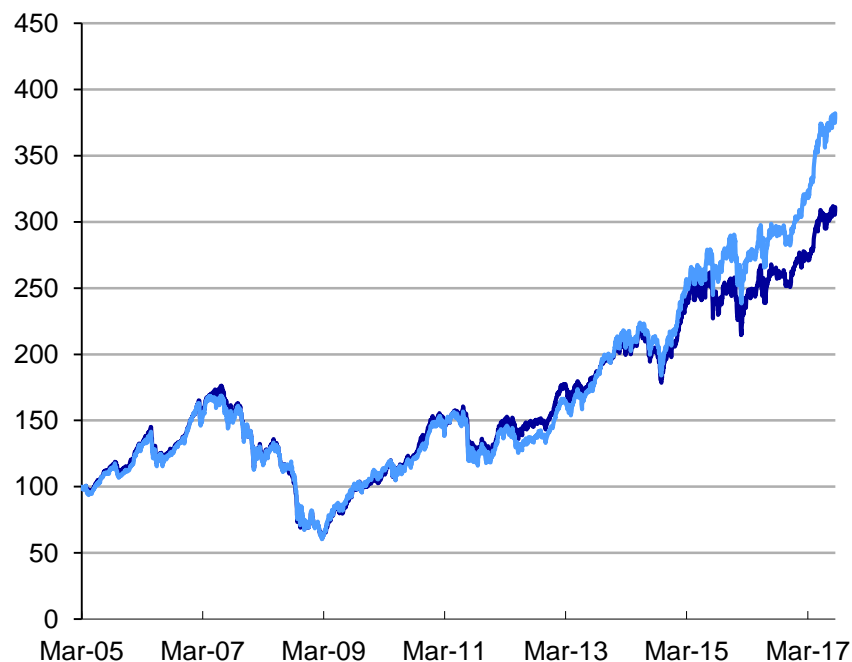
— SDAX 50[1)] without Tech TR EUR

— SDAX 60[1)] with Tech TR EUR

Risk and Return Figures[1)2)]

Key figures[3)]	SDAX 50[1)] without Tech companies TR EUR	SDAX 60[1)] with Tech companies TR EUR
Perf (1Y)	19.18%	31.87%
Perf (3Y)	15.88%	22.69%
Perf (5Y)	16.81%	23.91%
Overall	9.76%	11.63%
Vola (1Y)	10.72%	10.81%
Vola (3Y)	15.96%	16.86%
Vola (5Y)	14.44%	15.57%
Vola (10Y)	18.52%	20.21%
Div.Yield	2.46%	2.25%
Correl	1.0000	0.9659

1) As the rules underlying the SDAX have changed over time, the SDAX (50) has been recalculated based on the current rule set in order to show the difference arising from the considered rule change.
2) Risk and return and dividend figures are annualized. Time period: Mar. 2005 – Aug. 2017.
3) As of: 31.08.2017.

Sensitivity analysis:
Impact of considered rule change on risk and return of TecDAX[1]

Historical Performance (TR)[1][2]

— TecDAX 30[1] without DAX companies TR EUR

— TecDAX 30[1] with DAX companies TR EUR

Risk and Return Figures[1][2]

Key figures[3]	TecDAX 30[1] without DAX companies TR EUR	TecDAX 30[1] with DAX companies TR EUR
Perf (1Y)	33.55%	27.01%
Perf (3Y)	23.30%	22.34%
Perf (5Y)	24.20%	22.88%
Overall	11.74%	11.80%
Vola (1Y)	12.78%	12.46%
Vola (3Y)	19.83%	19.64%
Vola (5Y)	18.09%	17.81%
Vola (10Y)	24.96%	24.25%
Div.Yield	1.61%	2.07%
Correl	1.0000	0.9765

1) As the rules underlying the TecDAX have changed over time, the TecDAX (30) has been recalculated based on the current rule set in order to show the difference arising from the considered rule change.
2) Risk and return and dividend figures are annualized. Time period: Mar. 2005 – Aug. 2017.
3) As of: 31.08.2017.

7.

Index statistics and turnover

Scenario analysis: Impact of considered rule change on free-float market cap

Market cap analysis of the index composition

Impact-Analysis[1]		Market Capitalization (in mn EUR)				
		Min	Max	Sum	Median	Weighted average
MDAX	Before	1259.84	40644.35	214686.55	2546.49	8615.11
	After	1301.38	40644.35	253632.00	2783.01	8570.31
SDAX	Before	257.56	2776.35	42204.04	693.25	1210.67
	After	381.58	2776.35	55171.14	744.22	1220.19
TecDAX	Before	209.53	7851.08	55994.63	1211.41	3367.87
	After	281.26	86389.59	213575.22	1633.95	18420.19

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1) Simulation of the September 2017 Review.

Scenario analysis: Impact of considered rule change on "one-off" turnover and trading volume

Trading volume analysis of the index composition

Impact-Analysis[1]		Trading Volume (in mn EUR)					One way index turnover
		Min	Max	Sum	Median	Weighted average	
MDAX	Before	923.81	8649.89	166042.17	2992.05	4018.78	18.43%
	After	974.42	8649.89	201477.13	2972.62	3962.04	
SDAX	Before	166.79	1984.58	27340.67	438.04	593.20	35.63%
	After	220.90	3841.82	42150.30	513.12	720.59	
TecDAX	Before	346.05	6073.37	54630.02	1035.30	2800.69	30.53%
	After	346.05	45501.26	153637.88	1923.97	12239.01	

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1) Simulation of the September 2017 Review.

8.

Appendix

Subsectors classified as "Tech" under Deutsche Börse sector classification[1]

No.	Sector	Subsector
1	Industrial	Advanced Industrial Equipment
2	Industrial	Renewable Energies
3	Pharma & Healthcare	Biotechnology
4	Pharma & Healthcare	Medical Technology
5	Software	Internet
6	Software	IT-Services
7	Software	Software
8	Technology	Communications Technology
9	Technology	Electronic Components & Hardware
10	Technology	Semiconductors
11	Telecommunication	Fixed-Line Telecommunication
12	Telecommunication	Wireless Telecommunication
13	Telecommunication	Telecommunication Services

1) For an overview of the full classification please consult the Equity Indices Guide available at www.dax-indices.com.

Subsectors classified as "Classic" under Deutsche Börse sector classification[1]

No.	Sector	Subsector	No.	Sector	Subsector
1	Automobile	Auto Parts & Equipment	26	Construction	Building Materials
2	Automobile	Automobile Manufacturers	27	Construction	Construction & Engineering
3	Consumer	Clothing & Footwear	28	Industrial	Containers & Packaging
4	Consumer	Consumer Electronics	29	Industrial	Heavy Machinery
5	Consumer	Home Construction & Furnishings	30	Industrial	Industrial Machinery
6	Consumer	Household Appliances & Housewares	31	Industrial	Industrial, Diversified
7	Consumer	Leisure	32	Industrial	Industrial Products & Services
8	Consumer	Personal Products	33	Transportation & Logistics	Airlines
9	Food & Beverages	Beverages	34	Transportation & Logistics	Logistics
10	Food & Beverages	Food	35	Transportation & Logistics	Transportation Services
11	Banks	Credit Banks	36	Media	Advertising
12	Banks	Mortgage Banks	37	Media	Broadcasting
13	Financial Services	Diversified Financial	38	Media	Movies & Entertainment
14	Financial Services	Private Equity & Venture Capital	39	Media	Publishing & Printing
15	Financial Services	Real Estate	40	Retail	Retail, Catalogue
16	Financial Services	Securities Brokers	41	Retail	Retail, Food & Drug
17	Insurance	Insurance	42	Retail	Retail, Internet
18	Insurance	Re-Insurance	43	Retail	Retail, Multiline
19	Basic Resources	Forest & Paper Products	44	Retail	Retail, Specialty
20	Basic Resources	Mining	45	Pharma & Healthcare	Pharmaceuticals
21	Basic Resources	Oil & Gas	46	Pharma & Healthcare	Health Care
22	Basic Resources	Steel & Other Metals	47	Utilities	Electricity
23	Chemicals	Chemicals, Commodity	48	Utilities	Water
24	Chemicals	Chemicals, Speciality	49	Utilities	Oil & Gas (Distribution)
25	Chemicals	Industrial Gases	50	Utilities	Multi-Utilities

1) For an overview of the full classification please consult the Equity Indices Guide at www.dax-indices.com.

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