Online-Appendix zu

„Revenue Sharing in European Football: An Assessment of the Bundesliga's New Four-Pillar Model "

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7. Appendix

7.1.   Figures

Four-Pillar Revenue Sharing Model, new mechanisms marked in red

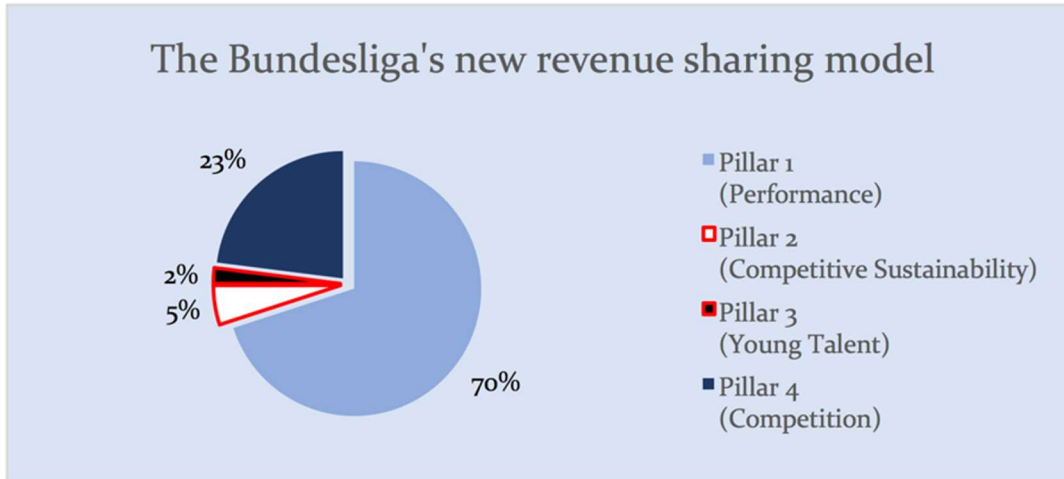Source: DFL Deutsche Fußball Liga, 2016

Figure 1

TV Revenue Income allocation, 1. Bundesliga, 2016/2017 Season

Source: Randerath, 2017

	Domestic	Inter-national	Total	Previous Season	Difference
München	€41.1m	€33.0m	€74.1m	€71.9m	3%
Dortmund	€40.1m	€22.0m	€62.1m	€59.5m	4%
Schalke	€37.9m	€19.9m	€57.8m	€60.0m	-4%
Leverkusen	€39.0m	€18.3m	€57.3m	€56.4m	2%
Mönchengladbach	€36.9m	€7.9m	€44.8m	€43.0m	4%
Wolfsburg	€35.8m	€8.3m	€44.1m	€41.0m	8%
Mainz	€34.3m	€2.9m	€37.2m	€34.9m	7%
Augsburg	€33.3m	€2.5m	€35.8m	€36.1m	-1%
Hoffenheim	€32.6m	€2.5m	€35.1m	€33.4m	5%
Frankfurt	€29.0m	€5.4m	€34.4m	€33.9m	1%
Bremen	€31.5m	€2.5m	€34.0m	€33.1m	3%
Berlin	€30.3m	€2.5m	€32.8m	€26.9m	22%
Hamburg	€27.7m	€2.5m	€30.2m	€28.3m	7%
Köln	€26.2m	€2.5m	€28.7m	€25.5m	13%
Freiburg	€24.8m	€2.5m	€27.3m	€11.8m	131%
Ingolstadt	€23.4m	€2.5m	€25.9m	€24.1m	7%
Darmstadt	€22.0m	€2.5m	€24.5m	€22.7m	8%
Leipzig	€20.6m	€2.5m	€23.1m	€6.0m	285%
Total	€566.5m	€142.7m	€709.2m	€648.5m	9%
Average	€31.5m	€7.9m	€39.4m	€36.0m	9%

Figure 2

Development of TV income, Premier League, 1992-2019
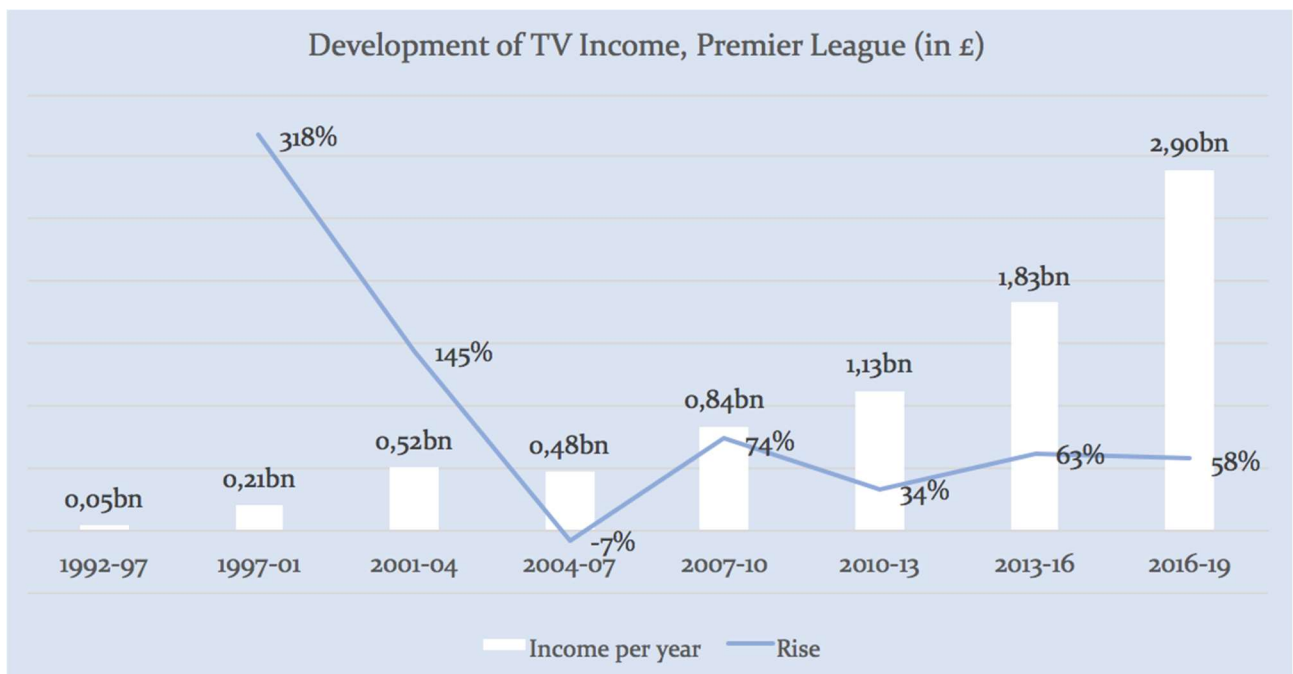
Source: Harris, 2016

Figure 3

Development of TV income, 1. Bundesliga, 1956-2017

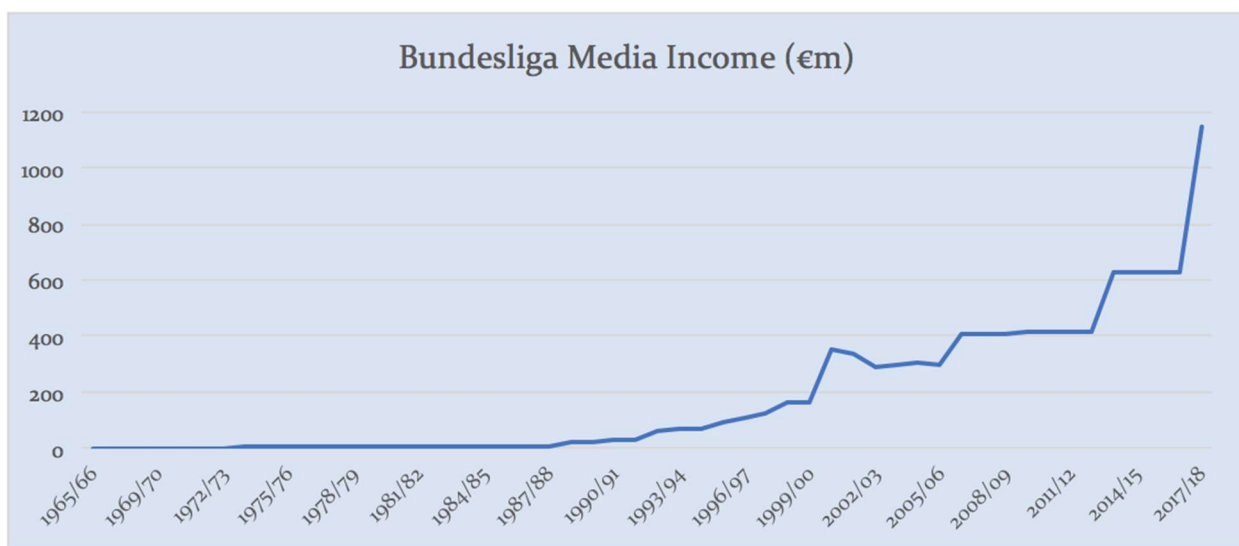Source: Quitzau, 2015; Sportschau, 2016

Figure 4

Allocation of TV revenue to Premier League clubs in the 2015/2016 season
Source: Premier League, 2016

	UK Live Games	Equal Share	Facility Fees	Merit Payment	Overseas TV	Central Comm.	Total Payment
Leicester	15	£21.9m	£12.5m	£24.8m	£29.4m	£4.5m	£93.1m
Arsenal	27	£21.9m	£21.5m	£23.6m	£29.4m	£4.5m	£100.9m
Tottenham	21	£21.9m	£17.0m	£22.3m	£29.4m	£4.5m	£95.1m
Manchester City	25	£21.9m	£20.0m	£21.1m	£29.4m	£4.5m	£96.9m
Manchester United	26	£21.9m	£20.7m	£19.9m	£29.4m	£4.5m	£96.4m
Southampton	12	£21.9m	£10.3m	£18.6m	£29.4m	£4.5m	£84.7m
West Ham	15	£21.9m	£12.5m	£17.4m	£29.4m	£4.5m	£85.7m
Liverpool	23	£21.9m	£18.5m	£16.1m	£29.4m	£4.5m	£90.4m
Stoke	10	£21.9m	£8.8m	£14.9m	£29.4m	£4.5m	£79.5m
Chelsea	22	£21.9m	£17.8m	£13.7m	£29.4m	£4.5m	£87.3m
Everton	18	£21.9m	£14.8m	£12.4m	£29.4m	£4.5m	£83.0m
Swansea	10	£21.9m	£8.8m	£11.2m	£29.4m	£4.5m	£75.8m
Watford	10	£21.9m	£8.8m	£9.9m	£29.4m	£4.5m	£74.5m
West Bromwich	10	£21.9m	£8.8m	£8.7m	£29.4m	£4.5m	£73.3m
Crystal Palace	10	£21.9m	£8.8m	£7.5m	£29.4m	£4.5m	£72.1m
Bournemouth	10	£21.9m	£8.8m	£6.2m	£29.4m	£4.5m	£70.8m
Sunderland	13	£21.9m	£11.0m	£5.0m	£29.4m	£4.5m	£71.8m
Newcastle	16	£21.9m	£13.3m	£3.7m	£29.4m	£4.5m	£72.8m
Norwich	10	£21.9m	£8.8m	£2.4m	£29.4m	£4.5m	£67.0m
Aston Villa	11	£21.9m	£9.5m	£1.2m	£29.4m	£4.5m	£66.5m
		£438m	£261m	£261m	£588m	£90m	£1,638m

Figure 5

International comparison of ratios of top-to-bottom earning clubs

Source: The Guardian, 2012

Broadcasting income ratio of top to bottom-earning club (2012)

La Liga — 12,5
Serie A — 10
Ligue 1 — 3,5
Bundesliga — 2
Premier League — 1,5
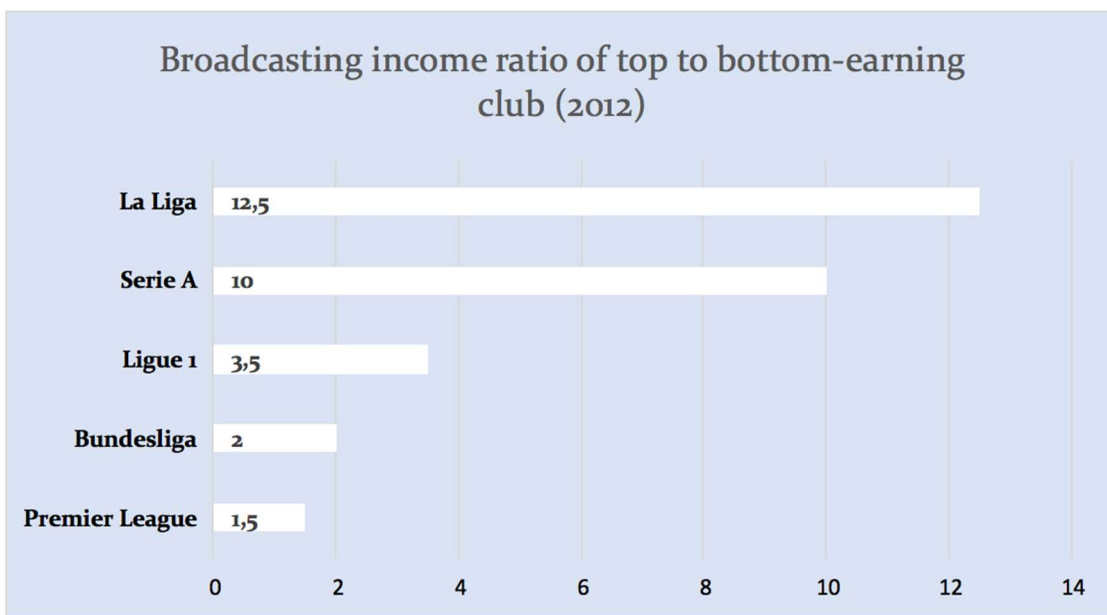
Figure 6

Mix of total revenues generated in the 2015/16 Bundesliga season

Source: DFL, 2017

Income-Mix Bundesliga

- Game — 16%
- Advertising — 24%
- Media — 29%
- Transfers — 16%
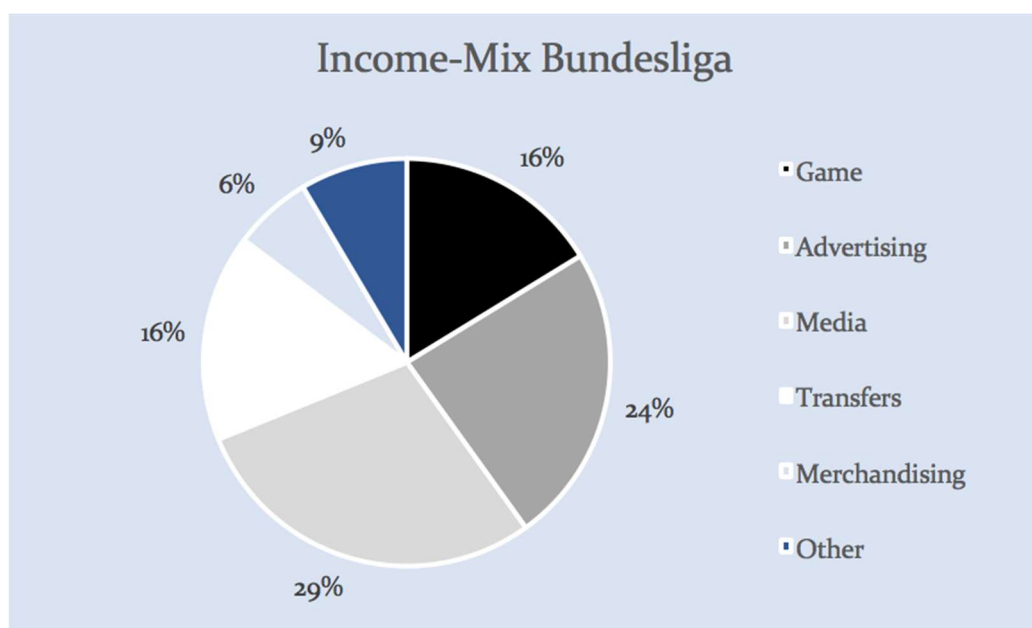- Merchandising — 6%
- Other — 9%

Figure 7

Table of 1. Bundesliga from the 2010/2011 season to the 30. match day of the 2016/17 season

Source: Bulibox, 2017

	Team	Seasons	Games	Goals	Goal Difference	Points per Game	Points
1	Bayern München	7	234	583:155	428	2.38	556
2	Borussia Dortmund	7	234	502:238	264	2.02	473
3	Bayer Leverkusen	7	234	402:291	111	1.73	405
4	Schalke 04	7	234	365:305	60	1.54	361
5	Borussia Mönchengladbach	7	234	360:301	59	1.53	358
6	VfL Wolfsburg	7	234	349:340	9	1.42	332
7	1. FSV Mainz 05	7	234	323:326	-3	1.35	315
8	1899 Hoffenheim	7	234	350:375	-25	1.26	295
9	Werder Bremen	7	234	338:432	-94	1.19	279
10	Hamburger SV	7	234	269:388	-119	1.13	265
11	Hannover 96	6	204	267:329	-62	1.26	257
12	SC Freiburg	6	200	248:311	-63	1.25	249
13	FC Augsburg	6	200	230:291	-61	1.21	242
14	Eintracht Frankfurt	6	200	242:300	-58	1.21	241
15	VfB Stuttgart	6	204	301:357	-56	1.17	239
16	Hertha BSC Berlin	5	166	194:241	-47	1.22	203
17	1. FC Köln	5	166	201:256	-55	1.19	198
18	1. FC Nürnberg	4	136	161:211	-50	1.17	159
19	1. FC Kaiserslautern	2	68	72:105	-33	1.01	69
20	FC Ingolstadt 04	2	64	66:96	-30	1.06	68
21	RB Leipzig	1	30	2.3549	25	2.07	62
22	SV Darmstadt 98	2	64	61:111	-50	0.92	59
23	SC Paderborn 07	1	34	31:65	-34	0.91	31
24	Fortuna Düsseldorf	1	34	1.6646	-18	0.88	30
25	FC St. Pauli	1	34	35:68	-33	0.85	29
26	Eintracht Braunschweig	1	34	29:60	-31	0.74	25
27	SpVgg Greuther Fürth	1	34	26:60	-34	0.62	21

Figure 8

Overview of total team market values in the 1. Bundesliga, April 24th 2017

Source: Transfermarkt.de, 2017

Team	Number of Players	Total Market Value	Average Market Value
FC Bayern München	23	€566m	€25m
Borussia Dortmund	28	€376m	€13m
Bayer 04 Leverkusen	27	€274m	€10m
FC Schalke 04	31	€217m	€7m
Borussia Mönchengladbach	30	€166m	€5m
VfL Wolfsburg	31	€154m	€5m
RasenBallsport Leipzig	23	€124m	€5m
TSG 1899 Hoffenheim	25	€102m	€4m
1.FC Köln	24	€99m	€4m
Hertha BSC	26	€86m	€3m
1.FSV Mainz 05	30	€80m	€3m
Hamburger SV	31	€76m	€2m
SV Werder Bremen	32	€70m	€2m
Eintracht Frankfurt	31	€69m	€2m
FC Augsburg	31	€63m	€2m
SC Freiburg	27	€59m	€2m
FC Ingolstadt 04	25	€35m	€1m
SV Darmstadt 98	31	€23m	€1m

Figure 9

Cycle of consequences of even revenue sharing systems
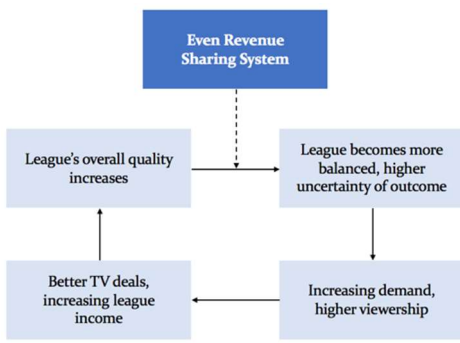
Source: Own Research; Rottenberg, 1956

Figure 10

Cycle of consequences of uneven revenue sharing systems

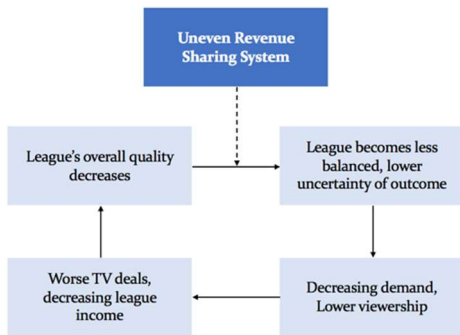Source: Own Research; Rottenberg, 1956

Figure 11

Impact of the proportion of equally shared revenues on the top to bottom market value ratio after 5 years
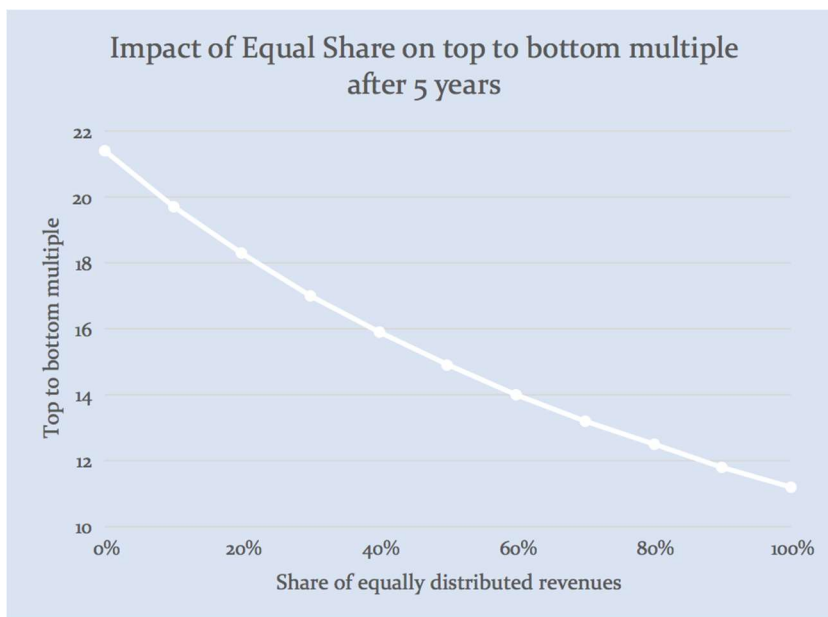
Source: Own Research

Figure 12

7.2.   Proof for Equation in Chapter 7.5

We have:

$$\square_t\square_1 = \frac{MV_{t-1;A}}{MV_{t-1;B}}$$

$$\square_{t;E} = \frac{MV_{t;A}}{MV_{t;B}} = \frac{MV_{t-1;A}+i\square LR_{t-1}\square(1\square\frac{1}{T})}{MV_{t-1;B}+i\square LR_{t-1}\square(1\square\frac{1}{T})}$$

$$\square_{t;P} = \frac{MV_{t;A}}{MV_{t;B}} = \frac{MV_{t-1;A}+i\square LR_{t-1}\square(1\square P_A)}{MV_{t-1;B}+i\square LR_{t-1}\square(1\square P_B)}$$

We denote:

$\square\ \square_{t-1;A}$	as	$\square\square$
$\square\ \square_{t-1;B}$	as	$\square\square$
$\square\square\square\square_{t-1}\square(1\square\frac{1}{T})$	as	$\square\square$
$\square\square\square\square_{t-1}\square(1\square\square_A\square)$	as	$\square\square$
$\square\square\square\square_{t-1}\square(1\square\square_B\square)$	as	$\square\square$

Hence, our side conditions are:

$\square \gtrless \square\ \square$	as	$MV_{t-1;A} > MV_{t-1;B}$
$\square \gtrless \square\ \square$	as	$P_A > P_B$
$\frac{m}{n} > \frac{x}{y}$	as	we assume that the gap in P is larger than the one in MV

We conclude that:

$$\square_{t;P} > \square_{t-1} > \square_{t;E}$$

Meaning that:

$$\frac{\square+\square\square\ \square}{\square+\square\square\square\square} > \frac{\square}{\square} > \frac{\square\square+\square\square}{\square\square+\square\square\square}$$

$$\square_{t-1} > \square_{t;E}$$

holds true when

$$\frac{\square_{t-1}}{\square_{t;E}} > 1$$

$$\frac{\square_{t-1}}{\square_{t;E}} = \frac{1 + \square/\square\square}{1 + \square/\square\square}$$

$\square/\square \gtrless \square/\square$, as $\square \gtrless \square$, so $\square_{t-1} > \square_{t;E}$

$$\square_{t;P} > \square_{t-1}$$

only holds true when

$$\frac{m}{n} > \frac{x}{y}$$

meaning that

$$\frac{i\square LR_{t-1}\square(1\square P_A)}{i\square LR_{t-1}\square(1\square P_B)} > \frac{MV_{t-1;A}}{MV_{t-1;B}} = \frac{P_A}{P_B} > \frac{MV_{t-1;A}}{MV_{t-1;B}}$$ has to hold

7.3. Simulation 1 – Performance-Based System

Simulation of potential market values in the Bundesliga based on a system that allocates revenues solely based on performance; the calculations follow the theoretic model introduced in Chapter 6.4.1

Source: Own Research; Transfermarkt.de, 2017; Bulibox, 2017

Equal Share (SE)	0.0%
Performance Share (SP)	100.0%
Clubs reinvest (i)	10.0%

Club	Points Last 5 Seasons (P)	Performance (P)	Market Value Season 0 (MV0)	Income 1 (R1)	Market Value Season 1 (MV1)	Income 2 (R2)	Market Value Season 2 (MV2)	Income 3 (R3)	Market Value Season 3 (MV3)	Income 4 (R4)	Market Value Season 4 (MV4)	Income 5 (R5)	Market Value Season 5 (MV5)	MV5 / MV1	Share of Total Income
FC Bayern München	486	11.42%	€566m	€114m	€578m	€120m	€590m	€126m	€602m	€131m	€615m	€137m	€629m	11.1%	11.4%
Borussia Dortmund	392	9.21%	€376m	€92m	€386m	€97m	€395m	€101m	€405m	€106m	€416m	€111m	€427m	13.5%	9.2%
Bayer 04 Leverkusen	336	7.90%	€274m	€79m	€282m	€83m	€290m	€87m	€299m	€91m	€308m	€95m	€317m	15.9%	7.9%
FC Schalke 04	317	7.45%	€217m	€75m	€224m	€78m	€232m	€82m	€240m	€86m	€249m	€89m	€258m	18.9%	7.5%
Borussia Mönchengladbach	319	7.50%	€164m	€75m	€171m	€79m	€179m	€82m	€187m	€86m	€196m	€90m	€205m	25.2%	7.5%
VfL Wolfsburg	291	6.84%	€154m	€68m	€161m	€72m	€168m	€75m	€176m	€79m	€183m	€82m	€192m	24.4%	6.8%
RB Leipzig	55	1.29%	€124m	€13m	€125m	€14m	€127m	€14m	€128m	€15m	€129m	€16m	€131m	5.7%	1.3%
TSG 1899 Hoffenheim	248	5.83%	€102m	€58m	€107m	€61m	€114m	€64m	€120m	€67m	€127m	€70m	€134m	31.5%	5.8%
1. FC Köln	153	3.60%	€99m	€36m	€103m	€38m	€107m	€40m	€111m	€41m	€115m	€43m	€119m	19.9%	3.6%
Hertha BSC	197	4.63%	€86m	€46m	€91m	€49m	€96m	€51m	€101m	€53m	€106m	€56m	€112m	29.5%	4.6%
1. FSV Mainz 05	253	5.95%	€80m	€59m	€86m	€62m	€92m	€65m	€98m	€68m	€105m	€71m	€112m	41.0%	5.9%
Hamburger SV	217	5.10%	€76m	€51m	€81m	€54m	€86m	€56m	€92m	€59m	€98m	€61m	€104m	37.0%	5.1%
SV Werder Bremen	231	5.43%	€70m	€54m	€75m	€57m	€81m	€60m	€87m	€62m	€93m	€65m	€100m	42.8%	5.4%
Eintracht Frankfurt	203	4.77%	€69m	€48m	€74m	€50m	€79m	€52m	€84m	€55m	€90m	€57m	€95m	38.0%	4.8%
FC Augsburg	239	5.62%	€63m	€56m	€68m	€59m	€74m	€62m	€80m	€65m	€87m	€67m	€94m	49.3%	5.6%
SC Freiburg	199	4.68%	€59m	€47m	€65m	€49m	€68m	€51m	€73m	€54m	€79m	€56m	€84m	43.8%	4.7%
FC Ingolstadt 04	65	1.53%	€35m	€15m	€36m	€16m	€38m	€17m	€39m	€18m	€41m	€18m	€43m	24.3%	1.5%
SV Darmstadt 98	53	1.25%	€23m	€12m	€24m	€13m	€25m	€14m	€26m	€14m	€28m	€15m	€29m	30.5%	1.2%
Sum	4254	100%	€2,635m	€1,000m	€2,735m	€1,050m	€2,840m	€1,100m	€2,950m	€1,150m	€3,065m	€1,200m	€3,185m		
Average			€146m		€152m		€158m		€164m		€170m		€177m		
Top to bottom multiple			25.2		24.3		23.5		22.8		22.1		21.4		
Top to average multiple			3.9		3.8		3.7		3.7		3.6		3.6		
Standard Deviation			91.5		89.6		87.7		85.9		84.1		82.5		

Figure 13

7.4. Simulation 2 – Balanced System

Simulation of potential market values in the Bundesliga based on a system that allocates revenues both equally and performance-based; the calculations follow the theoretic model introduced in Chapter 6.4.1

Source: Own Research; Transfermarkt.de, 2017; Bulibox, 2017

Equal Share (SE)	50.0%
Performance Share (SP)	50.0%
Clubs reinvest (i)	10.0%

Club	Points Last 5 Seasons	Per-formance (P)	Market Value Season 0 (MV0)	Income 1 (R1)	Market Value Season 1 (MV1)	Income 2 (R2)	Market Value Season 2 (MV2)	Income 3 (R3)	Market Value Season 3 (MV3)	Income 4 (R4)	Market Value Season 4 (MV4)	Income 5 (R5)	Market Value Season 5 (MV5)	MV5 / MV1	Share of Total Income
FC Bayern München	486	11.42%	€566m	€85m	€575m	€89m	€584m	€93m	€593m	€98m	€603m	€102m	€613m	8.2%	8.5%
Borussia Dortmund	392	9.21%	€376m	€74m	€384m	€78m	€391m	€81m	€400m	€85m	€408m	€89m	€447m	10.8%	7.4%
Bayer 04 Leverkusen	336	7.90%	€274m	€67m	€281m	€71m	€288m	€74m	€295m	€77m	€303m	€81m	€311m	13.5%	6.7%
FC Schalke 04	317	7.45%	€217m	€65m	€223m	€68m	€230m	€72m	€237m	€75m	€245m	€78m	€252m	16.5%	6.5%
Borussia Mönchengladbach	319	7.50%	€164m	€65m	€170m	€69m	€177m	€72m	€184m	€75m	€192m	€78m	€199m	22.0%	6.5%
VfL Wolfsburg	291	6.84%	€154m	€62m	€160m	€65m	€167m	€68m	€174m	€71m	€181m	€74m	€188m	22.1%	6.2%
RB Leipzig	55	1.29%	€124m	€34m	€127m	€36m	€131m	€38m	€135m	€39m	€139m	€41m	€143m	15.2%	3.4%
TSG 1899 Hoffenheim	248	5.83%	€102m	€57m	€107m	€60m	€113m	€63m	€120m	€65m	€126m	€68m	€133m	30.8%	5.7%
1. FC Köln	153	3.60%	€99m	€46m	€104m	€48m	€109m	€50m	€114m	€53m	€119m	€55m	€124m	25.3%	4.6%
Hertha BSC	197	4.63%	€86m	€51m	€91m	€53m	€97m	€56m	€102m	€59m	€108m	€61m	€114m	32.5%	5.1%
1. FSV Mainz 05	253	5.95%	€80m	€58m	€85m	€60m	€92m	€63m	€98m	€66m	€104m	€69m	€111m	39.7%	5.8%
Hamburger SV	217	5.10%	€76m	€53m	€81m	€56m	€87m	€59m	€93m	€61m	€99m	€64m	€105m	38.7%	5.3%
SV Werder Bremen	231	5.43%	€70m	€55m	€75m	€58m	€81m	€60m	€87m	€63m	€93m	€66m	€100m	43.3%	5.5%
Eintracht Frankfurt	203	4.77%	€63m	€52m	€74m	€54m	€80m	€57m	€85m	€59m	€91m	€62m	€97m	41.1%	5.2%
FC Augsburg	239	5.62%	€63m	€56m	€68m	€59m	€74m	€61m	€80m	€64m	€87m	€67m	€93m	49.0%	5.6%
SC Freiburg	199	4.68%	€59m	€51m	€64m	€54m	€69m	€56m	€75m	€59m	€81m	€61m	€87m	48.0%	5.1%
FC Ingolstadt 04	65	1.53%	€35m	€35m	€38m	€37m	€42m	€39m	€46m	€41m	€50m	€43m	€54m	56.4%	3.5%
SV Darmstadt 98	53	1.25%	€23m	€34m	€26m	€36m	€29m	€37m	€33m	€39m	€37m	€41m	€41m	83.1%	3.4%
Sum	4254	100%	€2,635m	€1,000m	€2,735m	€1,050m	€2,840m	€1,100m	€2,950m	€1,150m	€3,065m	€1,200m	€3,185m		
Average			€146m		€152m		€158m		€164m		€170m		€177m		
Top to bottom multiple			25.2		22.2		19.8		17.9		16.2		14.9		
Top to average multiple			3.9		3.8		3.7		3.6		3.5		3.5		
Standard Deviation			91.5		88.9		86.3		83.8		81.4		79.0		

Figure 14

7.5.   Simulation 3 – Equal System

Simulation of potential market values in the Bundesliga based on a system that allocates revenues perfectly even; the calculations follow the theoretic model introduced in Chapter 6.4.1

Source: Own Research; Transfermarkt.de, 2017; Bulibox, 2017

Equal Share (SE)	100.0%
Performance Share (SP)	0.0%
Clubs reinvest (i)	10.0%

Club	Points Last 5 Seasons (P)	Performance Share (P)	Market Value Season 0 (MV0)	Income 1 (R1)	Market Value Season 1 (MV1)	Income 2 (R2)	Market Value Season 2 (MV2)	Income 3 (R3)	Market Value Season 3 (MV3)	Income 4 (R4)	Market Value Season 4 (MV4)	Income 5 (R5)	Market Value Season 5 (MV5)	MV5 / MV1	Share of Total Income
FC Bayern München	486	11.42%	€566m	€56m	€572m	€58m	€578m	€61m	€584m	€64m	€590m	€67m	€597m	5.4%	5.6%
Borussia Dortmund	392	9.21%	€376m	€56m	€382m	€58m	€388m	€61m	€394m	€64m	€400m	€67m	€407m	8.1%	5.6%
Bayer 04 Leverkusen	336	7.90%	€274m	€56m	€280m	€58m	€285m	€61m	€291m	€64m	€298m	€67m	€305m	11.2%	5.6%
FC Schalke 04	317	7.45%	€217m	€56m	€222m	€58m	€228m	€61m	€234m	€64m	€241m	€67m	€247m	14.1%	5.6%
Borussia Mönchengladbach	319	7.50%	€164m	€56m	€169m	€58m	€175m	€61m	€181m	€64m	€187m	€67m	€194m	18.7%	5.6%
VfL Wolfsburg	291	6.84%	€154m	€56m	€160m	€58m	€165m	€61m	€172m	€64m	€178m	€67m	€185m	19.8%	5.6%
RB Leipzig	55	1.29%	€124m	€56m	€129m	€58m	€135m	€61m	€141m	€64m	€148m	€67m	€154m	24.7%	5.6%
TSG 1899 Hoffenheim	248	5.83%	€102m	€56m	€107m	€58m	€113m	€61m	€119m	€64m	€126m	€67m	€132m	30.1%	5.6%
1. FC Köln	153	3.60%	€99m	€56m	€105m	€58m	€111m	€61m	€117m	€64m	€123m	€67m	€130m	30.8%	5.6%
Hertha BSC	197	4.63%	€86m	€56m	€92m	€58m	€98m	€61m	€104m	€64m	€110m	€67m	€117m	35.4%	5.6%
1. FSV Mainz 05	253	5.95%	€80m	€56m	€85m	€58m	€91m	€61m	€97m	€64m	€104m	€67m	€110m	38.3%	5.6%
Hamburger SV	217	5.10%	€76m	€56m	€81m	€58m	€87m	€61m	€93m	€64m	€100m	€67m	€106m	40.3%	5.6%
SV Werder Bremen	231	5.43%	€70m	€56m	€75m	€58m	€81m	€61m	€87m	€64m	€94m	€67m	€100m	43.8%	5.6%
Eintracht Frankfurt	203	4.77%	€63m	€56m	€68m	€58m	€74m	€61m	€80m	€64m	€87m	€67m	€93m	44.3%	5.6%
FC Augsburg	239	5.62%	€59m	€56m	€64m	€58m	€70m	€61m	€76m	€64m	€83m	€67m	€89m	48.7%	5.6%
SC Freiburg	199	4.68%	€58m	€56m	€63m	€58m	€69m	€61m	€75m	€64m	€82m	€67m	€88m	52.1%	5.6%
FC Ingolstadt 04	65	1.53%	€35m	€56m	€40m	€58m	€46m	€61m	€52m	€64m	€58m	€67m	€65m	88.4%	5.6%
SV Darmstadt 98	53	1.25%	€23m	€56m	€28m	€58m	€34m	€61m	€40m	€64m	€46m	€67m	€53m	135.8%	5.6%
Sum	4254	100%	€2,635m	€1,000m	€2,735m	€1,050m	€2,840m	€1,100m	€2,950m	€1,150m	€3,065m	€1,200m	€3,185m		
Average			€146m		€152m		€158m		€164m		€170m		€177m		
Top to bottom multiple			25.2		20.4		17.0		14.6		12.7		11.2		
Top to average multiple			3.9		3.8		3.7		3.6		3.5		3.4		
Standard Deviation			91.5		88.1		84.9		81.7		78.7		75.7		

Figure 15