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# Is the Benign Credit Cycle Over and Are Credit Markets In a Bubble?

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Keynote  
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# **Benign Credit Cycle? Is It a Bubble?**

- **Length of Benign Credit Cycles: Is the Current Cycle Over?**
  - **Default Rates✗, Recovery Rates✓, Yields ✓ & Liquidity ✓**
- **Bubble: Focus on Default Rates in Credit Markets**
- **Coincidence with Recessions: U.S. & European Scenarios**
- **Comparative Health of High-Yield Firms (2007 vs. 2012/2014)**
- **High-Yield and CCC New Issuance**
- **Impact of Maturity Profile?**
- **LBO Statistics and Trends**
- **Liquidity Concerns (Market and Market-Makers)**
- **Large Increase in the Distress Ratio (11.6% in 12/14, 24.7% in 12/15)**
- **Possible Timing of the Bubble Burst**
  
- **Major Risks Going Forward?**
  - **China, U.S. Economy, Oil Prices, Unexpected**
- **High-Yield Bonds Compared to Middle-Market Senior Secured Debt**
  - **Little or No Exposure to Energy Credits, Recovery Rates**

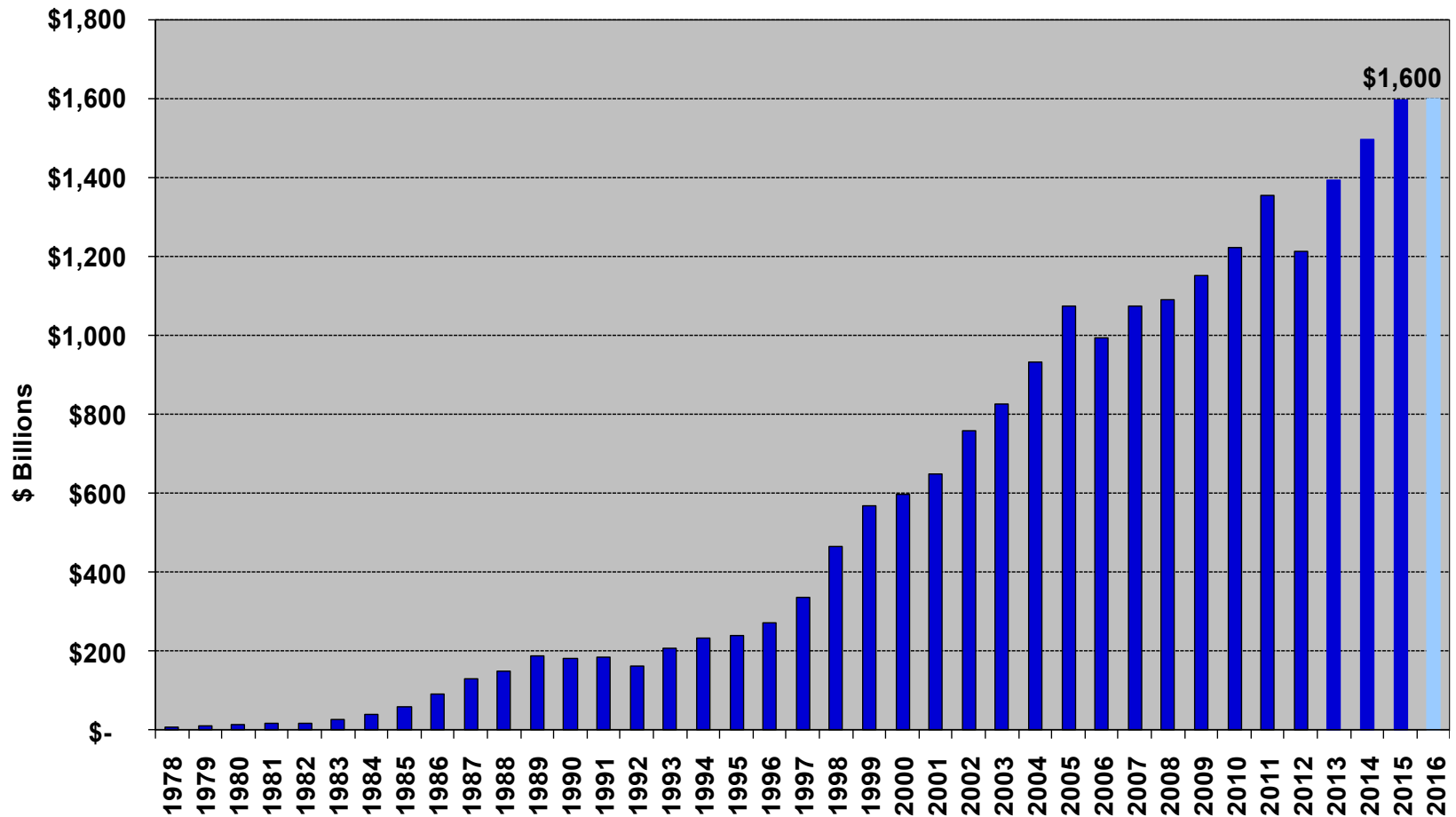
# Size of U.S. Corporate Bond Market (2/29/16)

Size of Market	
U.S. Corporate Investment-Grade (IG)	\$4,315B
U.S. High-Yield (HY)	\$1,600B
Total	\$5,915B

Distribution of Market (in \$ billions)		
	IG	HY
Financials	\$1,329	\$126
Industrials	\$2,678	\$1,420
Utilities	\$308	\$54
Totals	\$4,315	\$1,600

# Size of the US High-Yield Bond Market

1978 – 2016 (Mid-year US\$ billions)



Source: NYU Salomon Center estimates using Credit Suisse, S&P and Citi data.

# Historical H.Y. Bond Default Rates

Straight Bonds Only Excluding Defaulted Issues From Par Value Outstanding, (US\$ millions), 1971 – 2016 (5/23)

Year	Par Value Outstanding <sup>a</sup> (\$)	Par Value Defaults (\$)	Default Rates (%)
<b>2016 (5/23)</b>	<b>1,600,227</b>	<b>43,853</b>	<b>2.740</b>
2015	1,595,839	45,122	2.827
2014	1,496,814	31,589	2.110
2013	1,392,212	14,539	1.044
2012	1,212,362	19,647	1.621
2011	1,354,649	17,963	1.326
2010	1,221,569	13,809	1.130
2009	1,152,952	123,878	10.744
2008	1,091,000	50,763	4.653
2007	1,075,400	5,473	0.509
2006	993,600	7,559	0.761
2005	1,073,000	36,209	3.375
2004	933,100	11,657	1.249
2003	825,000	38,451	4.661
2002	757,000	96,855	12.795
2001	649,000	63,609	9.801
2000	597,200	30,295	5.073
1999	567,400	23,532	4.147
1998	465,500	7,464	1.603
1997	335,400	4,200	1.252
1996	271,000	3,336	1.231
1995	240,000	4,551	1.896
1994	235,000	3,418	1.454
1993	206,907	2,287	1.105
1992	163,000	5,545	3.402
1991	183,600	18,862	10.273
1990	181,000	18,354	10.140
1989	189,258	8,110	4.285

Year	Par Value Outstanding* (\$)	Par Value Defaults (\$)	Default Rates (%)
1988	148,187	3,944	2.662
1987	129,557	7,486	5.778
1986	90,243	3,156	3.497
1985	58,088	992	1.708
1984	40,939	344	0.840
1983	27,492	301	1.095
1982	18,109	577	3.186
1981	17,115	27	0.158
1980	14,935	224	1.500
1979	10,356	20	0.193
1978	8,946	119	1.330
1977	8,157	381	4.671
1976	7,735	30	0.388
1975	7,471	204	2.731
1974	10,894	123	1.129
1973	7,824	49	0.626
1972	6,928	193	2.786
1971	6,602	82	1.242

		Standard Deviation (%)
<b>Arithmetic Average Default Rate (%)</b>		
1971 to 2015	3.111	3.063
1978 to 2015	3.327	3.231
1985 to 2015	3.810	3.365
<b>Weighted Average Default Rate (%)*</b>		
1971 to 2015	3.441	
1978 to 2015	3.445	
1985 to 2015	3.460	
<b>Median Annual Default Rate (%)</b>		
1971 to 2015	1.708	

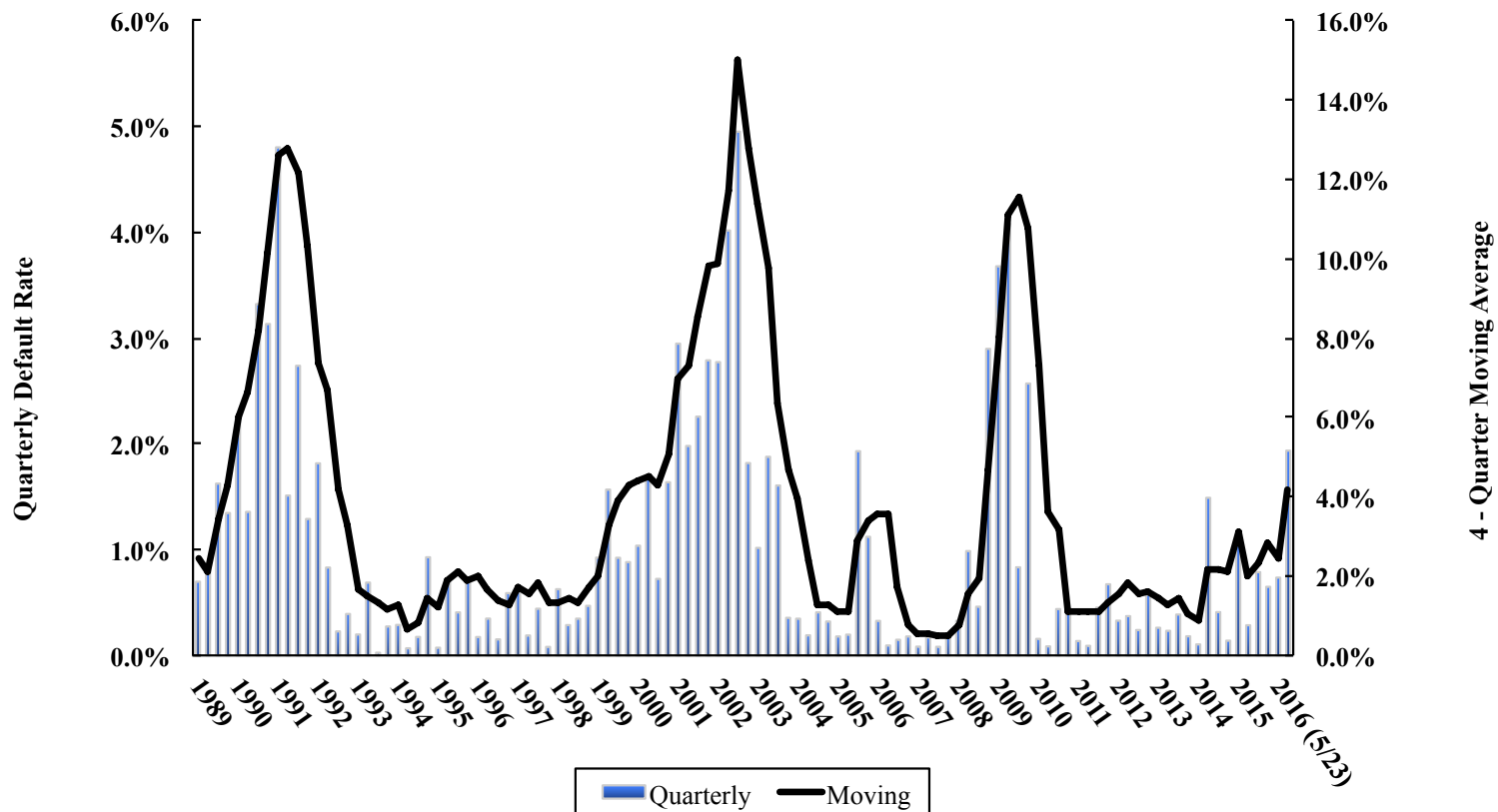
Source: Author's compilation and Citigroup/ Credit Suisse estimates

<sup>a</sup> Weighted by par value of amount outstanding for each year.

# Default Rates on High-Yield Bonds

## Quarterly Default Rate and Four-Quarter Moving Average

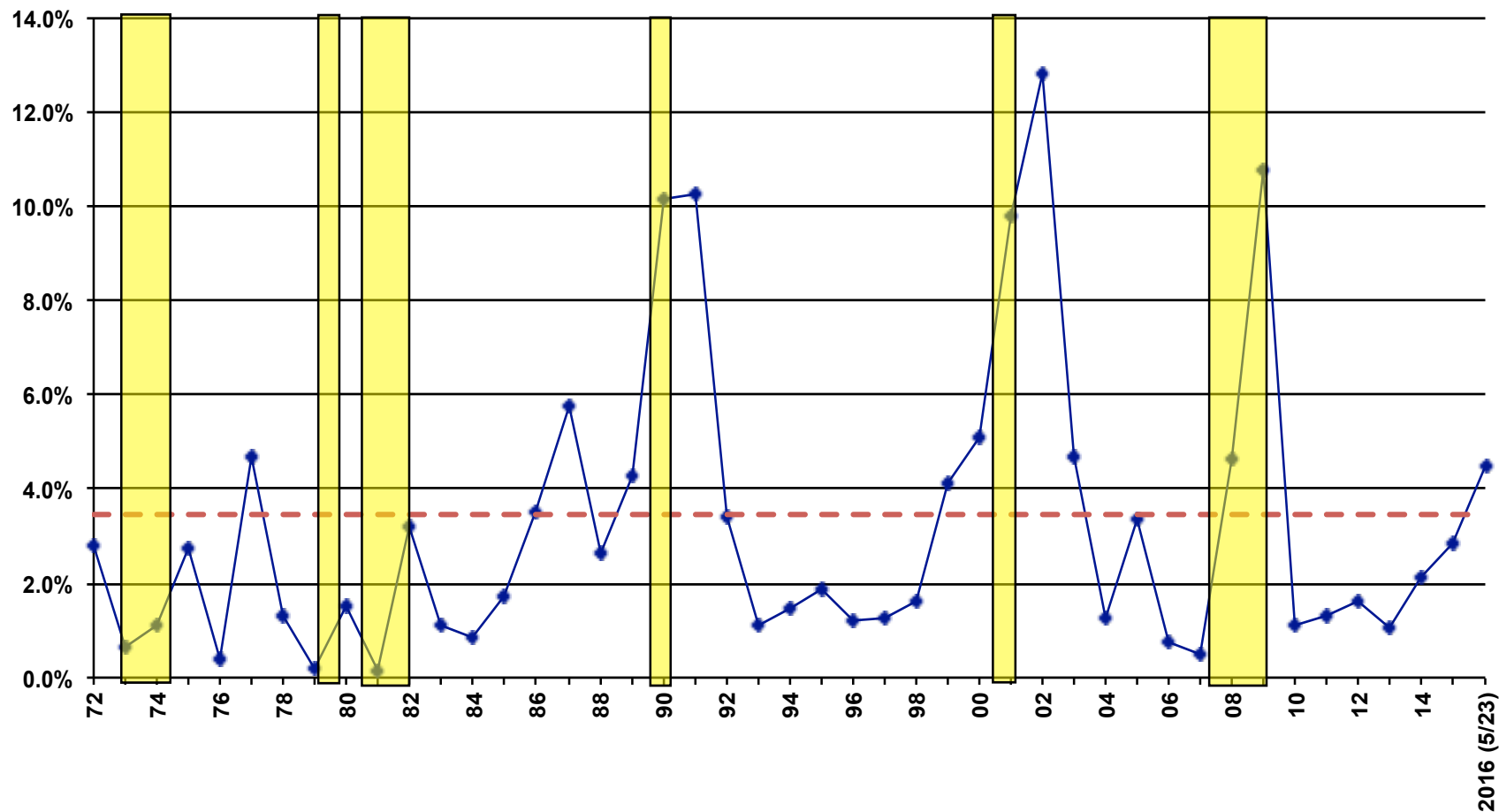
1989 – 2016 (5/23)



Source: Author's Compilations

# Historical Default Rates and Recession Periods in the U.S.\*

High-Yield Bond Market (1972 – 2016 (5/23))



Periods of Recession: 11/73 - 3/75, 1/80 - 7/80, 7/81 - 11/82, 7/90 - 3/91, 4/01 - 12/01, 12/07 - 6/09

\*All rates annual, except 2016 (5/23) which is the LTM

Source: E. Altman (NYU Salomon Center) & National Bureau of Economic Research

# 2016 U.S. High-Yield Bond Default Rate Forecasts

	2016 U.S. HY Bond Default Rate Forecasts
Fitch*	6.0%
Altman-Kuehne*	5.0%
Moody's**	4.4%
S&P**	5.3% Baseline; 4.2% Optimistic; 7.0% Pessimistic

\*Dollar-Based. \*\* Issuer-Based

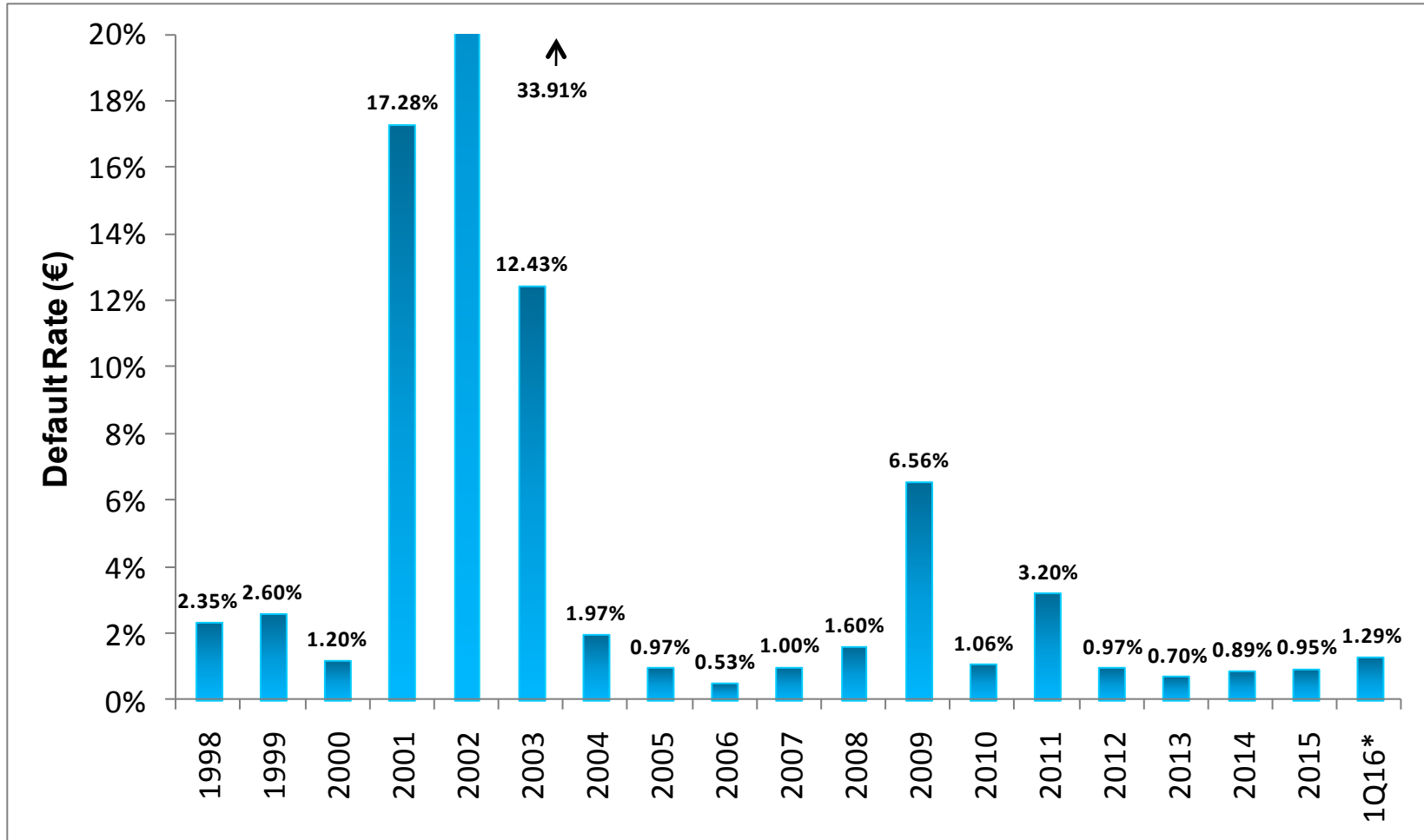
Source: Authors' Compilations, Fitch, Moody's & S&P



## Default & Recovery Rates for High-Yield Bond Defaults, 2014-2016 (5/23)

	Default Rate	Overall Recovery Rate	Energy/Mining Recovery Rate	All Other Recovery Rate
2014	2.11%	63.19	n/a	63.19
2015	2.83%	33.91	25.64	46.78
2016 (5/23)	2.74%	18.18	16.55	33.60
Weighted Average Default Rate (1971-2015)			3.44%	
Arithmetic Average Recovery Rate (1978-2015)			46.01	

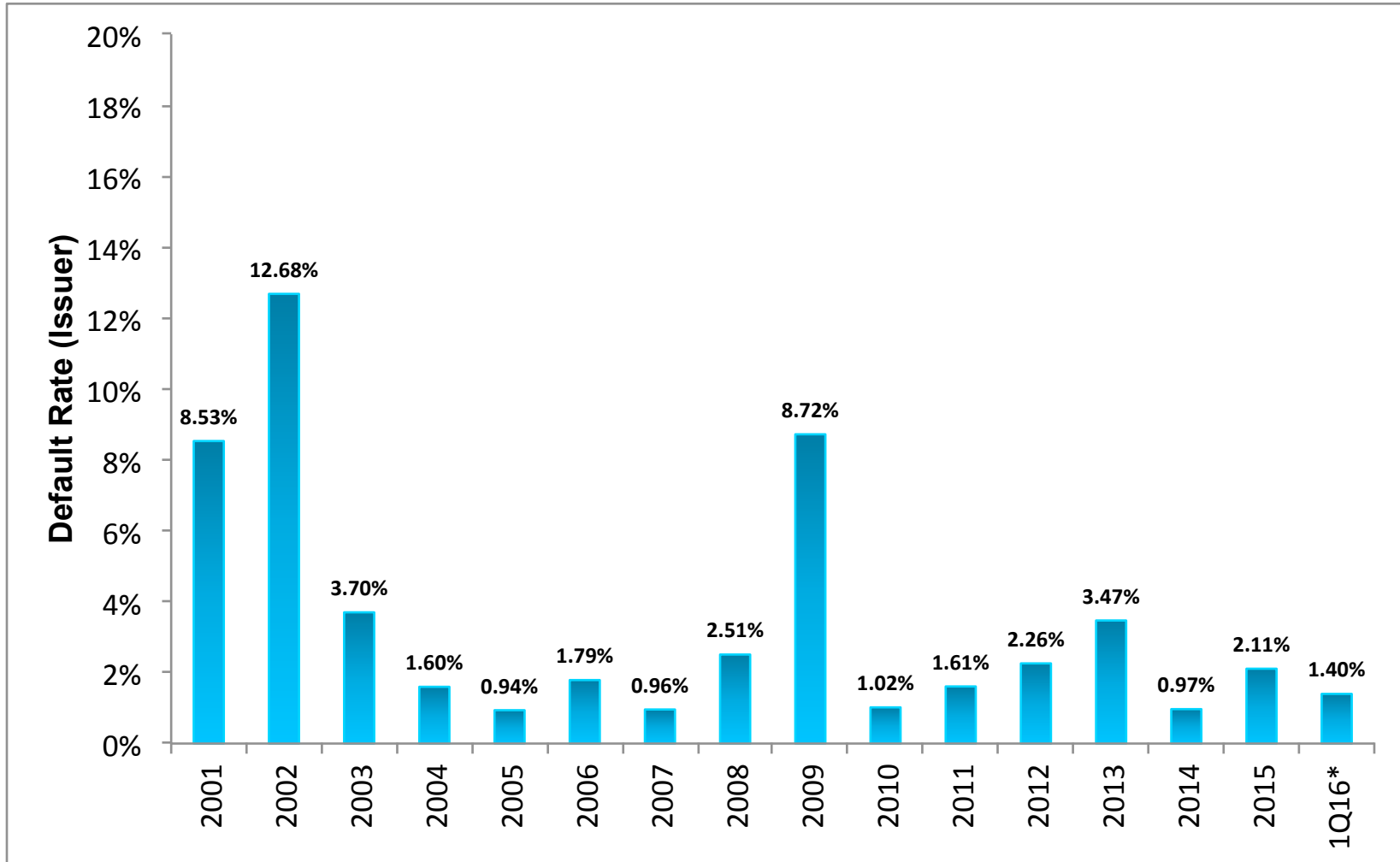
# Historical Annual European High-Yield Default Rates, by Amount Defaulted



\*LTM

Source: Credit Suisse

# Historical Annual European High-Yield Default Rates, by Issuer



\*LTM

Source: Standard & Poor's Global Fixed Income Research

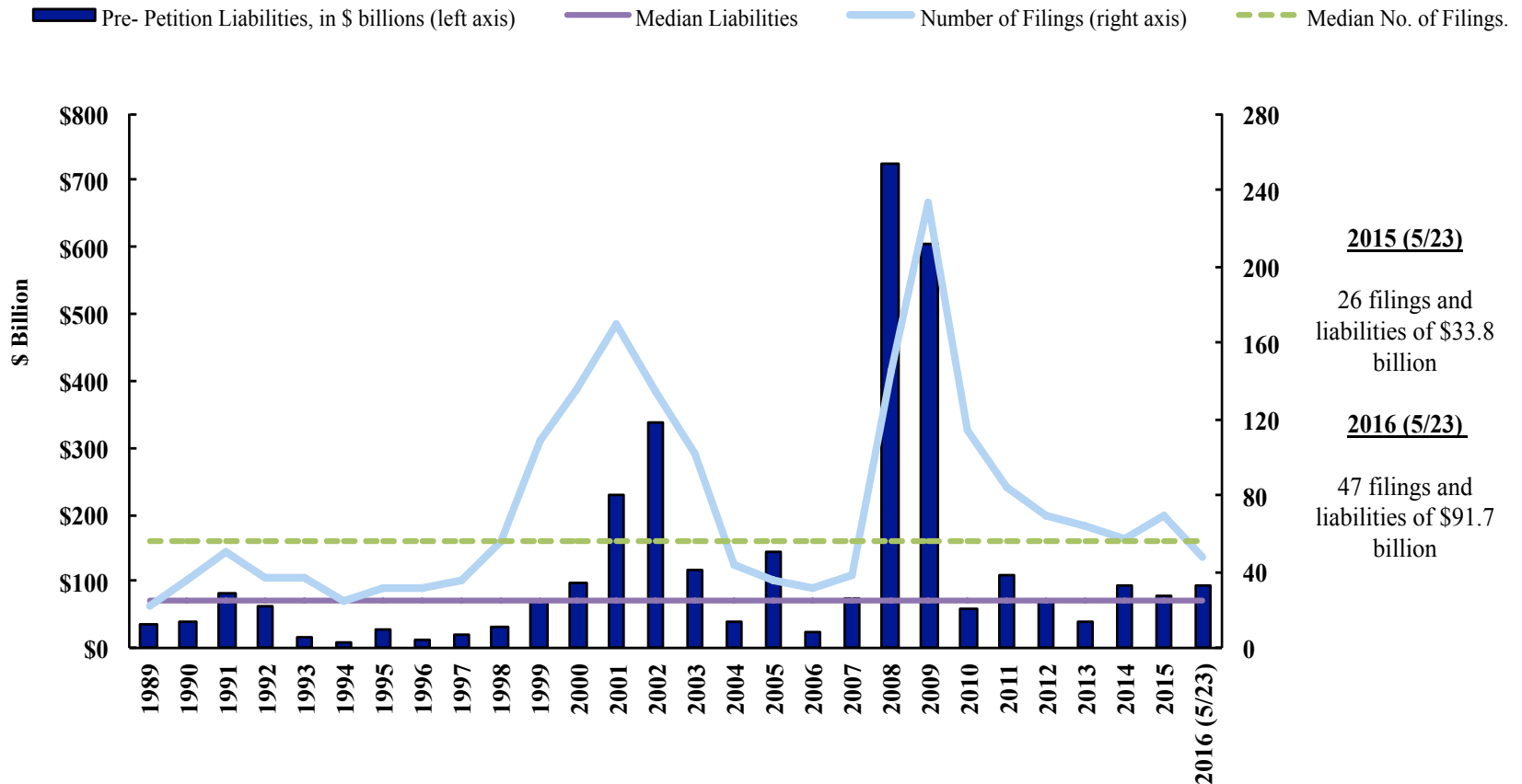
# Default Rates and Losses<sup>a</sup>: 1978 – 2016 (5/23)

Year	Par Value Outstanding (\$MM)	Par Value Defaults (\$MM)	Default Rate (%)	Weighted Price After Default (\$)	Weighted Coupon (%)	Default Loss (%)
2016 (5/23)	1,600,227	43,853	2.74	18.4	8.06	2.31
2015	1,595,839	45,122	2.83	33.9	9.28	2.00
2014	1,496,814	31,589	2.11	63.2	10.44	0.89
2013	1,392,212	14,539	1.04	53.6	10.04	0.54
2012	1,212,362	19,647	1.62	57.8	8.97	0.76
2011	1,354,649	17,963	1.33	60.3	9.10	0.59
2010	1,221,569	13,809	1.13	46.6	10.59	0.66
2009	1,152,952	123,878	10.74	36.1	8.16	7.30
2008	1,091,000	50,763	4.65	42.5	8.23	2.83
2007	1,075,400	5,473	0.51	66.6	9.64	0.19
2006	993,600	7,559	0.76	65.3	9.33	0.30
2005	1,073,000	36,209	3.37	61.1	8.61	1.46
2004	933,100	11,657	1.25	57.7	10.30	0.61
2003	825,000	38,451	4.66	45.5	9.55	2.76
2002	757,000	96,858	12.79	25.3	9.37	10.15
2001	649,000	63,609	9.80	25.5	9.18	7.76
2000	597,200	30,248	5.06	26.4	8.54	3.94
1999	567,400	23,532	4.15	27.9	10.55	3.21
1998	465,500	7,464	1.60	35.9	9.46	1.10
1997	335,400	4,200	1.25	54.2	11.87	0.65
1996	271,000	3,336	1.23	51.9	8.92	0.65
1995	240,000	4,551	1.90	40.6	11.83	1.24
1994	235,000	3,418	1.45	39.4	10.25	0.96
1993	206,907	2,287	1.11	56.6	12.98	0.56
1992	163,000	5,545	3.40	50.1	12.32	1.91
1991	183,600	18,862	10.27	36.0	11.59	7.16
1990	181,000	18,354	10.14	23.4	12.94	8.42
1989	189,258	8,110	4.29	38.3	13.40	2.93
1988	148,187	3,944	2.66	43.6	11.91	1.66
1987	129,557	7,486	5.78	75.9	12.07	1.74
1986	90,243	3,156	3.50	34.5	10.61	2.48
1985	58,088	992	1.71	45.9	13.69	1.04
1984	40,939	344	0.84	48.6	12.23	0.48
1983	27,492	301	1.09	55.7	10.11	0.54
1982	18,109	577	3.19	38.6	9.61	2.11
1981	17,115	27	0.16	12.0	15.75	0.15
1980	14,935	224	1.50	21.1	8.43	1.25
1979	10,356	20	0.19	31.0	10.63	0.14
1978	8,946	119	1.33	60.0	8.38	0.59
Arithmetic Average 1978 – 2015			3.33	46.01	10.50	2.20
Weighted Average 1978 - 2015			3.45	38.62		2.25

<sup>a</sup> Excludes defaulted issues.  
Source: Authors' compilations and various dealer price quotes.

# Filings for Chapter 11

## Number of Filings and Pre-petition Liabilities of Filing Companies 1989 – 2016 (5/23)



Note: Minimum \$100 million in liabilities  
Source: NYU Salomon Center Bankruptcy Filings Database

Mean 1989-2015: 74 filings  
Median 1989-2015: 56 filings

# Energy/Mining Company Chapter 11 Filings\*

January 01, 2015 – May 23, 2016

Company	Liabilities (\$MM)	Date	SIC
Allied Nevada Gold Corp.	664	3/10/2015	1040
Alpha Natural Resources, Inc.	7,100	8/3/2015	1221
American Eagle Energy Corp.	215	5/8/2015	1311
Arch Coal, Inc.	6,453	1/11/2016	1221
Black Elk Energy Offshore Operations, LLC	432	9/1/2015	1311
BPZ Resources, Inc.	275	3/9/2015	1311
Breitbart Energy Partners LP	3,413	5/15/2016	1311
Cal Dive International, Inc.	411	3/3/2015	1389
CCNG Energy Partners, L.P.	250	10/12/2015	1389
Chaparral Energy, Inc.	1,825	5/9/2016	1311
Cubic Energy, Inc.	114	12/11/2015	1311
Dune Energy, Inc.	144	3/8/2015	1389
Emerald Oil, Inc.	361	3/22/2016	1311
Energy & Exploration Partners, Inc.	1,000	12/7/2015	1311
Energy XXI Ltd.	3,623	4/14/2016	1382
ERG Intermediate Holdings, LLC	250	4/30/2015	1311
Goodrich Petroleum Corp.	507	4/15/2016	1311
Hercules Offshore, Inc.	1,307	8/13/2015	1381
Hovensa, LLC	1,000	9/15/2015	1382
Intervention Energy Holdings, LLC	250	5/20/2016	1311
Linn Energy, LLC	8,278	5/11/2016	1311
Magnetation, Inc.	750	5/5/2015	1011
Magnum Hunter Resources Corp.	1,117	12/15/2015	1311
Midstates Petroleum Co., Inc.	2,005	4/30/2016	1311
Milagro Oil & Gas, Inc.	468	7/15/2015	1311
Miller Energy Resources, Inc.	337	10/1/2015	1311
Molycorp., Inc.	1,786	6/25/2015	1081
New Gulf Resources, LLC	508	12/17/2015	1311
Offshore Group Investment Ltd.	1,925	12/3/2015	1381
Paragon Offshore, LLC	2,963	2/14/2016	1381
Parallel Energy, L.P.	160	11/9/2015	1311
Patriot Coal Corp.	1,000	5/12/2015	1221
Peabody Energy Corp.	10,103	4/13/2016	1221
Penn Virginia Corp.	1,433	5/12/2016	1311

\*Liabilities of \$100mm or more at time of filing.

# Energy/Mining Company Chapter 11 Filings\* (continued)

January 01, 2015 – May 23, 2016

Company	Liabilities (\$MM)	Date	SIC
Quicksilver Resources, Inc.	2,352	3/17/2015	1311
RAAM Global Energy Co.	429	10/26/2015	1311
Sabine Oil & Gas Corp.	2,906	7/15/2015	1311
Samson Resources Corp.	5,369	9/16/2015	1311
Sandridge Energy, Inc.	3,998	5/16/2016	1311
Saratoga Resources, Inc.	219	6/18/2015	1382
Southcross Holdings, L.P.	1,000	3/27/2016	4922
SunEdison, Inc.	16,141	4/21/2016	3674
Swift Energy Co.	1,349	12/31/2015	1311
Trinity River Resources, L.P.	250	4/21/2016	1311
Ultra Petroleum Corp.	3,917	4/29/2016	1311
Venoco, Inc.	758	3/18/2015	1311
Walter Energy, Inc.	5,005	7/15/2015	1221
Xinergy Ltd.	250	4/6/2015	1221
Number of Energy/Mining Companies	48		
Total Number of Filings 1/1/15-5/23/16	117		
Percent Energy/Mining Companies	41%		
Total Energy/Mining Company Liabilities (\$MM)	\$106,372		

\*Liabilities of \$100mm or more at time of filing.

Source: NYU Salomon Center Bankruptcy Filings Database

# Energy/Mining Company Bond Defaults

January 01, 2015 – May 23, 2016

Company	Default Amount (\$MM)	Date	SIC
Alpha Natural Resources, Inc.	443	4/1/15	1221
Alpha Natural Resources, Inc.	2,268	8/3/15	1221
American Eagle Energy Corp.	175	5/8/15	1311
American Energy-Woodford, LLC	340	6/22/15	1311
American Energy-Woodford, LLC	148	4/28/16	1311
Arch Coal, Inc.	3,225	1/11/16	1221
Black Elk Energy Offshore Operations, LLC	139	9/1/2015	1311
Breitbart Energy Partners LP	1,805	5/15/2016	1311
Chaparral Energy, Inc.	384	4/15/2016	1311
Chaparral Energy, Inc.	298	5/1/2016	1311
Chaparral Energy, Inc.	526	5/9/2016	1311
Cliffs Natural Resources	675	3/30/15	1000
Cliffs Natural Resources	512	2/26/16	1000
Comstock Resources, Inc.	17	6/30/15	1311
Comstock Resources, Inc.	84	9/30/15	1311
Comstock Resources, Inc.	40	2/3/16	1311
Comstock Resources, Inc.	14	4/4/16	1311
Comstock Resources, Inc.	9	4/13/16	1311
Comstock Resources, Inc.	1	4/28/16	1311
Comstock Resources, Inc.	15	5/3/16	1311
Connacher Oil and Gas Ltd.	550	3/4/15	1311
Cubic Energy, Inc.	66	12/11/15	1311
Denbury Resources, Inc.	152	3/31/16	1311
Denbury Resources, Inc.	922	5/10/16	1311
Dune Energy, Inc.	68	3/8/15	1389
Energy XXI Ltd.	2,396	4/14/16	1382
EP Energy, LLC	345	3/31/16	1311
EP Energy, LLC	226	5/17/16	1311
EV Energy Partners, L.P.	73	4/27/16	1311
Exco Resources, Inc.	577	10/26/15	1311
Exco Resources, Inc.	251	11/4/15	1311
Far East Energy Bermuda Ltd.	164	11/10/15	1311
Goodrich Petroleum Corp.	158	10/1/15	1311
Goodrich Petroleum Corp.	80	4/8/16	1311
Goodrich Petroleum Corp.	250	4/15/16	1311



# Energy/Mining Company Bond Defaults (continued)

January 01, 2015 – May 23, 2016

Company	Default Amount (\$MM)	Date	SIC
Gran Colombia Gold Corp.	79	1/10/15	1221
Halcon Resources Corp.	252	4/14/15	1311
Halcon Resources Corp.	1,566	9/10/15	1311
Halcon Resources Corp.	290	12/17/15	1311
Halcon Resources Corp.	136	2/26/15	1311
Hercules Offshore, Inc.	1,204	8/13/15	1381
ION Geophysical Corp.	147	4/25/16	1382
Jones Energy Holdings, LLC	171	3/7/16	1311
Legacy Reserves LP	44	3/31/16	1311
Legacy Reserves LP	8	5/4/16	1311
Lightstream Resources Ltd.	464	7/2/15	1311
Linn Energy, LLC	1,999	11/20/15	1311
Linn Energy, LLC	4,861	5/11/16	1311
Magnetation, Inc.	425	5/5/15	1011
Magnum Hunter Resources, Inc.	600	12/15/15	1311
Midstates Petroleum Co., Inc.	628	5/21/15	1311
Midstates Petroleum Co., Inc.	1,790	4/30/16	1311
Molycorp, Inc.	650	6/25/15	1081
Murray Energy Corp.	96	1/29/16	1241
New Gulf Resources, LLC	508	12/17/15	1311
Nuverra Environmental Solutions, Inc.	328	4/13/16	1389
Ocean Rig UDW, Inc.	424	12/7/15	1381
Offshore Group Investment Ltd.	1,814	12/3/15	1381
Pacific Exploration & Production Corp.	4,104	4/27/16	1382
Paragon Offshore, plc	984	2/14/16	1381
Patriot Coal Corp.	282	5/12/15	1221
Peabody Energy Corp.	4,758	4/13/16	1221
Penn Virginia Corp.	1,075	5/12/16	1311
Permian Resources, LLC	203	5/20/16	1382
PetroQuest Energy, Inc.	214	2/11/16	1311
Quicksilver Resources, Inc.	1,173	3/17/15	1311
RAAM Global Energy Co.	238	5/1/15	1311
Rex Energy Corp.	633	3/30/16	1311
Sabine Oil & Gas Corp.	1,150	7/15/15	1311
SandRidge Energy, Inc.	49	5/19/15	1311

# Energy/Mining Company Bond Defaults (continued)

January 01, 2015 – May 23, 2016

Company	Default Amount (\$MM)	Date	SIC
SandRidge Energy, Inc.	525	8/19/15	1311
SandRidge Energy, Inc.	400	10/8/15	1311
SandRidge Energy, Inc.	3,554	5/16/16	1311
SAExploration Holdings, Inc.	10	8/26/15	1382
Samson Resources Corp.	2,250	9/16/15	1311
Saratoga Resources, Inc.	180	6/12/15	1382
Sidewinder Drilling, Inc.	133	2/12/16	1381
Swift Energy Co.	875	12/31/15	1311
Ultra Petroleum Corp.	2,260	4/29/16	1311
Vanguard Natural Resources, LLC	168	2/5/16	1311
Venoco, Inc.	192	4/10/15	1311
Venoco, Inc.	950	3/18/16	1311
Walter Energy, Inc.	2,102	7/15/15	1221
Warren Resources, Inc.	70	5/26/15	1311
Warren Resources, Inc.	63	10/22/15	1311
Warren Resources, Inc.	167	3/1/16	1311
White Star Petroleum, LLC (American Energy - Woodford)	148	4/28/16	1311
Xinergy Corp.	195	4/6/15	1221
Total of Energy/Mining Company Defaults \$	\$64,984		
Total Defaults 1/1/15-5/23/16	\$88,975		
Percent Energy/Mining (Dollars)	73%		
Percent Energy/Mining Issuers	59%		
2015 Default Rate	7.98%		

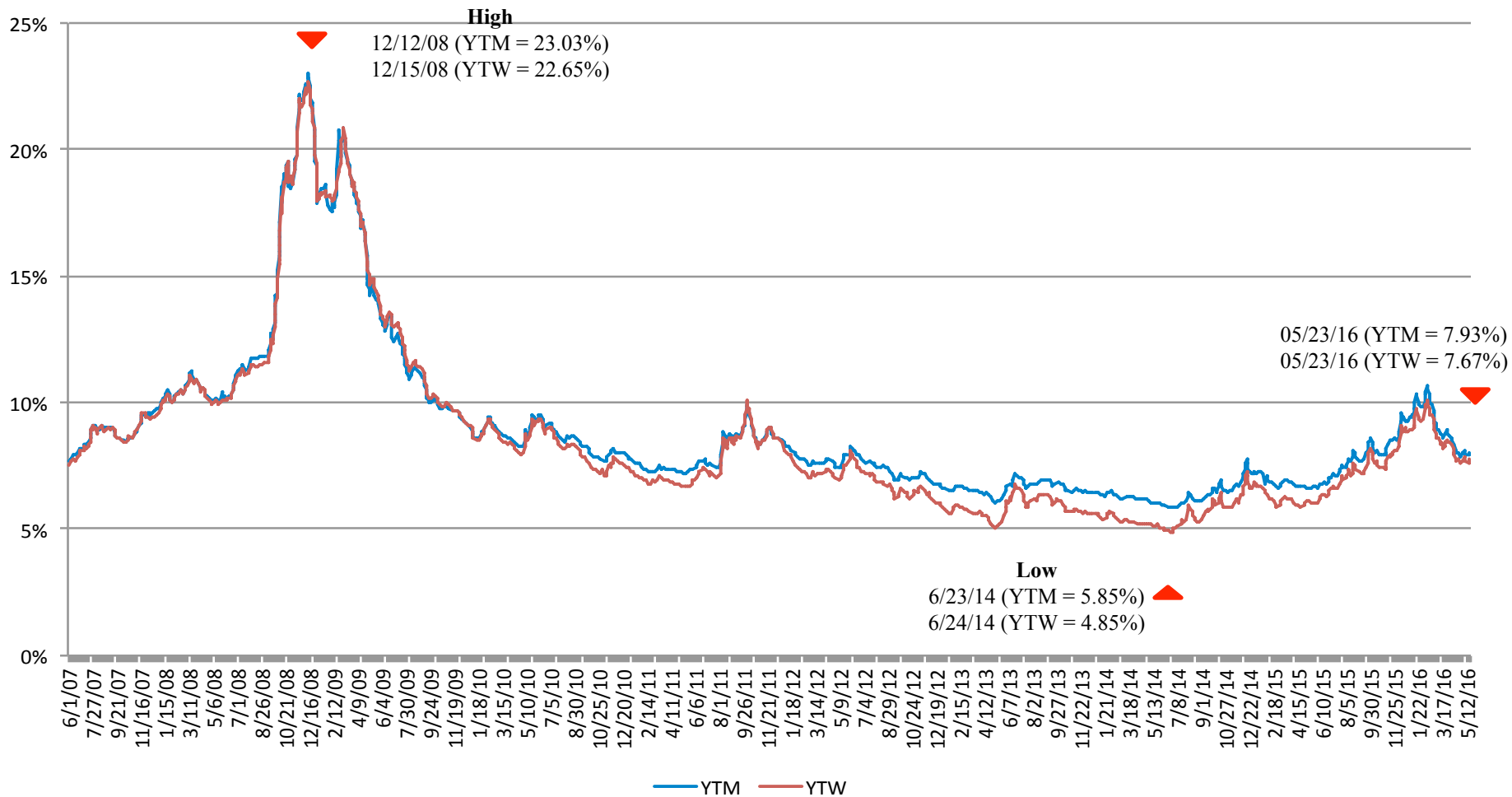
# YTM & Option-Adjusted Spreads Between High Yield Markets & U.S. Treasury Notes

June 01, 2007 – May 23, 2016



# High Yield Bonds - Yield to Maturity vs. Yield to Worst

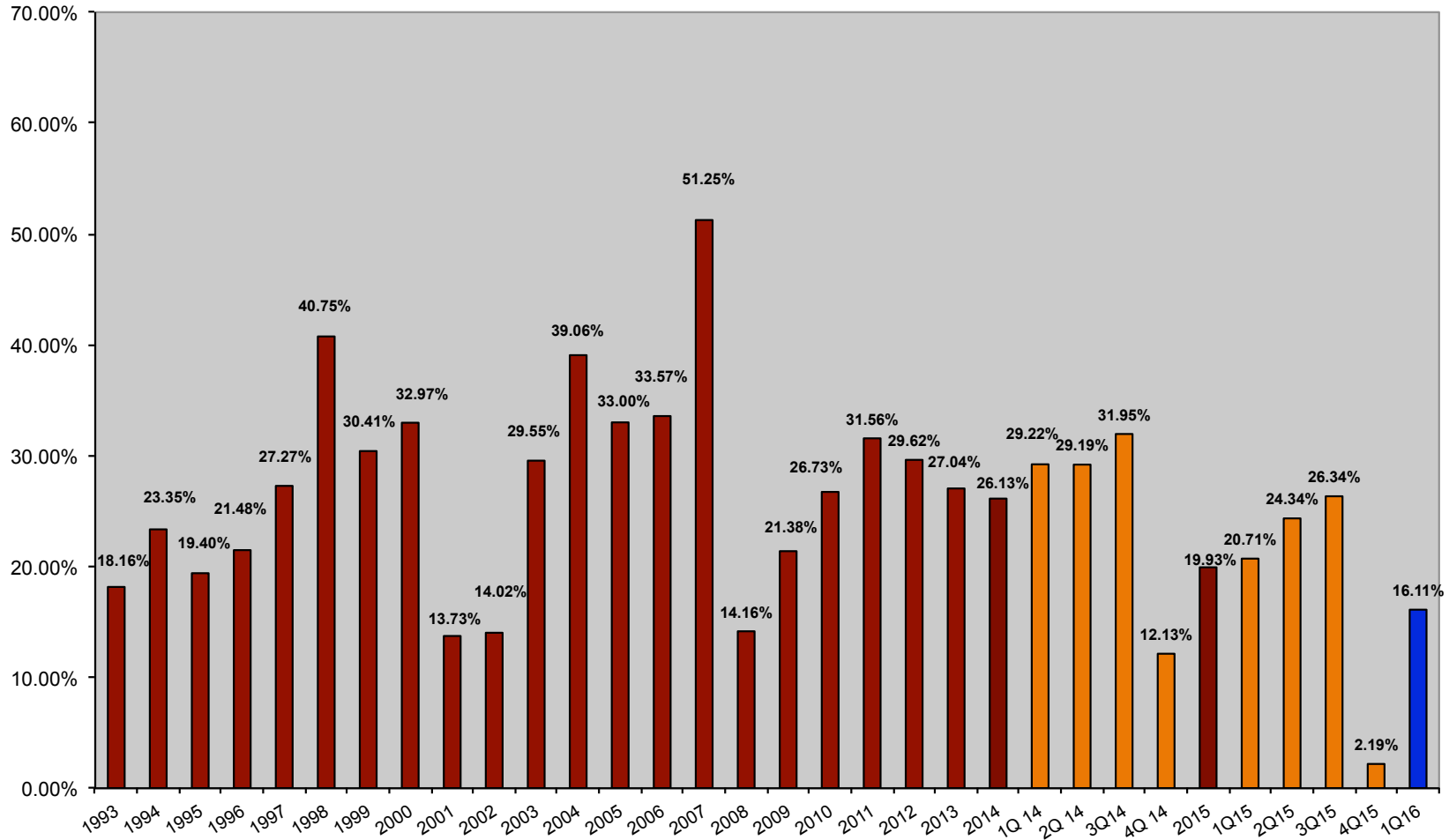
June 01, 2007 – May 23, 2016



Sources: Citigroup Yieldbook Index Data

# Liquidity Signal: New Issues Rated B- or Below, Based on the Dollar Amount of Issuance

(1993 – 2016 (1Q))



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# **DEFAULT RATE FORECAST**

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# Mortality Rates by Original Rating

All Rated Corporate Bonds\*  
1971-2015

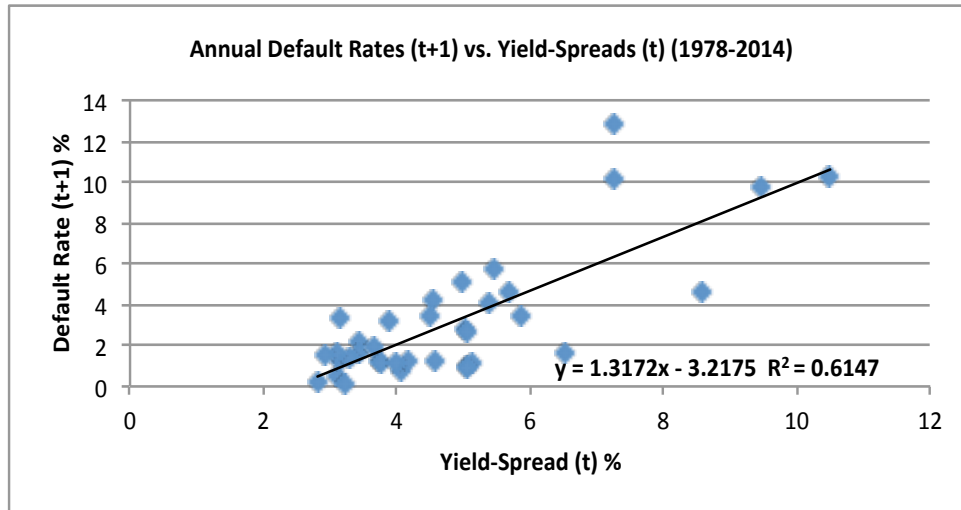
Years After Issuance

		1	2	3	4	5	6	7	8	9	10
AAA	Marginal	0.00%	0.00%	0.00%	0.00%	0.01%	0.02%	0.01%	0.00%	0.00%	0.00%
	Cumulative	0.00%	0.00%	0.00%	0.00%	0.01%	0.03%	0.04%	0.04%	0.04%	0.04%
AA	Marginal	0.00%	0.00%	0.21%	0.07%	0.02%	0.01%	0.01%	0.01%	0.02%	0.01%
	Cumulative	0.00%	0.00%	0.21%	0.28%	0.30%	0.31%	0.32%	0.33%	0.35%	0.36%
A	Marginal	0.01%	0.03%	0.12%	0.13%	0.10%	0.06%	0.02%	0.25%	0.08%	0.05%
	Cumulative	0.01%	0.04%	0.16%	0.29%	0.39%	0.45%	0.47%	0.72%	0.80%	0.85%
BBB	Marginal	0.33%	2.36%	1.26%	1.00%	0.50%	0.22%	0.26%	0.15%	0.15%	0.34%
	Cumulative	0.33%	2.68%	3.91%	4.87%	5.34%	5.55%	5.80%	5.94%	6.08%	6.40%
BB	Marginal	0.94%	2.02%	3.88%	1.97%	2.34%	1.51%	1.45%	1.12%	1.43%	3.13%
	Cumulative	0.94%	2.94%	6.71%	8.54%	10.68%	12.03%	13.31%	14.28%	15.51%	18.15%
B	Marginal	2.85%	7.72%	7.85%	7.80%	5.70%	4.48%	3.58%	2.08%	1.76%	0.77%
	Cumulative	2.85%	10.35%	17.39%	23.83%	28.17%	31.39%	33.85%	35.22%	36.36%	36.85%
CCC	Marginal	8.13%	12.43%	17.89%	16.32%	4.85%	11.65%	5.44%	4.84%	0.66%	4.28%
	Cumulative	8.13%	19.55%	33.94%	44.72%	47.40%	53.53%	56.06%	58.19%	58.46%	60.24%

\*Rated by S&P at Issuance  
Based on 2,903 issues

# Updated Market-Based Annual Default Rate Forecast

## Annual Default Rate (t+1) versus High-Yield Spreads (t)



The regression equation is

$$\text{Default Rate} = - 3.22 + 1.32 * \text{Spread}$$

<u>Predictor</u>	<u>Coef</u>	<u>SE Coef</u>	<u>T</u>	<u>P</u>
Constant	-3.2175	0.9271	-3.4704	0.0014
Spread	1.3172	0.1788	7.3652	0.0000

$$S = 1.9535 \quad R\text{-Sq} = 61.5\% \quad R\text{-Sq}(\text{adj}) = 60.3\%$$

### Application

Yield spread (12/31/2013) of 345bp, forecast  $P_D$  for 12/31/2014 = **1.30%** vs. actual of 2.11%

Yield spread (12/31/2014) of 500bp, forecast PD for 12/31/2015 = **3.38%** vs. actual of 2.83% (prelim)

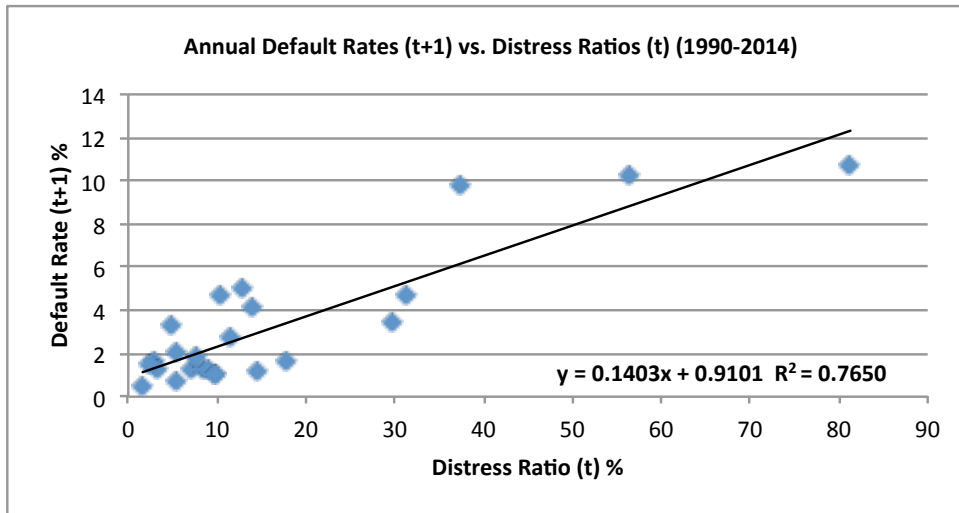
Yield spread (12/31/2015) of 700bp, forecast PD for 12/31/2016 = **6.00%**

Yield spread (5/23/2016) of 607bp, forecast PD for 5/23/2017 = **4.78%**



# Updated Market-Based Annual Default Rate Forecast

## Annual Default Rate (t+1) versus Distressed Ratio (t)



The regression equation is

$$\text{Default Rate} = 0.91 + 0.14 * \text{Distress Ratio}$$

Predictor	Coef	SE Coef	T	P
Constant	0.9101	0.4106	2.2164	0.0373
Spread	0.1403	0.0166	8.4625	0.0000

$$S = 1.5045 \quad R\text{-Sq} = 76.5\% \quad R\text{-Sq}(\text{adj}) = 75.4\%$$

### Application

Distress ratio (12/31/2013) of 5.29%, forecast  $P_D$  for 12/31/2014 = **1.61%** vs. actual of 2.11%

Distress ratio (12/31/2014) of 11.56%, forecast  $P_D$  for 12/31/2015 = **2.52%** vs. actual of 2.83% (prelim)

Distress ratio (12/31/2015) of 24.7%, forecast  $P_D$  for 12/31/2016 = **4.38%**

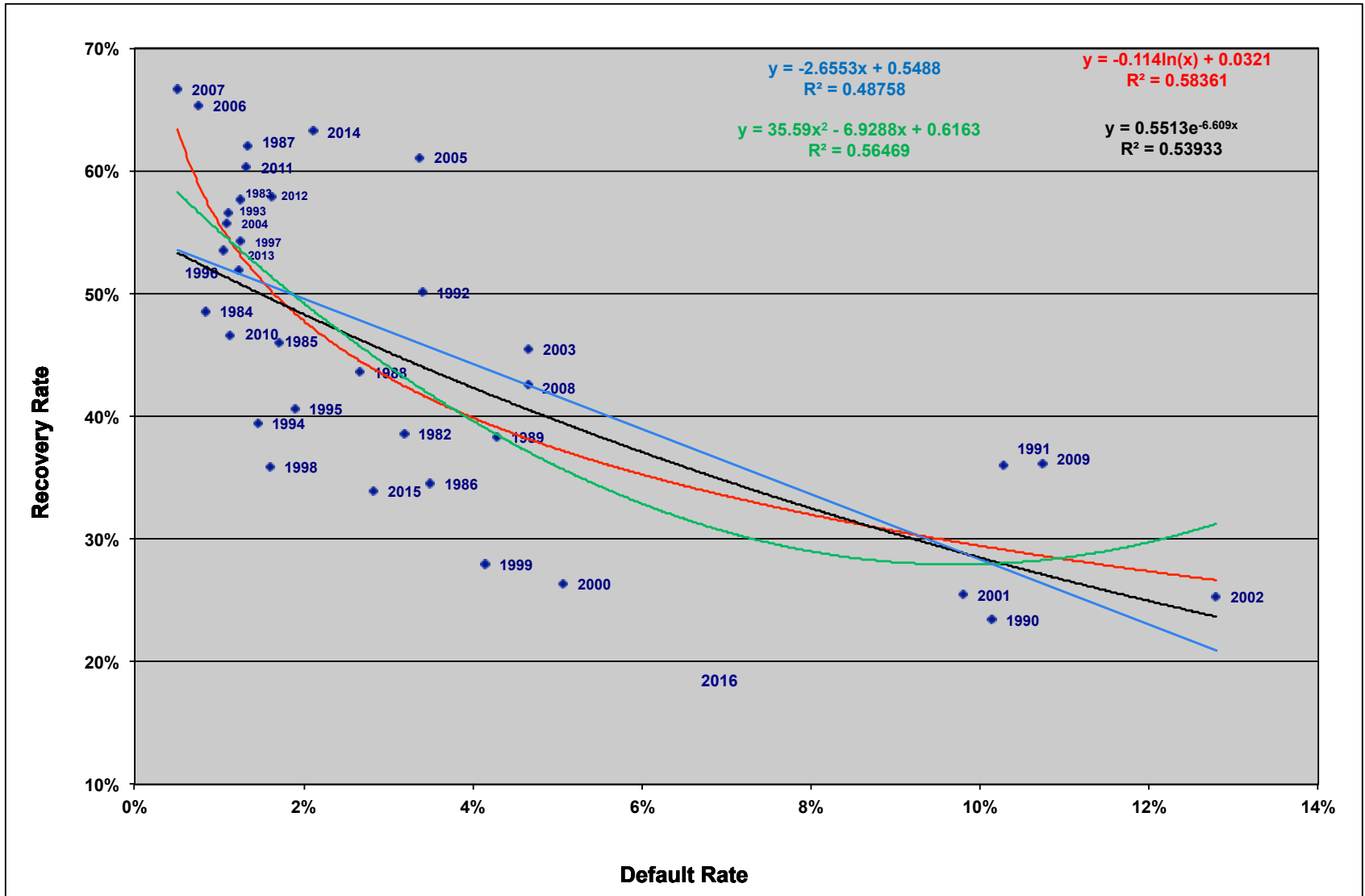
Distress ratio (4/30/2016) of 19.0%, forecast  $P_D$  for 4/30/2017 = **3.57%**

# Default and Recovery Forecasts: Summary of Forecast Models

<b>Model</b>	<b>2015 (12/31) Default Rate Forecast as of 12/31/2014</b>	<b>2016 (12/31) Default Rate Forecast as of 12/31/2015</b>	<b>2017 (5/23) Default Rate Forecast as of 5/23/2016</b>
Mortality Rate	3.95%	4.50%	4.50%
Yield-Spread	3.38% <sup>a</sup>	6.00% <sup>e</sup>	4.78% <sup>e</sup>
Distress Ratio	2.52% <sup>b</sup>	4.38% <sup>f</sup>	3.57% <sup>f</sup>
Average of Models Recovery Rates*	3.28% 39.5%	4.96% 37.5%	4.28% 39.1%

\* Recovery rate based on the log Linear equation between default and recovery rates, see Altman, et al (2005) Journal of Business, November and Slide 80. <sup>a</sup> Based on Dec.31, 2014 yield-spread of 499.9bp. <sup>b</sup> Based on Dec. 31, 2014 Distress Ratio of 11.56%. <sup>c</sup> Based on Dec. 31, 2015 yield-spread of 699.8bp. <sup>d</sup> Based on Dec. 31, 2015 Distress Ratio of 24.7%. <sup>e</sup> Based on May 23, 2016 yield-spread of 606.8bp. <sup>f</sup> Based on Apr. 30, 2016 Distress Ratio of 19.0%.

# Recovery Rate/Default Rate Association: Dollar-Weighted Average Recovery Rates to Dollar Weighted Average Default Rates, 1982 – 2016 (5/23)



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# **Comparative Health of High-Yield Firms (2007 vs. 2012/2014)**

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# Z-Score Component Definitions and Weightings

<u>Variable</u>	<u>Definition</u>	<u>Weighting Factor</u>
$X_1$ - - - - -	$\frac{\text{Working Capital}}{\text{Total Assets}}$	1.2
$X_2$ - - - - -	$\frac{\text{Retained Earnings}}{\text{Total Assets}}$	1.4
$X_3$ - - - - -	$\frac{\text{EBIT}}{\text{Total Assets}}$	3.3
$X_4$ - - - - -	$\frac{\text{Market Value of Equity}}{\text{Book Value of Total Liabilities}}$	0.6
$X_5$ - - - - -	$\frac{\text{Sales}}{\text{Total Assets}}$	1.0

# Z" Score Model for Manufacturers, Non-Manufacturer Industrials; Developed and Emerging Market Credits

$$Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4 + 3.25$$

$$X_1 = \frac{\text{Current Assets} - \text{Current Liabilities}}{\text{Total Assets}}$$

$$X_2 = \frac{\text{Retained Earnings}}{\text{Total Assets}}$$

$$X_3 = \frac{\text{Earnings Before Interest and Taxes}}{\text{Total Assets}}$$

$$X_4 = \frac{\text{Book Value of Equity}}{\text{Total Liabilities}}$$

# Median Z-Score by S&P Bond Rating for U.S. Manufacturing Firms: 1992 - 2013

Rating	2013 (No.)	2004-2010	1996-2001	1992-1995
AAA/AA	4.13 (15)	4.18	6.20*	4.80*
A	4.00 (64)	3.71	4.22	3.87
BBB	3.01 (131)	3.26	3.74	2.75
BB	2.69 (119)	2.48	2.81	2.25
B	1.66 (80)	1.74	1.80	1.87
CCC/CC	0.23 (3)	0.46	0.33	0.40
D	0.01 (33)	-0.04	-0.20	0.05

\*AAA Only.

Sources: Compustat Database, mainly S&P 500 firms, compilation by NYU Salomon Center, Stern School of Business.

# Comparing Financial Strength of High-Yield Bond Issuers in 2007 & 2012/2014

Number of Firms		
	Z-Score	Z''-Score
2007	277	383
2012	404	488
2014	558	760

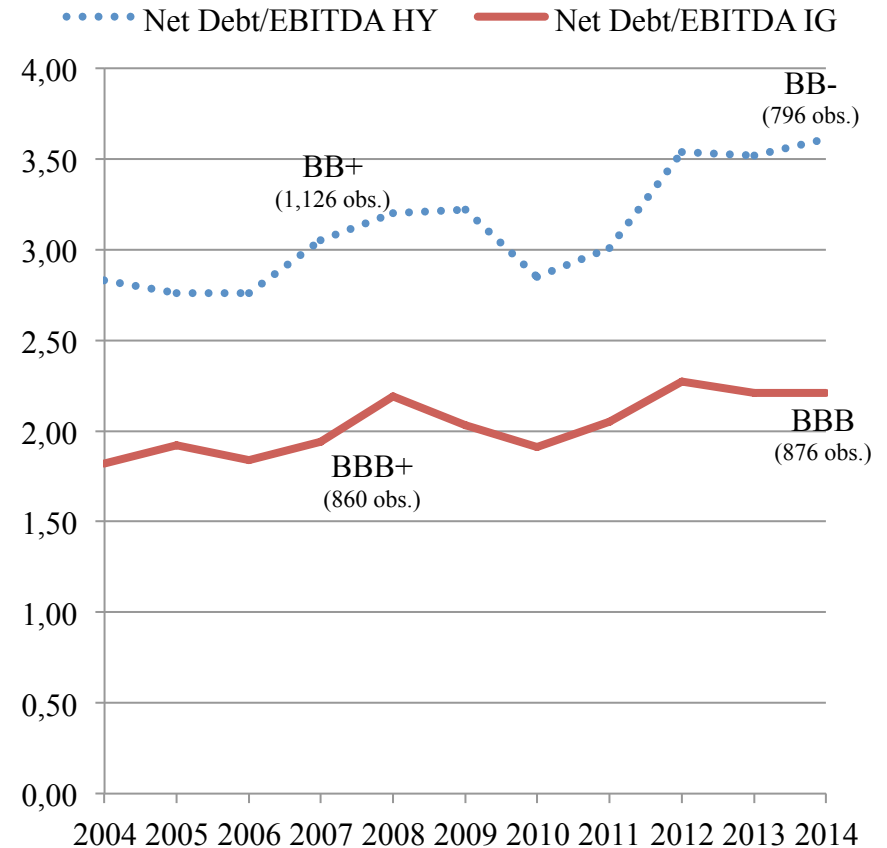
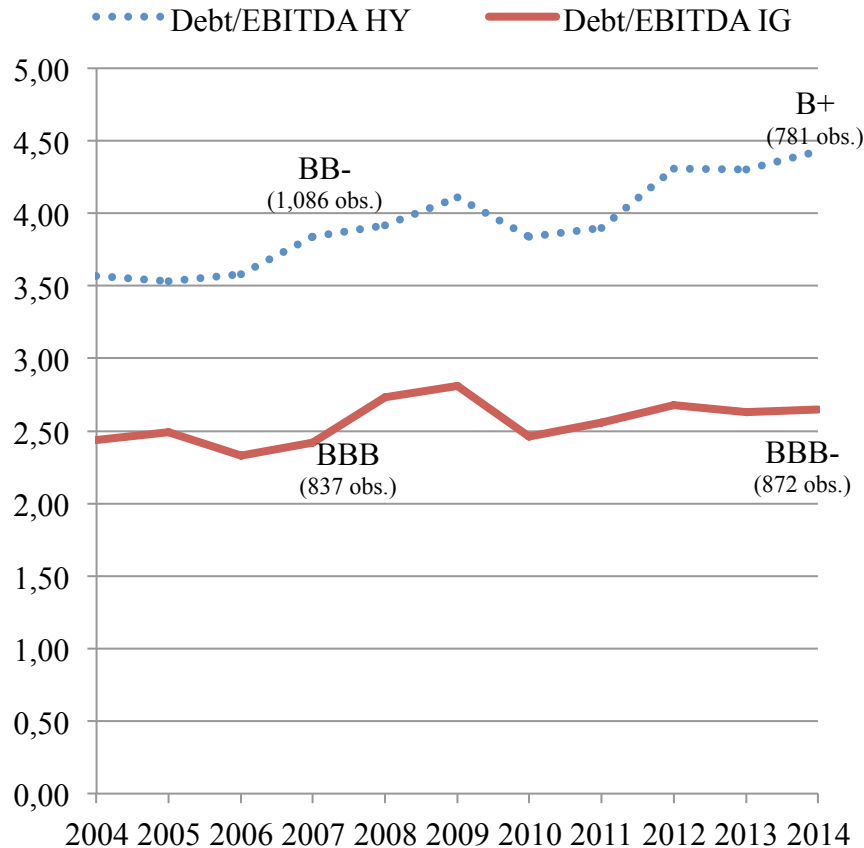
Year	Average Z-Score/ (BRE)*	Median Z-Score/ (BRE)*	Average Z''-Score/ (BRE)*	Median Z''-Score/ (BRE)*	
2007	1.89 (B+)	1.81 (B)	4.58 (B+)	4.61 (B+)	
2012	1.66 (B)	1.59 (B)	4.60 (B+)	4.60 (B+)	
2014	2.03 (B+)	1.80 (B)	4.67 (B+)	4.56 (B+)	
Difference in Means Test (2007 vs. 2012/2014)					
Model	Average Difference (2012/2014)	Standard Deviation (2007/2012/2014)	t-test (2012/2014)	Significance Level (2012/2014)	Significant at . 05? (2012/2014)
Z-Score	-0.23/+0.14	1.29 / 1.15/1.78	-2.38/+1.30	0.88%/9.70%	Yes /No
Z''-Score	+0.02/+0.09	2.50 / 2.07/2.65	+0.13/+0.56	44.68%/28.78%	No/No

\*Bond Rating Equivalent

Source: Authors' calculations, data from Altman and Hotchkiss (2006) and S&P *Capital IQ*.



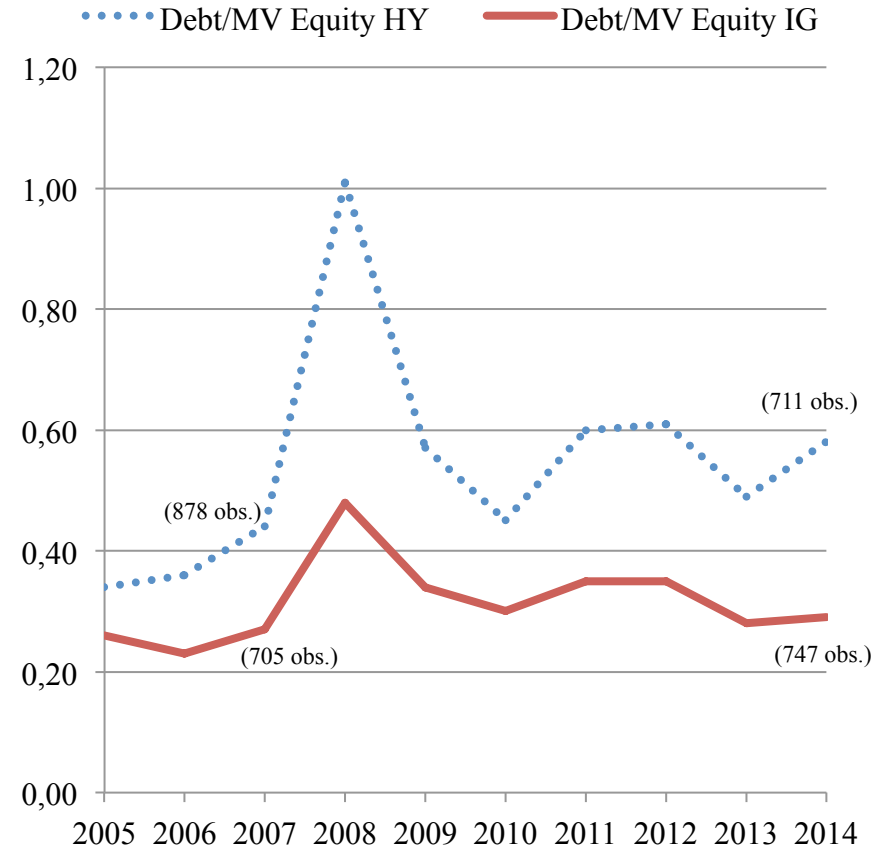
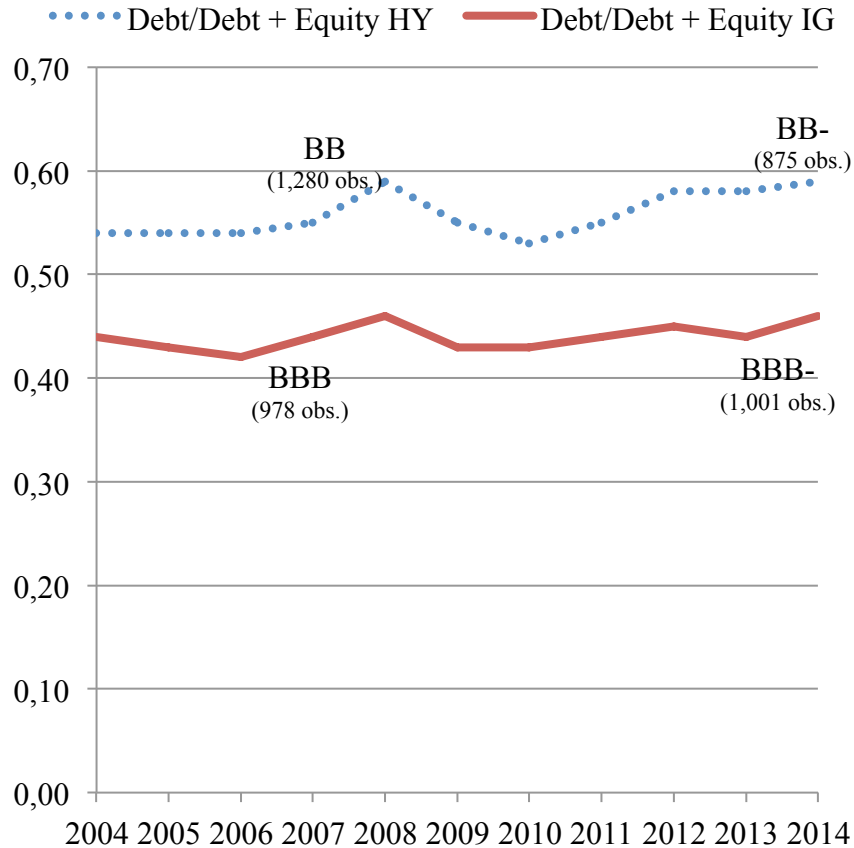
# Debt/EBITDA & Net Debt/EBITDA: U.S. High-Yield (HY) and Investment Grade (IG), (Median Levels, 2004-2014\*)



\*Bond Rating Equivalents (BRE) based on Aggregate S&P Statistics

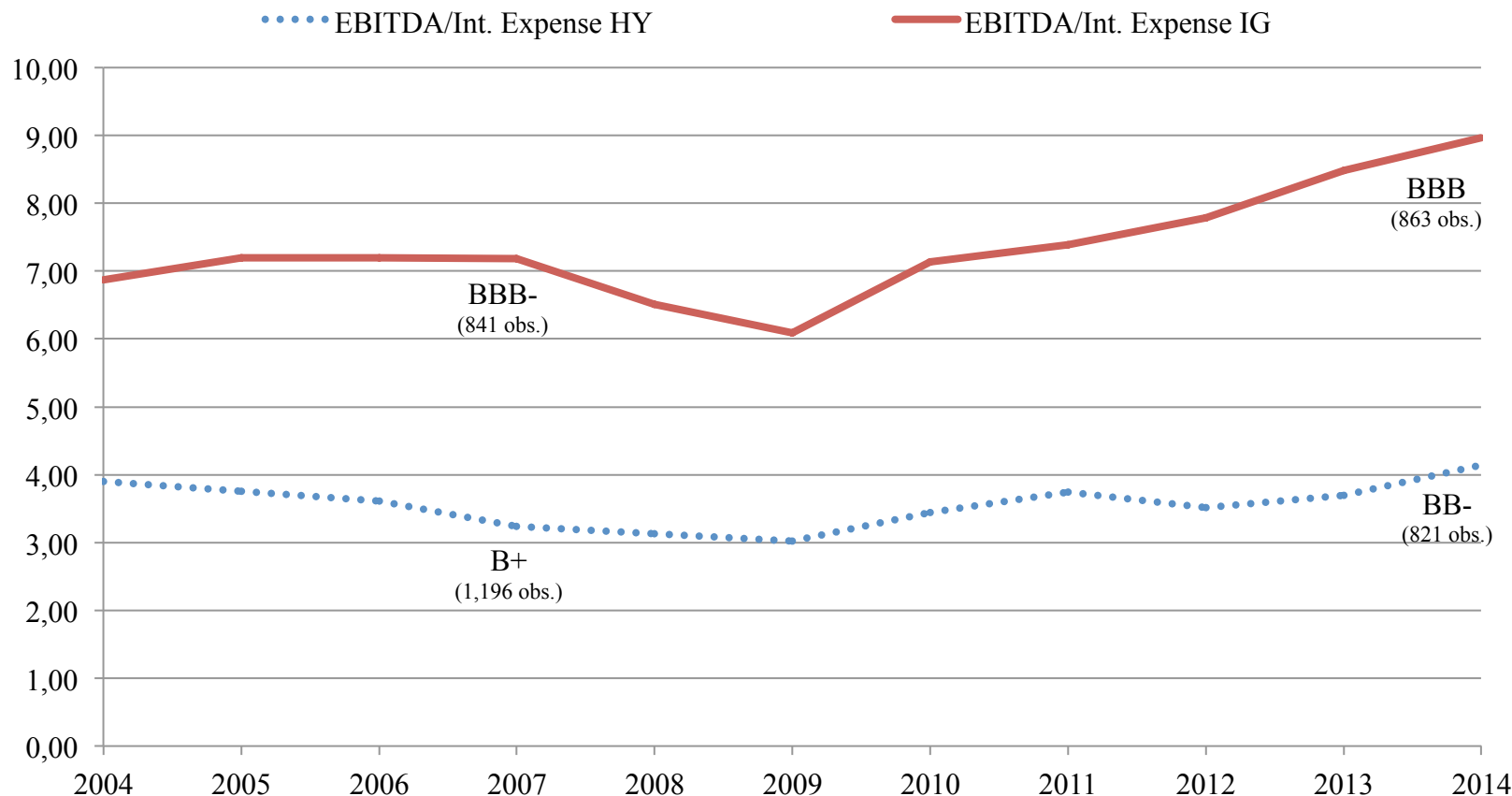
Sources: S&P *Capital IQ* and *Ratings Direct* and NYU Salomon Center calculations.

# Debt/Debt + Equity & Debt/MV Equity : U.S. High-Yield (HY) and Investment Grade (IG), (Median Levels, 2004-2014)



Sources: S&P Capital IQ and Ratings Direct and NYU Salomon Center calculations.

# EBITDA/Interest Expense : U.S. High-Yield (HY) and Investment Grade (IG), (Median Levels, 2004-2014)



Sources: S&P *Capital IQ* and *Ratings Direct* and NYU Salomon Center calculations.

# New Issuance: U.S. High-Yield Bond Market (\$ millions)

2005 – 2016 (4/30)

Ratings

Annual	Total	BB	B	CCC	(CCC % H.Y.)	NR
<b>2005</b>	<b>81,541.8</b>	18,615.0	45,941.2	15,750.9	(19.3%)	1,234.7
<b>2006</b>	<b>131,915.9</b>	37,761.2	67,377.3	25,319.2	(19.2%)	1,458.2
<b>2007</b>	<b>132,689.1</b>	23,713.2	55,830.8	49,627.6	(37.4%)	3,517.5
<b>2008</b>	<b>50,747.2</b>	12,165.0	25,093.1	11,034.4	(21.7%)	2,454.6
<b>2009</b>	<b>127,419.3</b>	54,273.5	62,277.4	10,248.4	(8.0%)	620.0
<b>2010</b>	<b>229,307.4</b>	74,189.9	116,854.7	35,046.8	(15.3%)	3,216.1
<b>2011</b>	<b>184,571.0</b>	54,533.8	105,640.4	21,375.0	(11.6%)	3,021.8
<b>2012</b>	<b>280,450.3</b>	71,852.1	153,611.1	48,690.2	(17.4%)	6,297.0
<b>2013 (1Q)</b>	73,492.3	31,953.1	29,534.2	11,480.0	(15.6%)	525.0
<b>(2Q)</b>	62,135.0	24,380.0	23,665.0	13,790.0	(22.2%)	300.0
<b>(3Q)</b>	73,770.8	22,964.2	32,610.0	18,196.6	(24.7%)	0.0
<b>(4Q)</b>	60,936.8	24,050.0	22,686.8	14,175.0	(23.3%)	25.0
<b>2013 Totals</b>	<b>270,334.8</b>	103,347.3	108,495.9	57,641.6	(21.3%)	850.0
<b>2014 (1Q)</b>	51,634.7	17,585.0	25,792.2	7,842.5	(15.2%)	415.0
<b>(2Q)</b>	74,629.6	23,893.7	30,852.3	19,363.6	(25.9%)	520.0
<b>(3Q)</b>	59,777.3	25,537.3	22,550.0	10,875.0	(18.2%)	815.0
<b>(4Q)</b>	52,721.1	21,975.0	28,906.1	1,840.0	(3.5%)	0.0
<b>2014 Totals</b>	<b>238,762.7</b>	<b>88,991.0</b>	<b>108,100.6</b>	<b>39,921.1</b>	<b>(16.7%)</b>	<b>1,750.0</b>
<b>2015 (1Q)</b>	76,059.5	23,184.2	44,785.3	8,090.0	(10.6%)	0.0
<b>(2Q)</b>	73,428.4	21,219.0	40,037.3	12,052.1	(16.4%)	120.0
<b>(3Q)</b>	31,740.0	14,770.0	12,675.0	4,295.0	(13.5%)	0.0
<b>(4Q)</b>	34,584.1	20,500.9	13,100.0	660.0	(1.9%)	323.2
<b>2015 Totals</b>	<b>215,812.0</b>	<b>79,674.2</b>	<b>110,597.5</b>	<b>25,097.1</b>	<b>(11.6%)</b>	<b>443.2</b>
<b>2016 (1Q)</b>	<b>34,665.0</b>	<b>19,325.0</b>	<b>11,070.0</b>	<b>4,270.0</b>	<b>(12.3%)</b>	<b>0.0</b>
<b>(4/1-4/30)</b>	<b>19,715.0</b>	<b>5,300.0</b>	<b>10,840.0</b>	<b>2,325.0</b>	<b>(11.8%)</b>	<b>0.0</b>

Source: Bank of America Merrill Lynch

# New Issuance: European High-Yield Bond Market

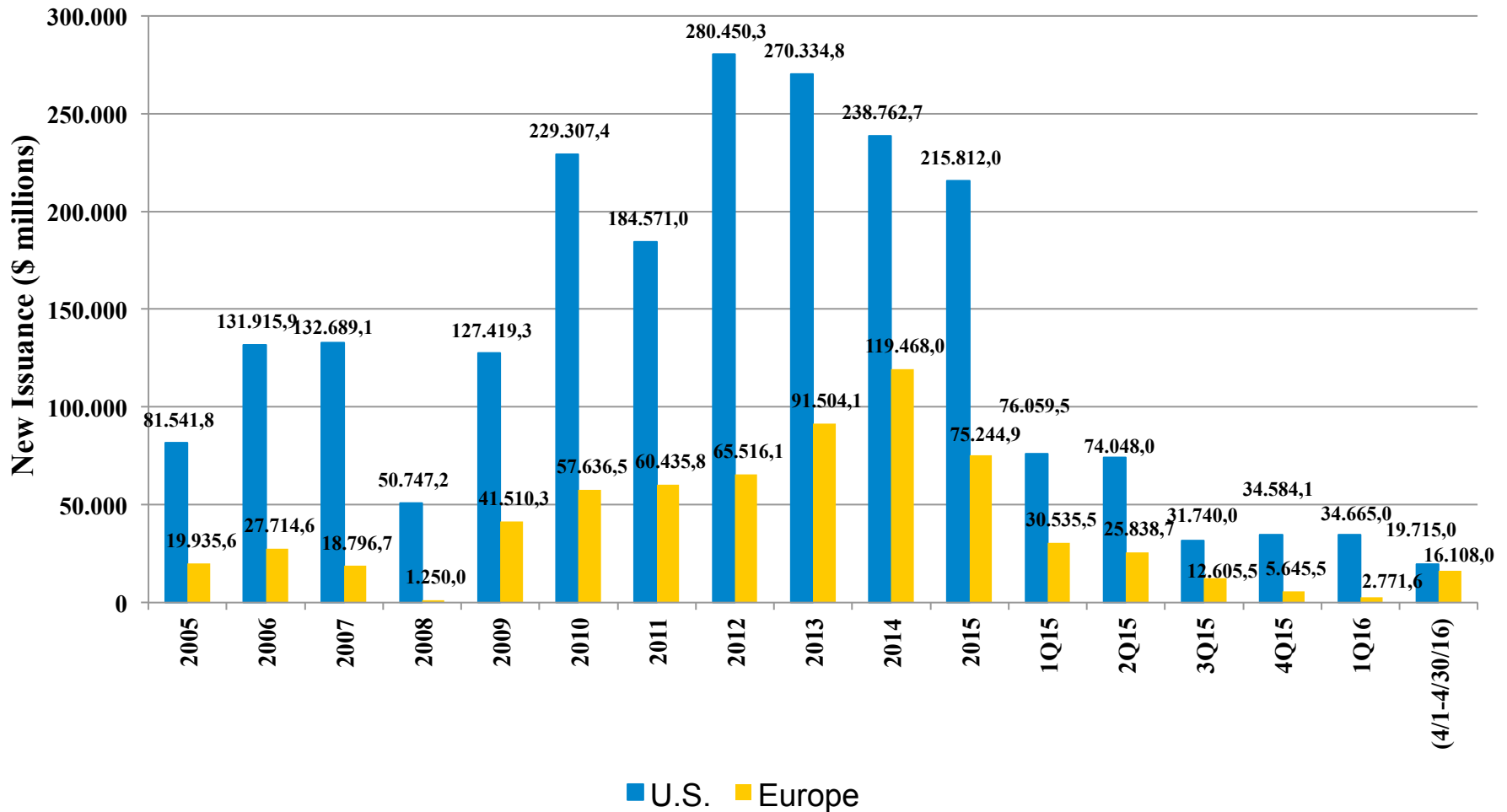
## Face Values (US\$)

2005 – 2016 (4/30)

Annual	Total	Ratings					Currency		
		BB	B	CCC	(CCC % HY)	NR	USD	EUR	GBP
<b>2005</b>	<b>19,935.6</b>	1,563.3	11,901.0	5,936.6	(29.8%)	534.8	2,861.0	15,080.3	1,668.3
<b>2006</b>	<b>27,714.6</b>	5,696.2	16,292.1	5,020.5	(18.1%)	705.9	7,657.8	19,935.7	121.1
<b>2007</b>	<b>18,796.7</b>	5,935.3	11,378.5	562.0	(3.0%)	920.9	4,785.5	12,120.9	1,890.3
<b>2008</b>	<b>1,250.0</b>	1,250.0	25,093.1				1,250.0		
<b>2009</b>	<b>41,510.3</b>	18,489.4	16,697.4	4,771.3	(11.5%)	1,552.2	12,315.0	28,696.9	498.3
<b>2010</b>	<b>57,636.5</b>	22,751.3	29,050.5	2,170.7	(3.8%)	3,663.9	12,775.0	43,147.7	1,403.3
<b>2011</b>	<b>60,435.8</b>	24,728.9	29,919.7	4,108.7	(6.8%)	1,678.6	16,720.0	33,758.0	8,842.4
<b>2012</b>	<b>65,516.1</b>	27,001.7	29,013.0	7,186.7	(11.0%)	2,314.6	28,198.0	32,270.4	2,929.3
<b>2013 (1Q)</b>	27,954.5	6,783.8	15,008.4	5,160.6		1,001.7	10,050.0	12,380.7	4,837.4
<b>(2Q)</b>	30,335.3	6,860.2	19,295.1	3,724.1		455.9	9,913.0	14,149.9	6,074.0
<b>(3Q)</b>	16,558.4	3,375.3	9,609.6	2,721.8		851.7	5,310.0	8,644.0	2,604.4
<b>(4Q)</b>	16,655.9	2,588.0	10,657.6	2,366.4		1,043.9	5,210.0	9,086.5	2,359.4
<b>2013 Totals</b>	<b>91,504.1</b>	19,607.3	54,435.2	13,972.9	(15.3%)	3,353.2	30,483.0	44,125.6	15,875.3
<b>2014 (1Q)</b>	27,169.2	12,565.7	11,685.2	1,230.0	(4.5%)	1,688.3	7,315.0	16,352.8	3,501.4
<b>(2Q)</b>	65,671.4	13,730.1	45,808.3	4,111.1	(6.2%)	2,021.9	23,150.0	36,009.0	6,096.7
<b>(3Q)</b>	15,980.5	3,586.3	10,593.2	1,241.3	(7.8%)	559.7	2,750.0	8,216.2	4,744.6
<b>(4Q)</b>	10,646.9	3,893.7	4,288.8	654.5	(6.1%)	1,810.0	6,305.0	4,341.9	
<b>2014 Totals</b>	<b>119,468.0</b>	<b>33,775.8</b>	<b>72,375.4</b>	<b>7,236.9</b>	<b>(5.1%)</b>	<b>6,080.0</b>	<b>39,520.0</b>	<b>64,919.9</b>	<b>14,342.7</b>
<b>2015 (1Q)</b>	30,535.5	15,387.8	10,054.6	938.7	(3.1%)	4,154.3	10,225.0	17,149.0	2,622.0
<b>(2Q)</b>	26,458.3	11,282.6	12,253.2	2,334.6	(8.8%)	587.8	12,465.0	11,744.4	1,782.2
<b>(3Q)</b>	12,605.5	2,068.1	10,125.9	411.5	(3.2%)		5,850.0	5,170.1	1,585.4
<b>(4Q)</b>	5,645.5	3,032.2	2,350.9	262.4	(4.6%)		2,050.0	3,169.1	426.4
<b>2015 Totals</b>	<b>75,244.9</b>	<b>31,770.8</b>	<b>34,784.6</b>	<b>3,947.3</b>	<b>(5.2%)</b>	<b>4,742.1</b>	<b>30,590.0</b>	<b>37,232.6</b>	<b>6,416.0</b>
<b>2016 (1Q)</b>	<b>2,771.6</b>	<b>334.7</b>	<b>2,280.6</b>	<b>156.2</b>	<b>(5.6%)</b>		<b>1,675.0</b>	<b>1,096.6</b>	
<b>(4/1-4/30)</b>	<b>16,108.4</b>	<b>1,600.7</b>	<b>12,353.9</b>	<b>2,153.8</b>	<b>(13.4%)</b>		<b>11,840.0</b>	<b>3,636.3</b>	<b>569.8</b>

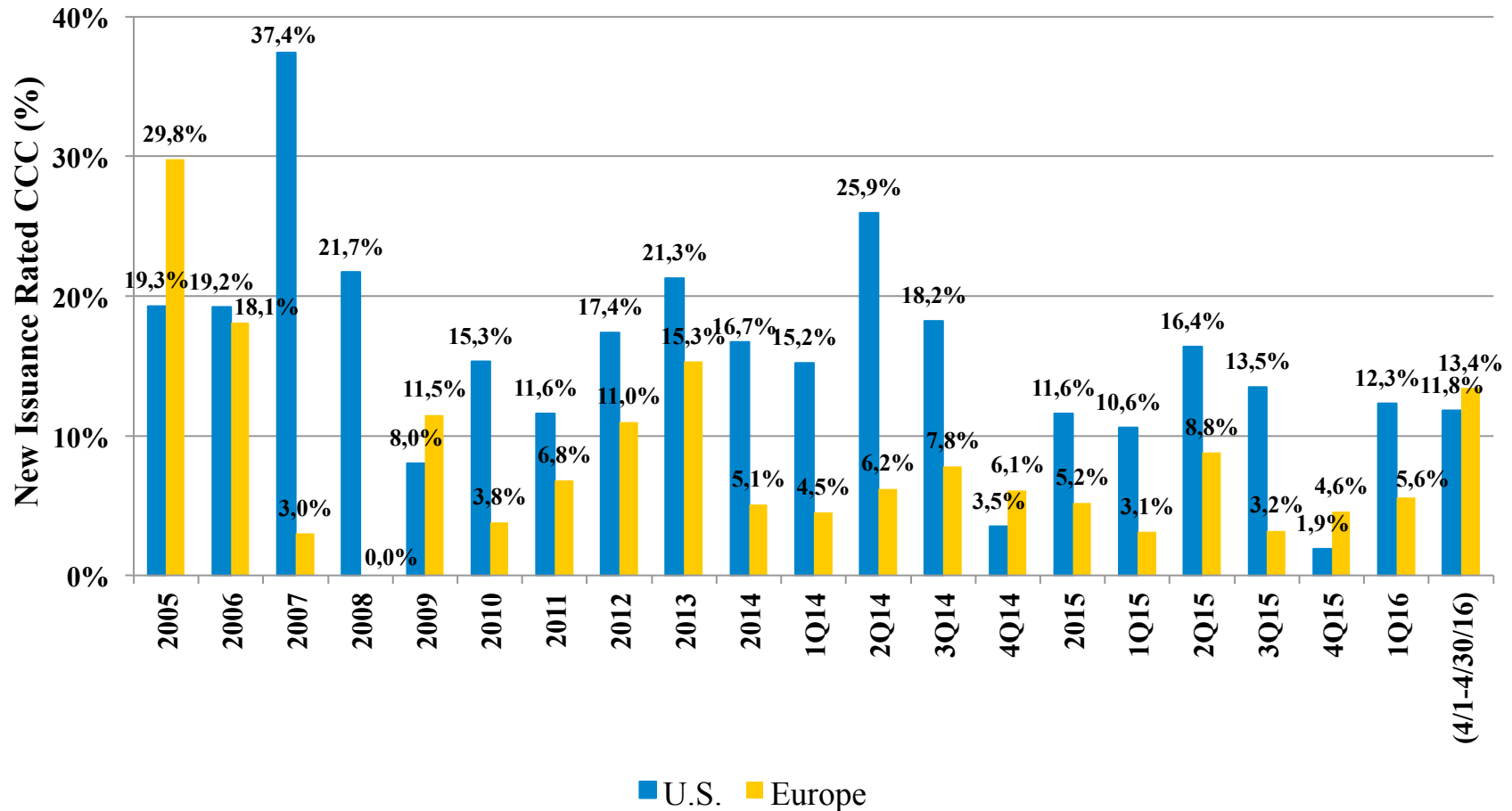
# U.S. & European High-Yield Bond Market: New Issuance (\$ millions)

2005 – 2016 (4/30)



# U.S. & European High-Yield Bond Market: CCC Rated New Issuance (%)

2005 – 2016 (4/30)



# Mortality Rates by Original Rating

All Rated Corporate Bonds\*  
1971-2015

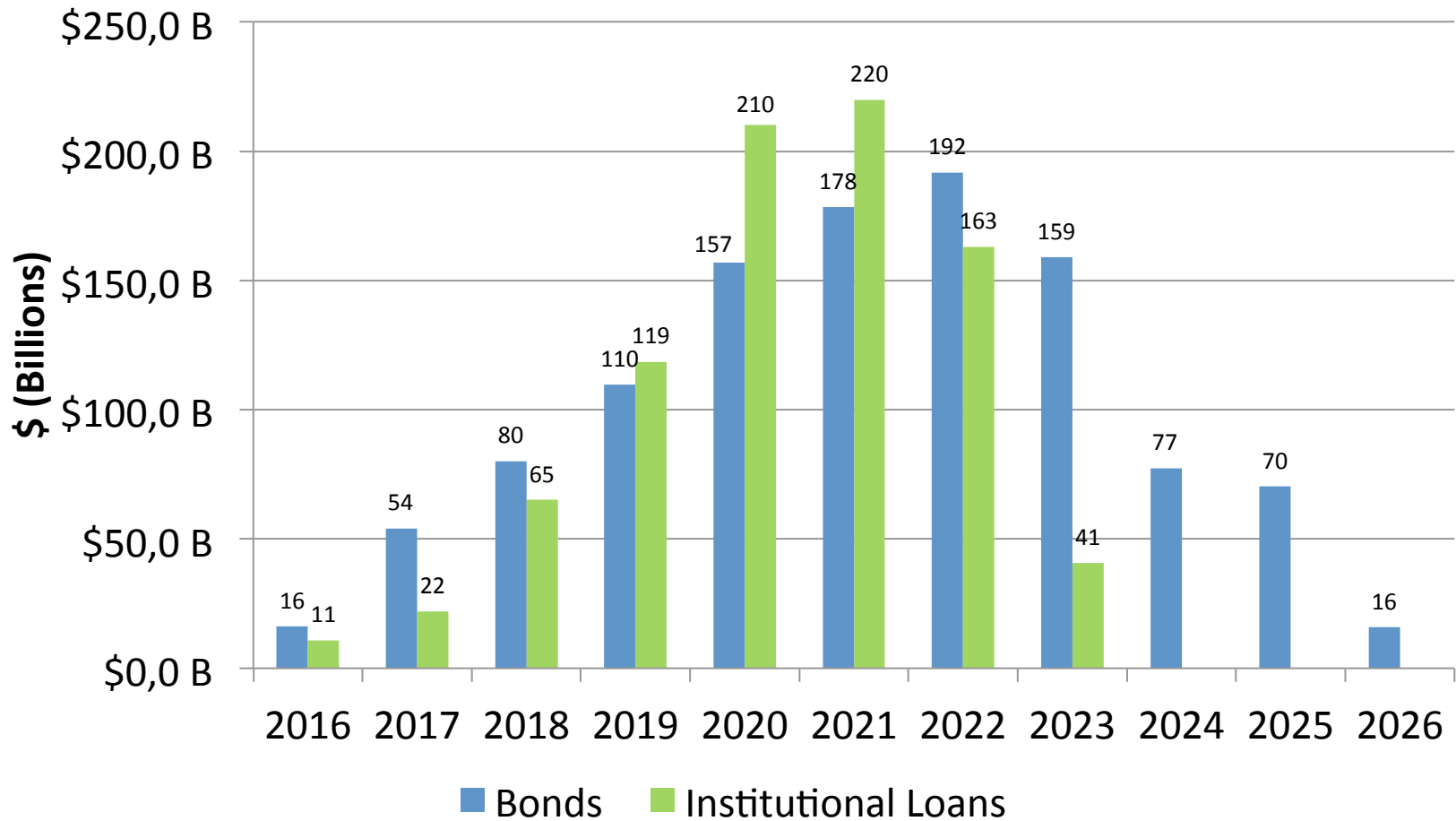
Years After Issuance

		1	2	3	4	5	6	7	8	9	10
AAA	Marginal	0.00%	0.00%	0.00%	0.00%	0.01%	0.02%	0.01%	0.00%	0.00%	0.00%
	Cumulative	0.00%	0.00%	0.00%	0.00%	0.01%	0.03%	0.04%	0.04%	0.04%	0.04%
AA	Marginal	0.00%	0.00%	0.21%	0.07%	0.02%	0.01%	0.01%	0.01%	0.02%	0.01%
	Cumulative	0.00%	0.00%	0.21%	0.28%	0.30%	0.31%	0.32%	0.33%	0.35%	0.36%
A	Marginal	0.01%	0.03%	0.12%	0.13%	0.10%	0.06%	0.02%	0.25%	0.08%	0.05%
	Cumulative	0.01%	0.04%	0.16%	0.29%	0.39%	0.45%	0.47%	0.72%	0.80%	0.85%
BBB	Marginal	0.33%	2.36%	1.26%	1.00%	0.50%	0.22%	0.26%	0.15%	0.15%	0.34%
	Cumulative	0.33%	2.68%	3.91%	4.87%	5.34%	5.55%	5.80%	5.94%	6.08%	6.40%
BB	Marginal	0.94%	2.02%	3.88%	1.97%	2.34%	1.51%	1.45%	1.12%	1.43%	3.13%
	Cumulative	0.94%	2.94%	6.71%	8.54%	10.68%	12.03%	13.31%	14.28%	15.51%	18.15%
B	Marginal	2.85%	7.72%	7.85%	7.80%	5.70%	4.48%	3.58%	2.08%	1.76%	0.77%
	Cumulative	2.85%	10.35%	17.39%	23.83%	28.17%	31.39%	33.85%	35.22%	36.36%	36.85%
CCC	Marginal	8.13%	12.43%	17.89%	16.32%	4.85%	11.65%	5.44%	4.84%	0.66%	4.28%
	Cumulative	8.13%	19.55%	33.94%	44.72%	47.40%	53.53%	56.06%	58.19%	58.46%	60.24%

\*Rated by S&P at Issuance  
Based on 2,903 issues

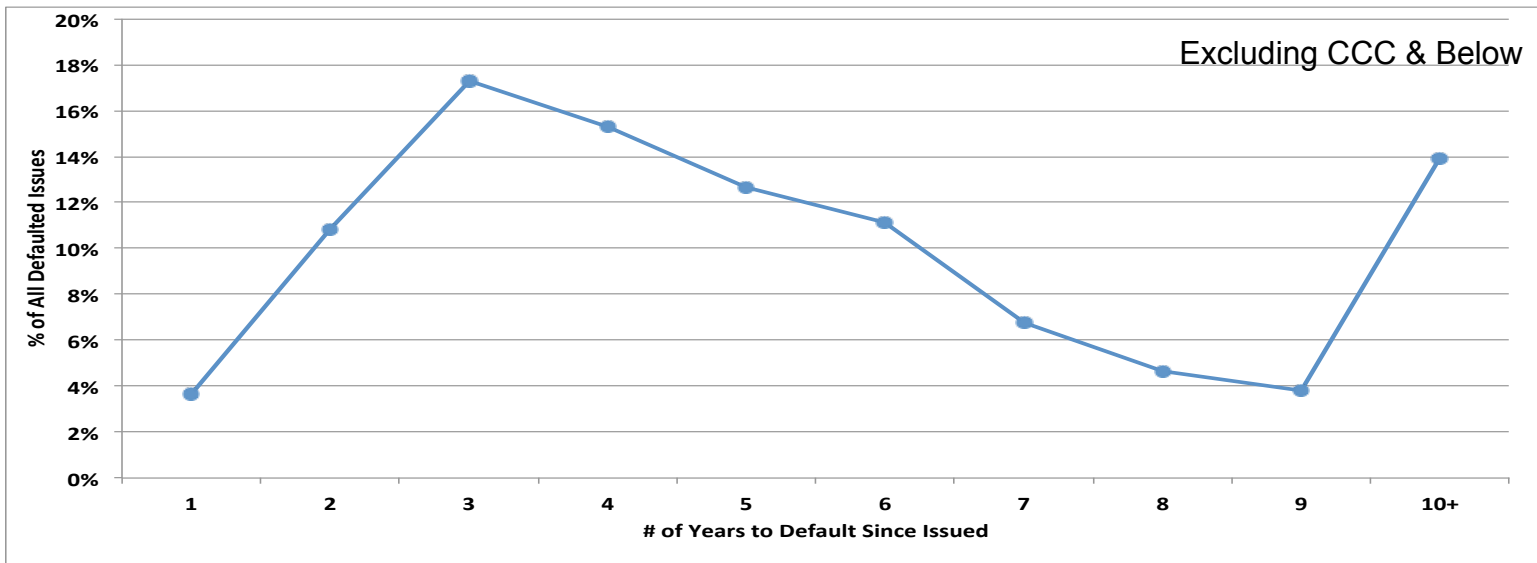
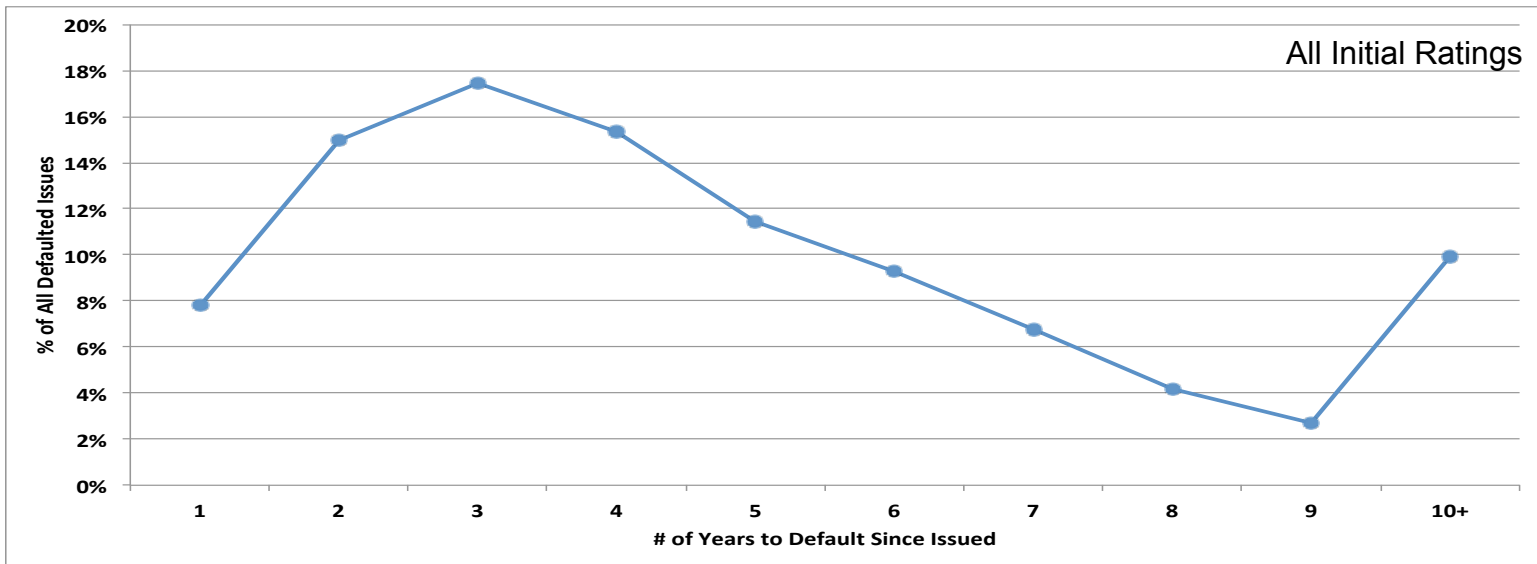


# Maturity Profile of Leveraged Debt – As of 3/31/16



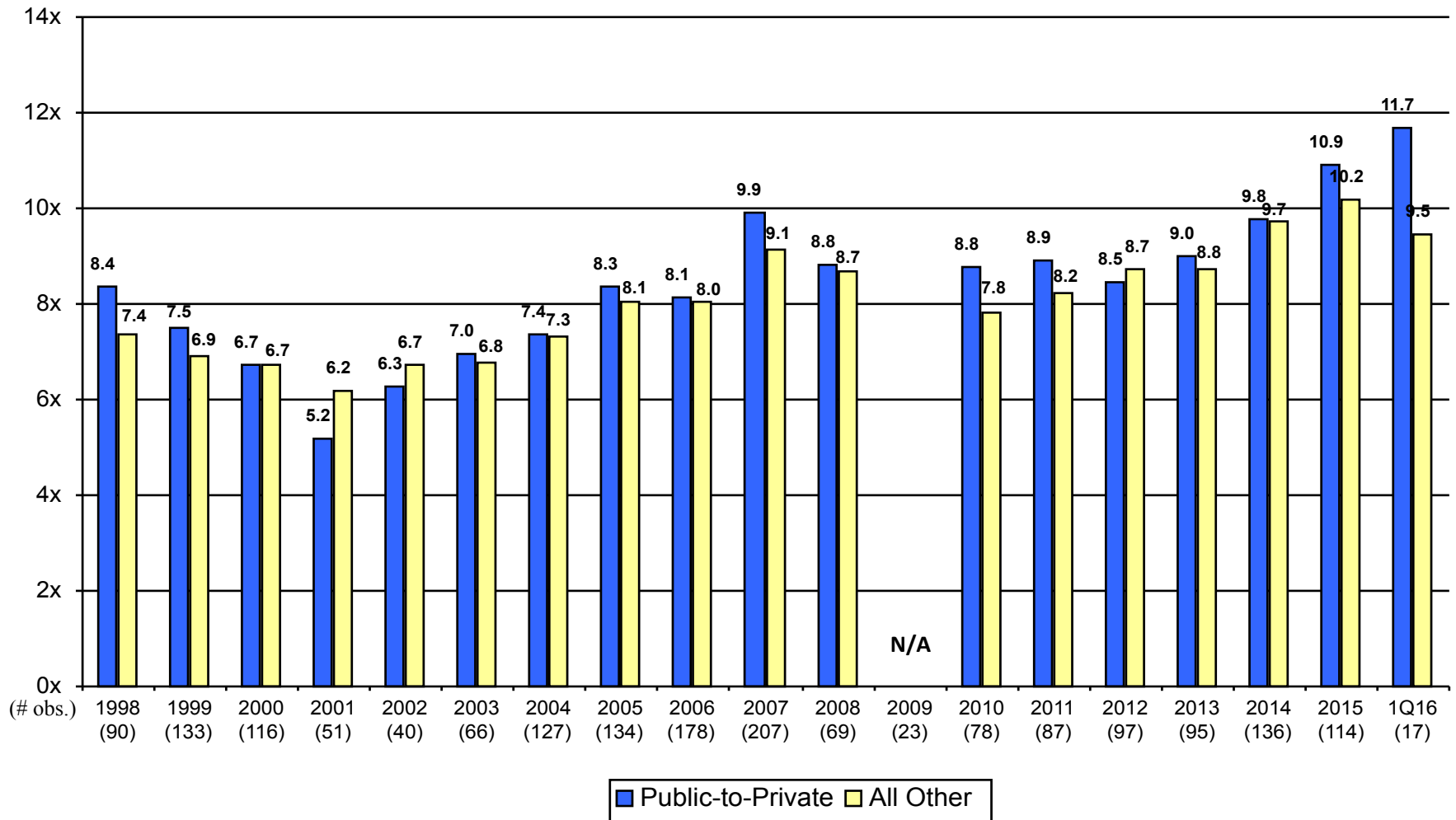
Source: S&P Capital I.Q.

# Distribution of Years to Default from Original Issuance Date: 1991 – 2016 (1Q)



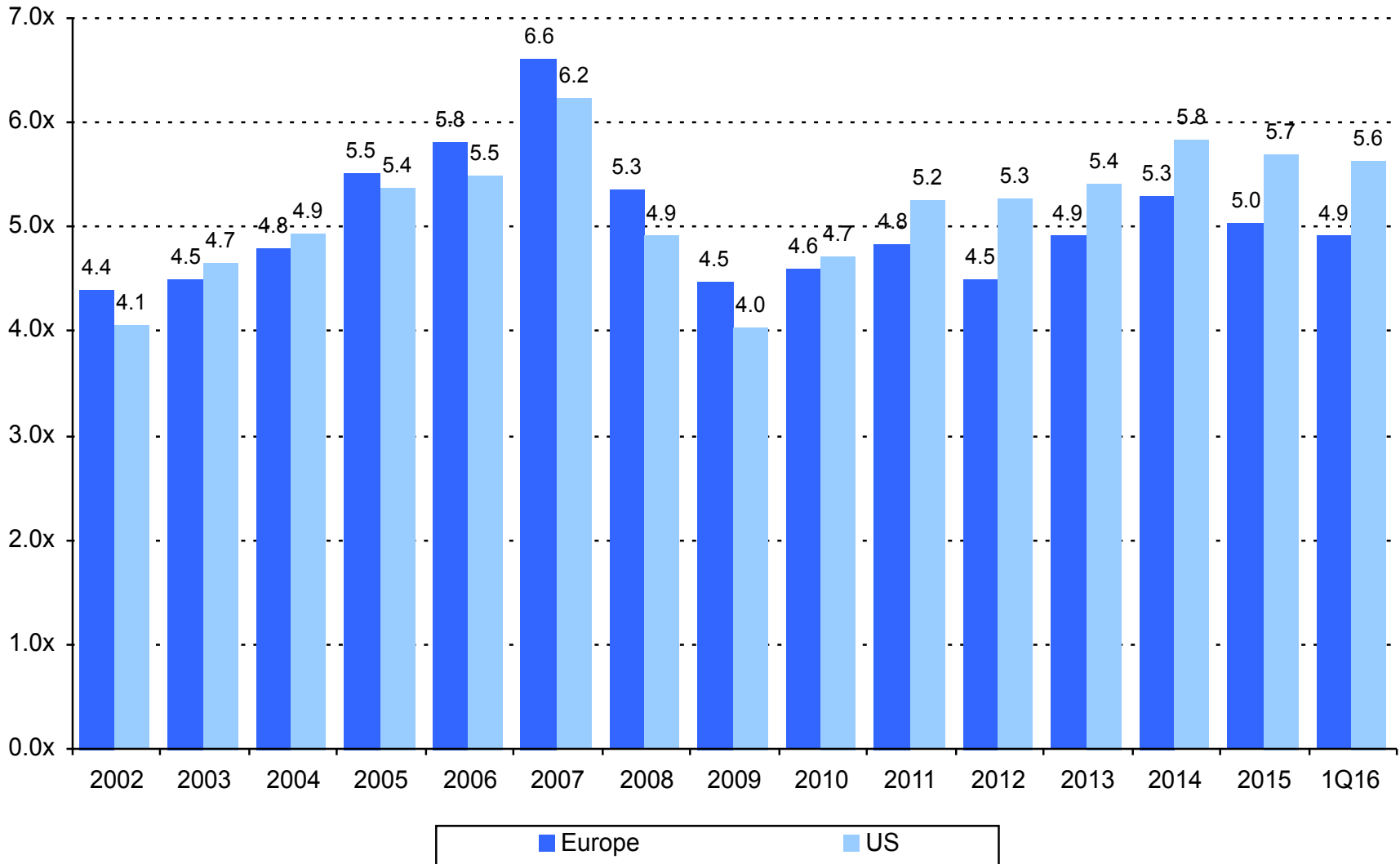
# Purchase Price Multiples

## Purchase Price Multiple excluding Fees for LBO Transactions



Source: S&P Capital IQ LCD

# Average Total Debt Leverage Ratio for LBO's: Europe and US with EBITDA of €/\$50M or More



Source: S&P Capital IQ LCD

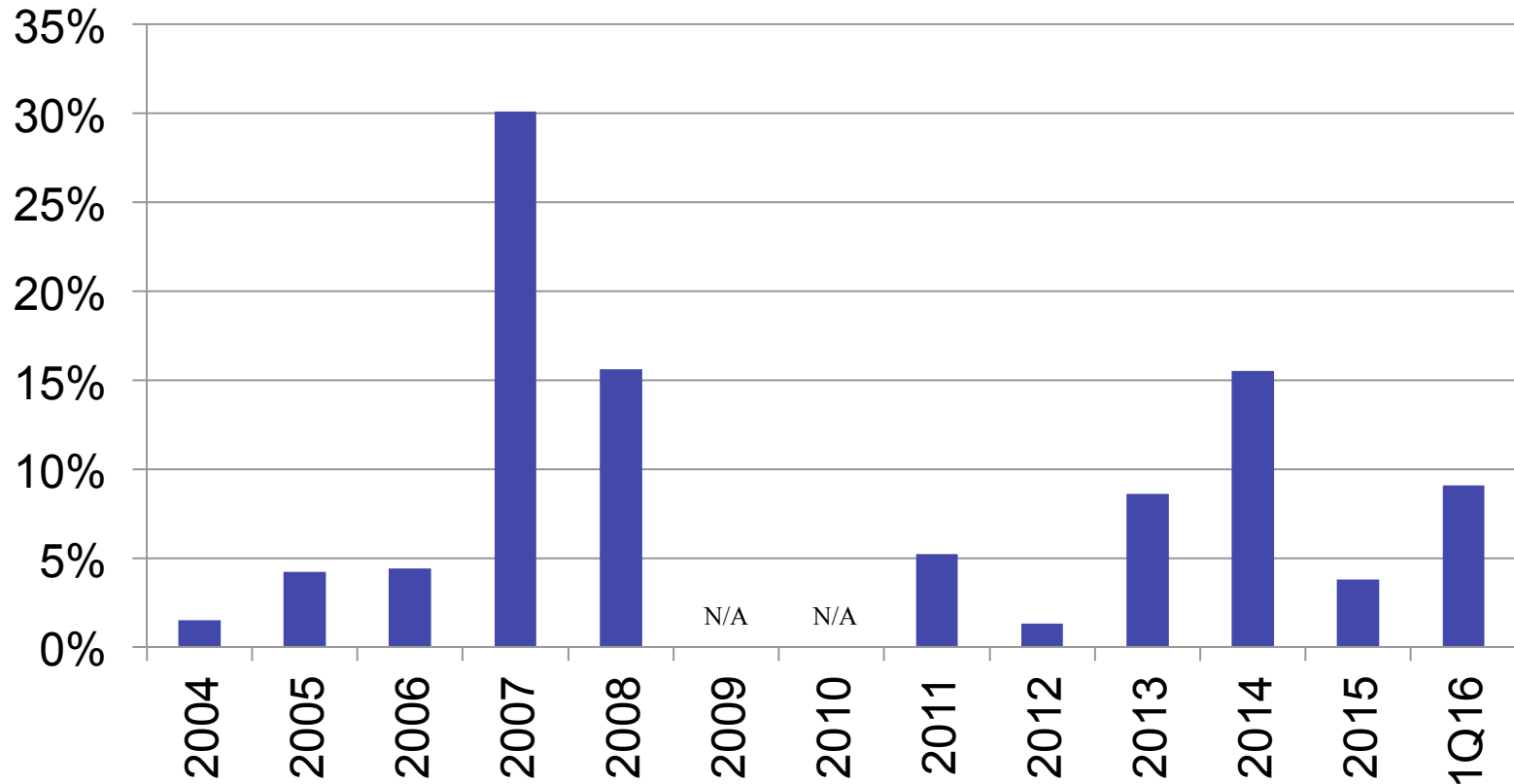
# LBO Statistics & Ratios: 2007 vs. 2014 (update 1Q16)

	<b>2007</b>	<b>2014</b>	<b>1Q16</b>
M&A/LBO as a % of Total Issuance	62%	47%	60%
Purchase Multiple	9.1-9.9x	9.7-9.8x	9.5-11.7x
Debt to EBITDA @ Inception	6.2x	5.8x	5.6x
EBITDA to Cash Interest	2.1x	3.4x	3.1x
Equity Contribution	31%	37%	43%

Source: Guggenheim Investments and S&P *Capital IQ*

# Share of Large LBOs with Leverage More than 7x\*

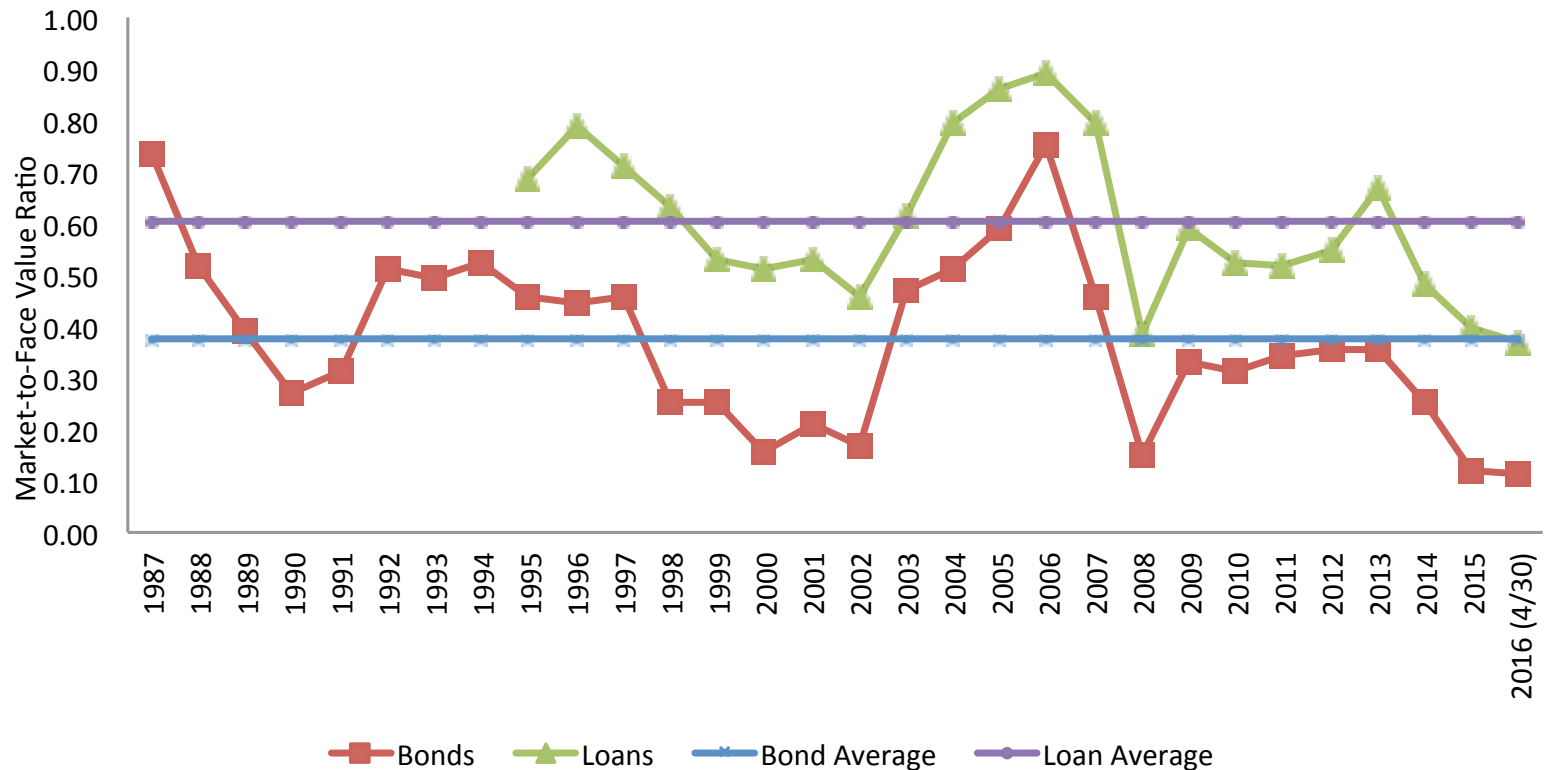
2004 – 2016 (1Q)



\* Issuers with EBITDA >\$50mm.

Source: S&P Capital I.Q.

# Defaulted Debt Indexes: Market-to-Face Value Ratios (1987 – 2016 (4/30))



Loans Median Market-to-Face value is 0.57 and Average Market-to-Face value is 0.60

Bonds Median Market-to-Face value is 0.36 and Average Market-to-Face value is 0.38

Source: Altman-Kuehne Defaulted Debt Indexes

# Hedge Fund & Other Distressed Debt Index Returns

2003 – 2016 (4/30)

Calendar Year	Dow Jones/ Credit Suisse	HFR	GAI	BoAML Distressed	Altman-Kuehne Combined
2003	25.12%	29.58%	27.42%	78.71%	49.30%
2004	15.60%	18.89%	18.19%	24.78%	15.14%
2005	11.75%	8.25%	9.34%	-15.95%	1.73%
2006	15.58%	15.95%	15.33%	42.80%	23.38%
2007	8.28%	5.07%	7.37%	-12.07%	-3.30%
2008	-20.48%	-25.21%	-21.05%	-44.91%	-47.52%
2009	20.95%	28.54%	24.69%	116.67%	55.99%
2010	10.26%	12.12%	16.35%	25.41%	17.70%
2011	-4.24%	-2.42%	-1.9%	-6.61%	-3.02%
2012	11.77%	10.40%	13.8%	24.10%	7.63%
2013	16.00%	14.04%	18.4%	11.66%	19.37%
2014	2.55%	-1.00%	-1.13%	-20.18%	-6.45%
2015	-5.30%	-11.14%	-6.0%	-37.99%	-30.94%
2016 (4/30)	-0.36%	0.67%	1.0%	16.28%	-6.45%
Δ Last Month	1.62%	2.27%	2.3%	12.41%	2.87%
2003-15 Compounded Average (Annual) Rate	7.58%	6.85%	8.33%	6.46%	3.77%