

Publication Date: 10 Oct 2017

Effective Date: 10 Oct 2017

Addendum 2 to the CRI Technical Report (Version: 2017, Update 1)

This addendum updates the Technical Report (Version: 2017, Update 1) and details the addition of Botswana, Ghana, Kenya, Malawi, Mauritius, Namibia, United Republic of Tanzania, Uganda and Rwanda to the CRI coverage. These changes have been implemented as of the October calibration, which was put into effect on 10 October 2017.

I. Changes to the grouping of monthly calibration

The CRI now covers 87 stock exchanges with the addition of these 9 economies. In order to ensure that there are enough defaults for calibration, various economies under the CRI coverage are categorized according to similarities in their stage of economic development as well as geographic location. Within these groups the economies are combined and calibrated together.

Based on this approach, Botswana, Ghana, Kenya, Malawi, Mauritius, Namibia, United Republic of Tanzania, Uganda and Rwanda have been added to the group of emerging economies (in addition to Bahrain, Egypt, Israel, Jordan, Kuwait, Morocco, Nigeria, Oman, Saudi Arabia, South Africa, Tunisia and the United Arab Emirates) which are grouped together with the 9 Asian countries (Bangladesh, Indonesia, Kazakhstan, Malaysia, Pakistan, the Philippines, Sri Lanka, Thailand and Vietnam) and 8 Latin American countries (Argentina, Brazil, Chile, Colombia, Jamaica, Mexico, Peru and Venezuela) to form the calibration group “emerging markets”.

II. Description and summary statistics

When adding new countries to the CRI coverage, several benchmark indices are carefully selected. The details are listed in the tables below.

Economy	Botswana	Ghana	Kenya
ISO Code	BW	GH	KE
Calibration Group	Emerging	Emerging	Emerging
Stock Index (Period Used)	Botswana Domestic Companies Index (1989-06-30 - Present)	GSE Composite Index (2010-12-31 - Present)	Kenya Nairobi Stock Exchange Index (1990-01-11 - Present)
Short Term Interest Rate (Period Used)	Botswana, Treasury Bills, Nominal Yield, 3 Month Average (2004-11-01 - Present)	Ghana 3 Month Bill Auction Average Yield (2007-11-02 – Present)	Thomson Reuters Kenya GVT BMK Bid Yield 3 Months (2009-05-26 - Present)
Interest Rate Name (Period Used)	Thomson Reuters Botswana Pula 1 Year Deposit (2010-07-27 - Present)	Ghana 1YR Note Auction Average Yield (2007-11-02 - Present)	Thomson Reuters Kenya GVT BMK Bid Yield 1 Year (2009-05-26 - Present)

Table 1: ISO Code, stock index and interest rates for Botswana, Ghana and Kenya

Economy	Malawi	Mauritius	Namibia
ISO Code	MW	MU	NA
Calibration Group	Emerging	Emerging	Emerging
Stock Index (Period Used)	Malawi All Share Index (1996-11-15 - Present)	Mauritius Stock Exchange SEMDEX Index (1989-07-05 - Present)	Namibia Overall Index (2003-12-19 - Present)
Short Term Interest Rate (Period Used)	Malawi 3 Month T-Bill Auction Average Yield (2009-01-02 - Present)	Thomson Reuters Mauritius GVT BMK Bid Yield 1 Year (2010-05-26 - Present)	Namibia, Treasury Bills, Effective Yield, 3 Month (1991-05-01 - Present)
Interest Rate Name (Period Used)	MALAWI 12 Month Bill Auction Average Accepted Yield (2012-03-06 - Present)	Thomson Reuters Mauritius GVT BMK Bid Yield 1 Year (2010-05-26 - Present)	Namibia 12 Month Bill Auction Average Yield (2002-03-13 - Present)

Table 2: ISO Code, stock index and interest rates for Malawi, Mauritius and Namibia

Economy	United Republic of Tanzania	Uganda	Rwanda
ISO Code	TZ	UG	RW
Calibration Group	Emerging	Emerging	Emerging
Stock Index (Period Used)	Tanzania Share (TSI) Index (2009-04-03 - Present)	Uganda SE All Share Index (2003-10-28 - Present)	Rwanda Stock Exchange All Share Index (2013-01-10 - Present)
Short Term Interest Rate (Period Used)	Tanzania 3 Month Bill Auction Average Yield (2003-01-02 - Present)	Uganda 3 Month Bill Auction Average Yield (2005-01-05 - Present)	Rwanda 3 Month Bill Auction Average Yield (2009-04-22 - Present)
Interest Rate Name (Period Used)	Tanzania 12 Month Bill Auction Average Yield (2003-01-02 - Present)	Uganda 12 Month Bill Auction Average Yield (2005-01-05 - Present)	Rwanda 12 Month Bill Auction Average Yield (2010-05-12 - Present)

Table 3: ISO Code, stock index and interest rates for Tanzania, Uganda and Rwanda

The following tables provide further information on the input variables included in the RMI PD model, the number of active companies, defaults and other exits.

	Min	25%	Median	75%	Max	Mean	StdDev	#Observation
DTD Level	0.081	6.560	10.052	14.784	31.623	11.679	7.415	1224
DTD Trend	-10.192	-2.318	0.010	1.883	8.888	0.077	4.283	1224
Cash/TA Level	0.000	0.040	0.123	0.209	0.979	0.144	0.138	3942
Cash/TA Trend	-0.259	-0.011	0.000	0.011	0.429	0.001	0.047	3942
NI/TA Level	-0.037	0.003	0.006	0.013	0.028	0.008	0.009	3970
NI/TA Trend	-0.028	-0.001	0.000	0.001	0.027	0.000	0.004	3970
Size Level	-5.810	-0.975	0.066	1.521	6.403	0.159	1.527	3888
Size Trend	-1.624	-0.077	0.010	0.099	1.918	0.004	0.245	3888
M/B	0.447	1.127	1.421	1.903	19.650	1.965	2.040	3367
Sigma	0.016	0.031	0.047	0.067	0.389	0.058	0.046	1647

Table 4: Botswana – Summary statistics of input variables (based on data from 1990 to 2016)

	Active	Defaults		Others	
		#	%	#	%
1990	0	0	NaN	0	NaN
1991	0	0	NaN	0	NaN
1992	0	0	NaN	0	NaN
1993	0	0	NaN	0	NaN
1994	0	0	NaN	0	NaN
1995	0	0	NaN	0	NaN
1996	8	0	0	0	0
1997	11	0	0	0	0
1998	12	0	0	0	0
1999	15	0	0	0	0
2000	16	0	0	0	0
2001	16	0	0	0	0
2002	18	0	0	0	0
2003	19	0	0	0	0
2004	19	0	0	2	10.53
2005	17	0	0	0	0
2006	17	0	0	0	0
2007	18	0	0	0	0
2008	21	0	0	1	4.76
2009	20	0	0	0	0
2010	22	0	0	1	4.55
2011	22	0	0	0	0
2012	23	0	0	0	0
2013	24	0	0	1	4.17
2014	23	0	0	1	4.35
2015	23	0	0	2	8.70
2016	23	0	0	0	0

Table 5: Botswana – Number of defaults and other exits from 1990 to 2016

	Min	25%	Median	75%	Max	Mean	StdDev	#Observation
DTD Level	-1.999	0.587	2.465	4.903	19.458	3.404	3.849	1314
DTD Trend	-7.800	-0.574	-0.074	0.340	8.888	-0.196	1.410	1314
Cash/TA Level	0.000	0.046	0.115	0.235	0.597	0.144	0.118	1971
Cash/TA Trend	-0.379	-0.019	0.000	0.018	0.429	-0.001	0.060	1971
NI/TA Level	-0.037	-0.001	0.003	0.007	0.028	0.003	0.011	1971
NI/TA Trend	-0.028	-0.002	0.000	0.001	0.027	0.000	0.008	1971
Size Level	-5.926	-3.093	-1.144	-0.319	1.804	-1.622	1.959	1904
Size Trend	-1.077	-0.229	-0.070	0.055	1.769	-0.078	0.250	1904
M/B	0.465	0.984	1.131	1.577	19.650	1.603	1.471	1699
Sigma	0.026	0.073	0.092	0.119	1.150	0.115	0.118	968

Table 6: Ghana – Summary statistics of input variables (based on data from 1990 to 2016)

	Active	Defaults		Others	
		#	%	#	%
1990	0	0	NaN	0	NaN
1991	0	0	NaN	0	NaN
1992	0	0	NaN	0	NaN
1993	0	0	NaN	0	NaN
1994	0	0	NaN	0	NaN
1995	0	0	NaN	0	NaN
1996	0	0	NaN	0	NaN
1997	0	0	NaN	0	NaN
1998	0	0	NaN	0	NaN
1999	0	0	NaN	0	NaN
2000	0	0	NaN	0	NaN
2001	0	0	NaN	0	NaN
2002	0	0	NaN	0	NaN
2003	0	0	NaN	0	NaN
2004	0	0	NaN	0	NaN
2005	0	0	NaN	0	NaN
2006	0	0	NaN	0	NaN
2007	0	0	NaN	0	NaN
2008	0	0	NaN	0	NaN
2009	0	0	NaN	0	NaN
2010	12	0	0	0	0
2011	24	0	0	0	0
2012	26	0	0	0	0
2013	27	0	0	0	0
2014	27	0	0	0	0
2015	29	0	0	0	0
2016	32	0	0	0	0

Table 7: Ghana – Number of defaults and other exits from 1990 to 2016

	Min	25%	Median	75%	Max	Mean	StdDev	#Observation
DTD Level	-1.254	1.794	2.832	4.362	31.623	3.433	2.698	5100
DTD Trend	-10.192	-0.542	-0.056	0.368	7.046	-0.093	1.048	5100
Cash/TA Level	0.000	0.021	0.062	0.133	0.434	0.089	0.086	9963
Cash/TA Trend	-0.321	-0.008	0.000	0.005	0.408	-0.001	0.034	9963
NI/TA Level	-0.037	0.001	0.003	0.007	0.028	0.004	0.006	10120
NI/TA Trend	-0.028	-0.001	0.000	0.000	0.027	0.000	0.004	10120
Size Level	-5.926	-1.681	-0.445	0.760	5.035	-0.452	1.793	11167
Size Trend	-1.624	-0.094	0.012	0.137	1.918	0.031	0.235	11167
M/B	0.197	0.852	1.077	1.405	19.650	1.388	1.278	9814
Sigma	0.034	0.088	0.116	0.155	0.521	0.128	0.056	9330

Table 8: Kenya – Summary statistics of input variables (based on data from 1990 to 2016)

	Active	Defaults		Others	
		#	%	#	%
1990	0	0	NaN	0	NaN
1991	0	0	NaN	0	NaN
1992	0	0	NaN	0	NaN
1993	0	0	NaN	0	NaN
1994	0	0	NaN	0	NaN
1995	0	0	NaN	0	NaN
1996	0	0	NaN	0	NaN
1997	44	0	0	0	0
1998	44	0	0	0	0
1999	44	0	0	0	0
2000	44	0	0	2	4.55
2001	46	0	0	1	2.17
2002	45	0	0	0	0
2003	47	0	0	1	2.13
2004	46	0	0	1	2.17
2005	46	0	0	2	4.35
2006	48	0	0	0	0
2007	51	0	0	0	0
2008	53	0	0	0	0
2009	54	0	0	3	5.56
2010	51	0	0	0	0
2011	55	0	0	1	1.82
2012	56	0	0	0	0
2013	58	0	0	3	5.17
2014	59	0	0	0	0
2015	60	0	0	0	0
2016	62	0	0	0	0

Table 9: Kenya – Number of defaults and other exits from 1990 to 2016

	Min	25%	Median	75%	Max	Mean	StdDev	#Observation
DTD Level	-1.134	0.990	2.407	4.187	14.405	3.259	3.107	345
DTD Trend	-7.385	-0.459	0.070	0.689	8.888	0.093	1.813	345
Cash/TA Level	0.001	0.034	0.126	0.256	0.465	0.149	0.125	1056
Cash/TA Trend	-0.209	-0.004	0.000	0.012	0.429	0.008	0.051	1056
NI/TA Level	-0.008	0.002	0.004	0.006	0.028	0.006	0.006	1045
NI/TA Trend	-0.028	-0.001	0.000	0.000	0.027	0.000	0.004	1045
Size Level	-5.409	-2.035	-0.229	0.456	2.039	-0.738	1.592	1204
Size Trend	-1.624	-0.086	0.000	0.120	1.918	0.021	0.306	1204
M/B	0.415	0.881	1.096	1.423	19.650	1.333	1.000	885
Sigma	0.024	0.073	0.103	0.235	0.247	0.133	0.077	86

Table 10: Malawi – Summary statistics of input variables (based on data from 1990 to 2016)

	Active	Defaults		Others	
		#	%	#	%
1990	0	0	NaN	0	NaN
1991	0	0	NaN	0	NaN
1992	0	0	NaN	0	NaN
1993	0	0	NaN	0	NaN
1994	0	0	NaN	0	NaN
1995	0	0	NaN	0	NaN
1996	0	0	NaN	0	NaN
1997	0	0	NaN	0	NaN
1998	2	0	0	0	0
1999	2	0	0	0	0
2000	3	0	0	0	0
2001	4	0	0	0	0
2002	4	0	0	0	0
2003	5	0	0	0	0
2004	5	0	0	0	0
2005	5	0	0	0	0
2006	5	0	0	5	100
2007	0	0	NaN	0	NaN
2008	0	0	NaN	0	NaN
2009	11	0	0	0	0
2010	11	0	0	0	0
2011	11	0	0	0	0
2012	13	0	0	0	0
2013	13	0	0	0	0
2014	13	0	0	0	0
2015	13	0	0	0	0
2016	13	0	0	1	7.69

Table 11: Malawi – Number of defaults and other exits from 1990 to 2016

	Min	25%	Median	75%	Max	Mean	StdDev	#Observation
DTD Level	0.589	4.343	6.508	11.131	31.623	8.812	6.694	2683
DTD Trend	-10.192	-0.952	-0.060	0.797	8.888	-0.110	2.691	2683
Cash/TA Level	0.000	0.005	0.021	0.057	0.980	0.052	0.095	6546
Cash/TA Trend	-0.379	-0.003	0.000	0.002	0.429	0.000	0.036	6546
NI/TA Level	-0.037	0.001	0.003	0.006	0.028	0.004	0.006	7193
NI/TA Trend	-0.028	-0.001	0.000	0.001	0.027	0.000	0.006	7193
Size Level	-4.799	-0.860	-0.097	0.701	3.619	-0.114	1.282	7635
Size Trend	-1.623	-0.084	-0.008	0.067	1.918	-0.004	0.195	7635
M/B	0.179	0.716	0.910	1.157	19.650	1.086	0.901	6938
Sigma	0.016	0.045	0.064	0.092	0.599	0.076	0.052	5345

Table 12: Mauritius – Summary statistics of input variables (based on data from 1990 to 2016)

	Active	Defaults		Others	
		#	%	#	%
1990	0	0	NaN	0	NaN
1991	0	0	NaN	0	NaN
1992	0	0	NaN	0	NaN
1993	0	0	NaN	0	NaN
1994	0	0	NaN	0	NaN
1995	26	0	0	0	0
1996	29	0	0	0	0
1997	29	0	0	0	0
1998	29	0	0	0	0
1999	29	0	0	0	0
2000	29	0	0	0	0
2001	29	0	0	0	0
2002	30	0	0	0	0
2003	30	0	0	0	0
2004	30	0	0	0	0
2005	31	0	0	0	0
2006	32	0	0	0	0
2007	32	0	0	0	0
2008	33	0	0	0	0
2009	33	0	0	0	0
2010	33	0	0	0	0
2011	34	0	0	0	0
2012	38	0	0	0	0
2013	39	0	0	0	0
2014	42	0	0	0	0
2015	42	0	0	1	2.38
2016	44	0	0	0	0

Table 13: Mauritius – Number of defaults and other exits from 1990 to 2016

	Min	25%	Median	75%	Max	Mean	StdDev	#Observation
DTD Level	0.755	6.234	8.037	10.975	31.623	9.670	5.867	443
DTD Trend	-10.192	-1.171	0.000	1.601	8.888	0.283	3.765	443
Cash/TA Level	0.000	0.024	0.070	0.164	0.593	0.117	0.124	811
Cash/TA Trend	-0.379	-0.009	0.000	0.005	0.269	-0.003	0.048	811
NI/TA Level	0.001	0.002	0.006	0.009	0.028	0.008	0.007	811
NI/TA Trend	-0.014	0.000	0.000	0.000	0.013	0.000	0.003	811
Size Level	-5.926	-1.375	-0.105	0.526	1.916	-0.673	1.796	780
Size Trend	-1.624	-0.044	0.024	0.120	1.918	0.108	0.380	780
M/B	0.781	1.099	1.258	1.529	5.006	1.495	0.736	688
Sigma	0.016	0.021	0.029	0.053	0.106	0.039	0.024	210

Table 14: Namibia – Summary statistics of input variables (based on data from 1990 to 2016)

	Active	Defaults		Others	
		#	%	#	%
1990	0	0	NaN	0	NaN
1991	0	0	NaN	0	NaN
1992	0	0	NaN	0	NaN
1993	0	0	NaN	0	NaN
1994	0	0	NaN	0	NaN
1995	0	0	NaN	0	NaN
1996	0	0	NaN	0	NaN
1997	0	0	NaN	0	NaN
1998	0	0	NaN	0	NaN
1999	0	0	NaN	0	NaN
2000	0	0	NaN	0	NaN
2001	0	0	NaN	0	NaN
2002	0	0	NaN	0	NaN
2003	5	0	0	0	0
2004	5	0	0	0	0
2005	5	0	0	0	0
2006	6	0	0	1	16.67
2007	5	0	0	0	0
2008	5	0	0	1	20
2009	4	0	0	0	0
2010	5	0	0	0	0
2011	6	0	0	1	16.67
2012	5	0	0	0	0
2013	8	0	0	0	0
2014	8	0	0	0	0
2015	8	0	0	0	0
2016	8	0	0	0	0

Table 15: Namibia – Number of defaults and other exits from 1990 to 2016

	Min	25%	Median	75%	Max	Mean	StdDev	#Observation
DTD Level	0.698	2.579	7.132	13.599	31.623	8.855	7.228	788
DTD Trend	-10.192	-1.725	-0.283	0.565	8.888	-0.650	3.415	788
Cash/TA Level	0.004	0.053	0.144	0.233	0.864	0.174	0.151	929
Cash/TA Trend	-0.379	-0.022	0.000	0.014	0.242	-0.003	0.057	929
NI/TA Level	-0.037	0.002	0.007	0.021	0.028	0.010	0.013	916
NI/TA Trend	-0.014	-0.001	0.000	0.001	0.027	0.001	0.005	916
Size Level	-5.926	-3.091	-0.737	0.213	1.340	-1.298	1.744	1007
Size Trend	-0.620	-0.087	-0.002	0.064	1.101	-0.009	0.172	1007
M/B	0.771	1.068	1.490	2.305	19.650	2.678	3.351	886
Sigma	0.016	0.035	0.065	0.098	0.301	0.073	0.047	739

Table 16: Tanzania – Summary statistics of input variables (based on data from 1990 to 2016)

	Active	Defaults		Others	
		#	%	#	%
1990	0	0	NaN	0	NaN
1991	0	0	NaN	0	NaN
1992	0	0	NaN	0	NaN
1993	0	0	NaN	0	NaN
1994	0	0	NaN	0	NaN
1995	0	0	NaN	0	NaN
1996	0	0	NaN	0	NaN
1997	0	0	NaN	0	NaN
1998	0	0	NaN	0	NaN
1999	0	0	NaN	0	NaN
2000	0	0	NaN	0	NaN
2001	0	0	NaN	0	NaN
2002	0	0	NaN	0	NaN
2003	0	0	NaN	0	NaN
2004	0	0	NaN	0	NaN
2005	0	0	NaN	0	NaN
2006	0	0	NaN	0	NaN
2007	0	0	NaN	0	NaN
2008	0	0	NaN	0	NaN
2009	9	0	0	0	0
2010	9	0	0	0	0
2011	9	0	0	0	0
2012	10	0	0	0	0
2013	10	0	0	0	0
2014	12	0	0	0	0
2015	12	0	0	0	0
2016	15	0	0	1	6.67

Table 17: Tanzania – Number of defaults and other exits from 1990 to 2016

	Min	25%	Median	75%	Max	Mean	StdDev	#Observation
DTD Level	0.016	1.377	2.872	4.725	31.623	4.889	6.572	499
DTD Trend	-10.192	-0.478	0.016	0.692	8.888	-0.135	3.094	499
Cash/TA Level	0.003	0.029	0.091	0.244	0.557	0.152	0.146	685
Cash/TA Trend	-0.336	-0.006	0.000	0.013	0.174	0.002	0.056	685
NI/TA Level	-0.008	0.003	0.003	0.005	0.023	0.004	0.005	700
NI/TA Trend	-0.018	0.000	0.000	0.000	0.019	0.000	0.003	700
Size Level	-2.365	-0.965	0.641	1.264	2.938	0.313	1.445	741
Size Trend	-0.775	-0.158	-0.035	0.081	1.335	-0.015	0.273	741
M/B	0.676	0.903	1.141	1.343	19.650	1.317	1.440	670
Sigma	0.016	0.075	0.118	0.203	0.474	0.151	0.112	306

Table 18: Uganda – Summary statistics of input variables (based on data from 1990 to 2016)

	Active	Defaults		Others	
		#	%	#	%
1990	0	0	NaN	0	NaN
1991	0	0	NaN	0	NaN
1992	0	0	NaN	0	NaN
1993	0	0	NaN	0	NaN
1994	0	0	NaN	0	NaN
1995	0	0	NaN	0	NaN
1996	0	0	NaN	0	NaN
1997	0	0	NaN	0	NaN
1998	0	0	NaN	0	NaN
1999	0	0	NaN	0	NaN
2000	0	0	NaN	0	NaN
2001	0	0	NaN	0	NaN
2002	0	0	NaN	0	NaN
2003	0	0	NaN	0	NaN
2004	0	0	NaN	0	NaN
2005	0	0	NaN	0	NaN
2006	0	0	NaN	0	NaN
2007	0	0	NaN	0	NaN
2008	0	0	NaN	0	NaN
2009	6	0	0	0	0
2010	7	0	0	0	0
2011	7	0	0	0	0
2012	8	0	0	0	0
2013	8	0	0	0	0
2014	8	0	0	0	0
2015	8	0	0	0	0
2016	8	0	0	0	0

Table 19: Uganda – Number of defaults and other exits from 1990 to 2016

	Min	25%	Median	75%	Max	Mean	StdDev	#Observation
DTD Level	0.394	4.019	5.106	18.657	31.623	9.385	8.612	108
DTD Trend	-10.192	-1.179	0.027	0.619	3.342	-0.985	3.168	108
Cash/TA Level	0.006	0.015	0.028	0.242	0.321	0.119	0.120	113
Cash/TA Trend	-0.125	-0.010	0.000	0.003	0.079	-0.005	0.032	113
NI/TA Level	0.003	0.003	0.003	0.005	0.014	0.005	0.004	113
NI/TA Trend	-0.006	-0.001	0.000	0.000	0.001	-0.001	0.001	113
Size Level	-2.608	-1.310	-0.509	0.005	0.355	-0.774	0.966	141
Size Trend	-0.527	-0.105	-0.025	0.032	0.654	-0.014	0.186	141
M/B	0.657	1.093	1.224	1.909	5.784	1.836	1.346	113
Sigma	0.016	0.028	0.056	0.073	0.128	0.054	0.027	112

Table 20: Rwanda – Summary statistics of input variables (based on data from 1990 to 2016)

	Active	Defaults		Others	
		#	%	#	%
1990	0	0	NaN	0	NaN
1991	0	0	NaN	0	NaN
1992	0	0	NaN	0	NaN
1993	0	0	NaN	0	NaN
1994	0	0	NaN	0	NaN
1995	0	0	NaN	0	NaN
1996	0	0	NaN	0	NaN
1997	0	0	NaN	0	NaN
1998	0	0	NaN	0	NaN
1999	0	0	NaN	0	NaN
2000	0	0	NaN	0	NaN
2001	0	0	NaN	0	NaN
2002	0	0	NaN	0	NaN
2003	0	0	NaN	0	NaN
2004	0	0	NaN	0	NaN
2005	0	0	NaN	0	NaN
2006	0	0	NaN	0	NaN
2007	0	0	NaN	0	NaN
2008	0	0	NaN	0	NaN
2009	0	0	NaN	0	NaN
2010	0	0	NaN	0	NaN
2011	0	0	NaN	0	NaN
2012	0	0	NaN	0	NaN
2013	2	0	0	0	0
2014	2	0	0	0	0
2015	3	0	0	0	0
2016	3	0	0	0	0

Table 21: Rwanda – Number of defaults and other exits from 1990 to 2016