

CREF Accounts, TIAA-CREF Funds - All Share Classes, and TIAA-CREF Life Funds 3 & 5 Year Annualized Tracking Error & Information Ratio for the period ending 3/31/17

Definitions:

Excess Return (ER): a measure of an investment's annualized return in excess of a benchmark.

Tracking Error (TE): a measure of the volatility of excess returns relative to a benchmark.

Information Ratio (IR): a measure of excess annualized return per unit of risk.

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CREF Accounts, TIAA-CREF Funds - All Share Classes, and TIAA-CREF Life Funds 3 & 5 Year Annualized Tracking Error & Information Ratio for the period ending 3/31/2017

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Fund/Account	Benchmark	3 YR Tracking Error (BP)	3 YR Information Ratio (%)	5 YR Tracking Error (BP)	5 YR Information Ratio (%)
CREF Accounts					
CREF Bond Market Account	Bloomberg Barclays Aggregate Bond Index	40	-0.28	43	0.17
CREF Equity Index Account	Russell 3000 Index	5	NA	5	NA
CREF Global Equities Account	MSCI World Index	144	-0.57	137	-0.32
CREF Growth Account	Russell 1000 Growth Index	173	-0.41	160	-0.24
CREF Inflation-Linked Bond Account	Bloomberg Barclays TIPS 1-10 Year Index	43	-1.39	36	-1.47
CREF Social Choice Account	SCA Composite Index	57	-1.26	68	-0.71
CREF Stock Account	CREF Composite Index	72	-0.81	68	-0.76
Retirement Share Class Funds					
Bond Fund	Bloomberg Barclays Aggregate Bond Index	64	0.52	85	0.84
Bond Index Fund	Bloomberg Barclays Aggregate Bond Index	26	NA	22	NA
Bond Plus Fund	Bloomberg Barclays Aggregate Bond Index	114	0.39	109	0.90
Emerging Markets Equity Fund	MSCI Emerging Markets Index	434	-0.28	390	-0.06
Emerging Markets Equity Index Fund	MSCI Emerging Markets Index	143	NA	168	NA
Equity Index Fund	Russell 3000 Index	8	NA	9	NA
Global Natural Resources Fund	MSCI AC World Index Commodity Producers Sec. Cap. Index	900	0.00	712	-0.03
Growth & Income Fund	S&P 500 Index	252	-0.34	242	-0.25
High-Yield Fund	BofA ML BB-B Cash Pay Issuer Constrained Index	119	-0.46	103	-0.44
Inflation-Linked Bond Fund	Bloomberg Barclays TIPS 1-10 Year Index	37	-1.35	33	-1.48
International Equity Fund	MSCI EAFE Index	497	-0.33	473	0.09
International Equity Index Fund	MSCI EAFE Index	209	NA	192	NA
International Opportunities Fund	MSCI All Country World Index ex-USA	523	-0.08	NA	NA
Large-Cap Growth Fund	Russell 1000 Growth Index	342	-0.26	356	-0.04
Large-Cap Growth Index Fund	Russell 1000 Growth Index	7	NA	7	NA
Large-Cap Value Fund	Russell 1000 Value Index	259	-0.27	228	-0.22
Large-Cap Value Index Fund	Russell 1000 Value Index	8	NA	9	NA
Lifecycle 2010 Fund	Lifecycle 2010 Fund Composite Index	85	-0.21	92	0.05
Lifecycle 2015 Fund	Lifecycle 2015 Fund Composite Index	96	-0.20	101	0.00
Lifecycle 2020 Fund	Lifecycle 2020 Fund Composite Index	101	-0.29	106	-0.06
Lifecycle 2025 Fund	Lifecycle 2025 Fund Composite Index	114	-0.32	117	-0.10
Lifecycle 2030 Fund	Lifecycle 2030 Fund Composite Index	127	-0.38	129	-0.17
Lifecycle 2035 Fund	Lifecycle 2035 Fund Composite Index	131	-0.44	135	-0.26
Lifecycle 2040 Fund	Lifecycle 2040 Fund Composite Index	143	-0.45	144	-0.29
Lifecycle 2045 Fund	Lifecycle 2045 Fund Composite Index	147	-0.47	145	-0.31
Lifecycle 2050 Fund	Lifecycle 2050 Fund Composite Index	146	-0.49	144	-0.33
Lifecycle 2055 Fund	Lifecycle 2055 Fund Composite Index	148	-0.51	145	-0.33
Lifecycle Retirement Income Fund	Lifecycle Retirement Income Fund Composite Index	83	-0.23	85	0.10
Lifecycle Index 2010 Fund	Lifecycle Index 2010 Composite Benchmark	33	NA	29	NA
Lifecycle Index 2015 Fund	Lifecycle Index 2015 Composite Benchmark	35	NA	33	NA
Lifecycle Index 2020 Fund	Lifecycle Index 2020 Composite Benchmark	37	NA	34	NA
Lifecycle Index 2025 Fund	Lifecycle Index 2025 Composite Benchmark	42	NA	40	NA
Lifecycle Index 2030 Fund	Lifecycle Index 2030 Composite Benchmark	49	NA	46	NA

CREF Accounts, TIAA-CREF Funds - All Share Classes, and TIAA-CREF Life Funds 3 & 5 Year Annualized Tracking Error & Information Ratio for the period ending 3/31/2017

All statistics were calculated using net of fees monthly returns using our Funds' and Accounts' official benchmarks.

Fund/Account	Benchmark	3 YR Tracking Error (BP)	3 YR Information Ratio (%)	5 YR Tracking Error (BP)	5 YR Information Ratio (%)
Lifecycle Index 2035 Fund	Lifecycle Index 2035 Composite Benchmark	50	NA	47	NA
Lifecycle Index 2040 Fund	Lifecycle Index 2040 Composite Benchmark	54	NA	50	NA
Lifecycle Index 2045 Fund	Lifecycle Index 2045 Composite Benchmark	58	NA	52	NA
Lifecycle Index 2050 Fund	Lifecycle Index 2050 Composite Benchmark	53	NA	49	NA
Lifecycle Index 2055 Fund	Lifecycle Index 2055 Composite Benchmark	58	NA	51	NA
Lifecycle Index Retirement Income Fund	Lifecycle Index Retirement Income Composite Benchmark	29	NA	27	NA
Lifestyle Aggressive Growth Fund	Lifestyle Aggressive Composite Benchmark	174	-0.49	172	-0.23
Lifestyle Conservative Fund	Lifestyle Conservative Composite Benchmark	91	-0.20	93	0.23
Lifestyle Growth Fund	Lifestyle Growth Composite Benchmark	150	-0.41	147	-0.07
Lifestyle Income Fund	Lifestyle Income Composite Benchmark	68	-0.01	72	0.40
Lifestyle Moderate Fund	Lifestyle Moderate Composite Benchmark	126	-0.31	125	0.12
Managed Allocation Fund	Managed Allocation Composite Index	112	-0.21	110	0.10
Mid-Cap Growth Fund	Russell Midcap Growth Index	274	-0.95	247	-0.71
Mid-Cap Value Fund	Russell Midcap Value Index	191	-0.78	188	-0.98
Real Estate Securities Fund	FTSE NAREIT All Equity REITs Index	206	-0.37	198	-0.61
S&P 500 Index Fund	S&P 500 Index	6	NA	8	NA
Short-Term Bond Fund	Bloomberg Barclays Short (1-3 Yr) Govt Credit Index	33	0.55	39	0.62
Small-Cap Blend Index Fund	Russell 2000 Index	9	NA	12	NA
Small-Cap Equity Fund	Russell 2000 Index	232	0.67	220	0.26
Social Choice Bond Fund	Bloomberg Barclays Aggregate Bond Index	56	1.57	NA	NA
Social Choice Equity Fund	Russell 3000 Index	99	-1.55	124	-0.89

Institutional Share Class Funds

Bond Fund	Bloomberg Barclays Aggregate Bond Index	62	0.96	85	1.12
Bond Index Fund	Bloomberg Barclays Aggregate Bond Index	32	NA	27	NA
Bond Plus Fund	Bloomberg Barclays Aggregate Bond Index	109	0.64	113	1.09
Emerging Markets Equity Fund	MSCI Emerging Markets Index	436	-0.22	392	0.00
Emerging Markets Equity Index Fund	MSCI Emerging Markets Index	145	NA	164	NA
Enhanced Intl Equity Index Fund	MSCI EAFE Index	278	NA	254	NA
Enhanced Large-Cap Growth Index Fund	Russell 1000 Growth Index	84	NA	98	NA
Enhanced Large-Cap Value Index Fund	Russell 1000 Value Index	121	NA	120	NA
Equity Index Fund	Russell 3000 Index	8	NA	10	NA
Global Natural Resources Fund	MSCI AC World Index Commodity Producers Sec. Cap. Index	900	0.03	713	0.00
Growth & Income Fund	S&P 500 Index	250	-0.24	241	-0.15
High-Yield Fund	BofA ML BB-B Cash Pay Issuer Constrained Index	115	-0.28	100	-0.24
Inflation-Linked Bond Fund	Bloomberg Barclays TIPS 1-10 Year Index	36	-0.71	33	-0.75
International Equity Fund	MSCI EAFE Index	492	-0.29	471	0.15
International Equity Index Fund	MSCI EAFE Index	209	NA	194	NA
International Opportunities Fund	MSCI All Country World Index ex-USA	521	-0.04	NA	NA
Large-Cap Growth Fund	Russell 1000 Growth Index	343	-0.17	356	0.03
Large-Cap Growth Index Fund	Russell 1000 Growth Index	7	NA	8	NA
Large-Cap Value Fund	Russell 1000 Value Index	262	-0.16	230	-0.11
Large-Cap Value Index Fund	Russell 1000 Value Index	8	NA	9	NA
Lifecycle 2010 Fund	Lifecycle 2010 Fund Composite Index	88	0.07	92	0.31
Lifecycle 2015 Fund	Lifecycle 2015 Fund Composite Index	93	0.06	97	0.27

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Fund/Account	Benchmark	3 YR Tracking Error (BP)	3 YR Information Ratio (%)	5 YR Tracking Error (BP)	5 YR Information Ratio (%)
Lifecycle 2020 Fund	Lifecycle 2020 Fund Composite Index	103	-0.03	107	0.17
Lifecycle 2025 Fund	Lifecycle 2025 Fund Composite Index	114	-0.10	117	0.11
Lifecycle 2030 Fund	Lifecycle 2030 Fund Composite Index	124	-0.19	128	0.03
Lifecycle 2035 Fund	Lifecycle 2035 Fund Composite Index	132	-0.25	136	-0.07
Lifecycle 2040 Fund	Lifecycle 2040 Fund Composite Index	145	-0.28	146	-0.13
Lifecycle 2045 Fund	Lifecycle 2045 Fund Composite Index	145	-0.31	144	-0.14
Lifecycle 2050 Fund	Lifecycle 2050 Fund Composite Index	146	-0.31	145	-0.15
Lifecycle 2055 Fund	Lifecycle 2055 Fund Composite Index	150	-0.32	147	-0.15
Lifecycle Retirement Income Fund	Lifecycle Retirement Income Fund Composite Index	81	0.09	84	0.43
Lifecycle Index 2010 Fund	Lifecycle Index 2010 Composite Benchmark	34	NA	31	NA
Lifecycle Index 2015 Fund	Lifecycle Index 2015 Composite Benchmark	36	NA	33	NA
Lifecycle Index 2020 Fund	Lifecycle Index 2020 Composite Benchmark	39	NA	36	NA
Lifecycle Index 2025 Fund	Lifecycle Index 2025 Composite Benchmark	41	NA	38	NA
Lifecycle Index 2030 Fund	Lifecycle Index 2030 Composite Benchmark	45	NA	43	NA
Lifecycle Index 2035 Fund	Lifecycle Index 2035 Composite Benchmark	48	NA	43	NA
Lifecycle Index 2040 Fund	Lifecycle Index 2040 Composite Benchmark	53	NA	49	NA
Lifecycle Index 2045 Fund	Lifecycle Index 2045 Composite Benchmark	52	NA	48	NA
Lifecycle Index 2050 Fund	Lifecycle Index 2050 Composite Benchmark	57	NA	51	NA
Lifecycle Index 2055 Fund	Lifecycle Index 2055 Composite Benchmark	57	NA	52	NA
Lifecycle Index Retirement Income Fund	Lifecycle Index Retirement Income Composite Benchmark	34	NA	33	NA
Lifestyle Aggressive Growth Fund	Lifestyle Aggressive Composite Benchmark	175	-0.34	174	-0.07
Lifestyle Conservative Fund	Lifestyle Conservative Composite Benchmark	92	0.07	94	0.49
Lifestyle Growth Fund	Lifestyle Growth Composite Benchmark	148	-0.25	144	0.09
Lifestyle Income Fund	Lifestyle Income Composite Benchmark	68	0.40	71	0.79
Lifestyle Moderate Fund	Lifestyle Moderate Composite Benchmark	124	-0.10	123	0.33
Managed Allocation Fund	Managed Allocation Composite Index	107	0.03	110	0.34
Mid-Cap Growth Fund	Russell Midcap Growth Index	272	-0.87	246	-0.62
Mid-Cap Value Fund	Russell Midcap Value Index	192	-0.65	188	-0.84
Real Estate Securities Fund	FTSE NAREIT All Equity REITs Index	209	-0.25	200	-0.47
S&P 500 Index Fund	S&P 500 Index	7	NA	7	NA
Short-Term Bond Fund	Bloomberg Barclays Short (1-3 Yr) Govt Credit Index	35	1.26	41	1.21
Small-Cap Blend Index Fund	Russell 2000 Index	9	NA	10	NA
Small-Cap Equity Fund	Russell 2000 Index	231	0.77	217	0.38
Social Choice Bond Fund	Bloomberg Barclays Aggregate Bond Index	54	2.03	NA	NA
Social Choice Equity Fund	Russell 3000 Index	96	-1.35	124	-0.68
Tax-Exempt Bond Fund	Bloomberg Barclays 10 Year Municipal Bond Index	67	-1.30	81	-1.30
Retail Share Class Funds					
Bond Fund	Bloomberg Barclays Aggregate Bond Index	63	0.44	89	0.74
Bond Index Fund	Bloomberg Barclays Aggregate Bond Index	26	NA	23	NA
Bond Plus Fund	Bloomberg Barclays Aggregate Bond Index	108	0.35	112	0.81
Emerging Markets Equity Fund	MSCI Emerging Markets Index	444	-0.31	397	-0.09
Emerging Markets Equity Index Fund	MSCI Emerging Markets Index	152	NA	169	NA

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Fund/Account	Benchmark	3 YR Tracking Error (BP)	3 YR Information Ratio (%)	5 YR Tracking Error (BP)	5 YR Information Ratio (%)
Equity Index Fund	Russell 3000 Index	9	NA	9	NA
Global Natural Resources Fund	MSCI AC World Index Commodity Producers Sec. Cap. Index	905	-0.01	718	-0.05
Growth & Income Fund	S&P 500 Index	253	-0.36	240	-0.29
High-Yield Fund	BofA ML BB-B Cash Pay Issuer Constrained Index	114	-0.52	102	-0.48
Inflation-Linked Bond Fund	Bloomberg Barclays TIPS 1-10 Year Index	35	-1.56	35	-1.62
International Equity Fund	MSCI EAFE Index	492	-0.36	471	0.07
International Opportunities Fund	MSCI All Country World Index ex-USA	529	-0.11	NA	NA
Large-Cap Growth Fund	Russell 1000 Growth Index	342	-0.27	356	-0.06
Large-Cap Value Fund	Russell 1000 Value Index	260	-0.28	228	-0.25
Lifecycle Retirement Income Fund	Retirement Income Fund Composite Index	82	-0.24	84	0.10
Lifestyle Aggressive Growth Fund	Lifestyle Aggressive Composite Benchmark	177	-0.54	174	-0.26
Lifestyle Conservative Fund	Lifestyle Conservative Composite Benchmark	90	-0.26	94	0.18
Lifestyle Growth Fund	Lifestyle Growth Composite Benchmark	148	-0.45	145	-0.11
Lifestyle Income Fund	Lifestyle Income Composite Benchmark	64	-0.05	71	0.37
Lifestyle Moderate Fund	Lifestyle Moderate Composite Benchmark	125	-0.31	125	0.10
Managed Allocation Fund	Managed Allocation Composite Index	111	-0.18	110	0.11
Mid-Cap Growth Fund	Russell Midcap Growth Index	274	-0.98	248	-0.74
Mid-Cap Value Fund	Russell Midcap Value Index	193	-0.79	189	-1.00
Real Estate Securities Fund	FTSE NAREIT All Equity REITs Index	210	-0.39	200	-0.63
Short-Term Bond Fund	Bloomberg Barclays Short (1-3 Yr) Govt Credit Index	40	0.32	42	0.43
Small-Cap Equity Fund	Russell 2000 Index	229	0.64	218	0.22
Social Choice Bond Fund	Bloomberg Barclays Aggregate Bond Index	52	1.63	NA	NA
Social Choice Equity Fund	Russell 3000 Index	97	-1.61	125	-0.90
Tax-Exempt Bond Fund	Bloomberg Barclays 10 Year Municipal Bond Index	75	-1.55	82	-1.65

Premier Share Class Funds

Bond Fund	Bloomberg Barclays Aggregate Bond Index	64	0.64	85	0.94
Bond Index Fund	Bloomberg Barclays Aggregate Bond Index	32	NA	27	NA
Bond Plus Fund	Bloomberg Barclays Aggregate Bond Index	110	0.52	113	0.96
Emerging Markets Equity Fund	MSCI Emerging Markets Index	440	-0.25	395	-0.03
Emerging Markets Equity Index Fund	MSCI Emerging Markets Index	146	NA	167	NA
Equity Index Fund	Russell 3000 Index	9	NA	9	NA
Global Natural Resources Fund	MSCI AC World Index Commodity Producers Sec. Cap. Index	897	0.01	711	-0.02
Growth & Income Fund	S&P 500 Index	254	-0.29	241	-0.21
High-Yield Fund	BofA ML BB-B Cash Pay Issuer Constrained Index	121	-0.40	106	-0.34
Inflation-Linked Bond Fund	Bloomberg Barclays TIPS 1-10 Year Index	33	-1.18	31	-1.27
International Equity Fund	MSCI EAFE Index	492	-0.32	471	0.12
International Equity Index Fund	MSCI EAFE Index	209	NA	193	NA
International Opportunities Fund	MSCI All Country World Index ex-USA	525	-0.06	NA	NA
Large-Cap Growth Fund	Russell 1000 Growth Index	344	-0.22	357	-0.01
Large-Cap Value Fund	Russell 1000 Value Index	261	-0.22	229	-0.17
Lifecycle 2010 Fund	Lifecycle 2010 Fund Composite Index	86	-0.09	92	0.16
Lifecycle 2015 Fund	Lifecycle 2015 Fund Composite Index	90	-0.13	96	0.07
Lifecycle 2020 Fund	Lifecycle 2020 Fund Composite Index	102	-0.19	106	0.04
Lifecycle 2025 Fund	Lifecycle 2025 Fund Composite Index	110	-0.25	116	-0.02
Lifecycle 2030 Fund	Lifecycle 2030 Fund Composite Index	126	-0.28	129	-0.09
Lifecycle 2035 Fund	Lifecycle 2035 Fund Composite Index	127	-0.36	133	-0.20
Lifecycle 2040 Fund	Lifecycle 2040 Fund Composite Index	147	-0.38	145	-0.22
Lifecycle 2045 Fund	Lifecycle 2045 Fund Composite Index	148	-0.40	147	-0.23
Lifecycle 2050 Fund	Lifecycle 2050 Fund Composite Index	145	-0.41	145	-0.25
Lifecycle 2055 Fund	Lifecycle 2055 Fund Composite Index	147	-0.44	146	-0.26
Lifecycle Retirement Income Fund	Lifecycle Retirement Income Fund Composite Index	81	-0.13	84	0.23

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Fund/Account	Benchmark	3 YR Tracking Error (BP)	3 YR Information Ratio (%)	5 YR Tracking Error (BP)	5 YR Information Ratio (%)
Lifecycle Index 2010 Fund	Lifecycle Index 2010 Composite Benchmark	35	NA	32	NA
Lifecycle Index 2015 Fund	Lifecycle Index 2015 Composite Benchmark	31	NA	29	NA
Lifecycle Index 2020 Fund	Lifecycle Index 2020 Composite Benchmark	38	NA	34	NA
Lifecycle Index 2025 Fund	Lifecycle Index 2025 Composite Benchmark	41	NA	37	NA
Lifecycle Index 2030 Fund	Lifecycle Index 2030 Composite Benchmark	44	NA	40	NA
Lifecycle Index 2035 Fund	Lifecycle Index 2035 Composite Benchmark	50	NA	47	NA
Lifecycle Index 2040 Fund	Lifecycle Index 2040 Composite Benchmark	52	NA	46	NA
Lifecycle Index 2045 Fund	Lifecycle Index 2045 Composite Benchmark	51	NA	48	NA
Lifecycle Index 2050 Fund	Lifecycle Index 2050 Composite Benchmark	58	NA	52	NA
Lifecycle Index 2055 Fund	Lifecycle Index 2055 Composite Benchmark	50	NA	46	NA
Lifecycle Index Retirement Income Fund	Lifecycle Index Retirement Income Composite Benchmark	32	NA	27	NA
Lifestyle Aggressive Growth Fund	Lifestyle Aggressive Composite Benchmark	177	-0.42	174	-0.15
Lifestyle Conservative Fund	Lifestyle Conservative Composite Benchmark	89	-0.11	92	0.33
Lifestyle Growth Fund	Lifestyle Growth Composite Benchmark	146	-0.36	146	-0.01
Lifestyle Income Fund	Lifestyle Income Composite Benchmark	67	0.15	72	0.55
Lifestyle Moderate Fund	Lifestyle Moderate Composite Benchmark	124	-0.20	123	0.22
Mid-Cap Growth Fund	Russell Midcap Growth Index	274	-0.91	247	-0.67
Mid-Cap Value Fund	Russell Midcap Value Index	191	-0.73	188	-0.92
Real Estate Securities Fund	FTSE NAREIT All Equity REITs Index	206	-0.33	199	-0.55
Short-Term Bond Fund	Bloomberg Barclays Short (1-3 Yr) Govt Credit Index	35	0.83	41	0.83
Small-Cap Equity Fund	Russell 2000 Index	230	0.71	218	0.31
Social Choice Bond Fund	Bloomberg Barclays Aggregate Bond Index	56	1.77	NA	NA
Social Choice Equity Fund	Russell 3000 Index	97	-1.51	123	-0.81
LIFE Funds					
Bond Fund	Bloomberg Barclays Aggregate Bond Index	78	0.58	83	0.84
Growth & Income Fund	S&P 500 Index	250	-0.27	239	-0.17
Growth Equity Fund	Russell 1000 Growth Index	343	-0.13	361	0.06
International Equity Fund	MSCI EAFE Index	490	-0.23	468	0.18
Large-Cap Value Fund	Russell 1000 Value Index	264	-0.22	231	-0.15
Real Estate Securities Fund	FTSE NAREIT All Equity REITs Index	211	-0.29	202	-0.48
Small-Cap Equity Fund	Russell 2000 Index	226	0.73	215	0.33
Social Choice Equity Fund	Russell 3000 Index	101	-1.52	127	-0.80
Stock Index Fund	Russell 3000 Index	5	NA	5	NA

Definitions:

Excess Return (ER)*: a measure of an investment's return in excess of a benchmark.

ER = Portfolio Return - Benchmark Return

Tracking Error (TE)*: a measure of the volatility of excess returns relative to a benchmark.

TE = Standard Deviation of Excess Return

$$\text{TE (Sample)} = \sqrt{\frac{n \sum_{i=1}^n e_i^2 - \left(\sum_{i=1}^n e_i\right)^2}{n(n-1)}} * \text{sqrt (frequency)}$$

Information Ratio (IR)*: a measure of excess return per units of risk.

Arithmetic IR* (*methodology is used by TIAA Risk Management*):

underlying Portfolio and Benchmark return information is generated from geometrically linked daily returns. The monthly excess return observations are then arithmetically averaged and then annualized to generate the Excess Return component. Information Ratio is derived by taking the ER component and dividing it by the Tracking Error.

$$\text{IR Arithmetic} = \frac{\text{Avg (Port Monthly Ret - Bmk Monthly Ret)}}{\text{TE (Sample)}} * 12$$

* ER, TE, and IR are annualized