

Addendum to the 2017 *Projection Assumption Guidelines*

Institut québécois de planification financière (IQPF)
Financial Planning Standards Council (FPSC)

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Addendum to the 2017 *Projection Assumption Guidelines*

The *Projection Assumption Guidelines* (the *Guidelines*) provide financial planners with objective assumptions to use in the preparation of retirement, education, insurance and other important projections. They are primarily recommended for making projections over the long term (10+ years).

The Projection Assumption Standards Committee (Committee) has prepared an Addendum to the 2017 *Projection Assumption Guidelines* (the Addendum) as a companion to the *Guidelines*, dated July 31, 2017. For transparency and replicability of the *Guidelines*, the Addendum provides the data sources on which the *Guidelines* are based and the calculations for each of the inflation and rate of return guidelines. Historical *Projection Assumption Guidelines*, rates of return for relevant indices and the standard deviation of returns are also provided for reference purposes.

The Addendum consists of the following sections:

- [Calculating the 2017 *Projection Assumption Guidelines*](#)
- [Supporting Data for Calculating the 2017 *Projection Assumption Guidelines*](#)
 - [Inflation](#)
 - [Short-Term Assets](#)
 - [Fixed-Income Securities](#)
 - [Canadian Equities](#)
 - [Foreign Equities \(Developed Markets\)](#)
 - [Foreign Equities \(Emerging Markets\)](#)
- [Historical Rates](#)

Calculating the 2017 *Projection Assumption Guidelines*

Each Guideline in the 2017 *Projection Assumption Guidelines* is calculated based on a number of independent, reliable data sources. The guideline for inflation is based on data from the Bank of Canada, the Willis Towers Watson Annual Portfolio Managers' Survey, the 2015 Canada Pension Plan Actuarial Report and the 2015 Quebec Pension Plan Actuarial Report. The guidelines for each asset class are based on data from Willis Towers Watson Annual Portfolio Managers' Survey, the 2015 Canada Pension Plan Actuarial Report, the 2015 Quebec Pension Plan Actuarial Report and 50-year historical average rates of return for relevant indices. Where appropriate, the averages for each guideline are rounded to the nearest tenth of a percent.

Clicking on any hyperlink in this section of the Addendum will provide the data used in the calculating the Guidelines.

Supporting Data for the 2017 *Projection Assumption Guidelines*

The *Supporting Data for the 2017 Projection Assumption Guidelines* provides links to the data sources, specific data and calculations for each of the guidelines.

Clicking on any hyperlink in this section of the Addendum will provide the data used in calculating each of the guidelines.

Historical Rates

For reference purposes, historical *Projection Assumption Guidelines* are provided dating back to 2009 as well as 50-year historical rates and standard deviations for inflation, T-Bills, bonds, foreign equities (developed), foreign equities (emerging) and Canadian equities.

Calculating the 2017 Projection Assumption Guidelines

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Calculating the 2017 Projection Assumption Guidelines

	Source				Average	Adjustment*	Projection Assumption Guideline**
	BoC	WTW	CPP	QPP			
Inflation	<u>2.00%</u>	<u>2.00%</u>	<u>2.00%</u>	<u>2.12%</u>	2.03%	0.00%	2.00%

	Source				Average	Adjustment*	Projection Assumption Guideline**
	50 Year	WTW	CPP	QPP			
Short-term	<u>4.13%</u>	<u>2.00%</u>	<u>3.00%</u>	<u>2.62%</u>	2.94%	0.00%	2.90%
Bonds	<u>5.57%</u>	<u>3.05%</u>	<u>3.95%</u>	<u>2.82%</u>	3.85%	0.00%	3.80%
Canadian equities	<u>7.35%</u>	<u>7.00%</u>	<u>6.70%</u>	<u>6.78%</u>	6.96%	-0.50%	6.50%
Foreign developed market equities	<u>7.85%</u>	<u>7.25%</u>	<u>6.70%</u>	<u>6.78%</u>	7.14%	-0.50%	6.60%
Emerging market equities	<u>8.85%</u>	<u>8.50%</u>	<u>7.70%</u>	<u>6.78%</u>	7.96%	-0.50%	7.50%
Borrowing rate							4.90%

*Note that equities have a margin of safety (0.5%) deducted from their average to compensate for the variability of long-run returns. The adjustment aligns with the outcome of a Monte Carlo analysis that approximates the probability of future returns over 300,000 trials.

** The Projection Assumption Guidelines rates are rounded to the nearest tenth of a percent.

Supporting Data for Calculating the 2017 Projection Assumption Guidelines

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Supporting Data for Calculating the 2017 Projection Assumption Guideline for Inflation

Source	Location of Data	Data	Calculations	Value
Actuarial Report (27th) on the Canada Pension Plan	Page 101. Table 51: Inflation, Real AAE and AWE Increases	100% of the price increase assumption for 2025+	1.00 (2.00%)	2.00%
Actuarial Valuation of the Quebec Pension Plan as at 31 December 2015	Page 73. Table 23: Inflation Rate, Pension Indexation Rate as at 1 January and Rate of Increase in Average Employment Earnings.	10/30 of the assumption for inflation for 2017 to 2025 + 5/30 of the assumption for inflation for 2026 to 2030 + 15/30 of the assumption for inflation for 2031 and 2032 and later	10/30 (2.00%) + 5/30 (2.10%) + 15/30 (2.20%)	2.12%
Willis Towers Watson Annual Survey of Canadian Investment Perspectives	Willis Towers Watson	50% of the 50th percentile over the medium term: 2017-2020 for the CPI inflation (%) + 50% of the 50th percentile over the long term: 2021-2030 for the CPI inflation (%)	0.50 (2.00%) + 0.50 (2.00%)	2.00%
Bank of Canada Inflation Data	Bank of Canada Measures of Inflation	Midpoint of Bank of Canada's inflation-control target range of 1 to 3 percent.	2.00%	2.00%
Average			100%	2.03%

Supporting Data for Calculating the 2017 Projection Assumption Guideline for Short-Term Assets

Source	Location of Data	Data	Calculations	Value
Actuarial Report (27th) on the Canada Pension Plan	Page 113. Table 60: Real Rates of Return by Asset Type (Before Investment Expenses)	100% of the assumption for short-term assets for 2025 and later + 2.00% CPP hypothesis for future inflation	1.00 (1.00%) + 2.00%	3.00%
Actuarial Valuation of the Quebec Pension Plan as at 31 December 2015	Page 75. Table 25: Real Rate of Return by Asset Category.	10/30 of the assumption for short-term assets for 2016 to 2025 + 5/30 of the assumption for short-term assets for 2026 to 2030 + 15/30 for the assumption for short term assets for 2031 and later + 2.12% QPP hypothesis for future inflation	10/30 (-0.50%) + 5/30 (0.40%) + 15/30 (1.20%) + 2.12%	2.62%
Willis Towers Watson Annual Survey of Canadian Investment Perspectives	Willis Towers Watson	50% of the 50th percentile over the medium term: 2017-2020 for the 3-month T-Bills (%) + 50% of the 50th percentile over the long term: 2021-2030 for the 3-month T-Bills (%)	0.50 (1.50%) + 0.50 (2.50%)	2.00%
50-Year Historical Average for the DEX 91-Day T-Bill Index	50 Years Data	(1 + 50-year nominal return historical average for the DEX Short-Term 91-Day T-Bill Index) ÷ (1 + historical rate of inflation) x (1 + guideline for future inflation) x (1 + guideline for future inflation) - 1 x 100	(1 + 6.18534% ÷ 100) ÷ (1 + 4.04275% ÷ 100) x (1 + 2.03% ÷ 100) - 1 x 100	4.13%
Average			100%	2.94%

Supporting Data for Calculating the 2017 Projection Assumption Guideline for Fixed-Income Securities

Source	Location of Data	Data	Calculations	Value
Actuarial Report (27th) on the Canada Pension Plan	Page 113, Table 60: Real Rates of Return by Asset Type (Before Investment Expenses)	100% of the assumption for marketable bonds for 2025 and beyond + 2.00% CPP hypothesis for future inflation - 0.75% to align the CPP long-term projections with a more typical holding period for individuals	1.00 (2.70%) + 2.00% - 0.75%	3.95%
Actuarial Valuation of the Quebec Pension Plan as at 31 December 2015	Page 75, Table 25: Real Rate of Return by Asset Category.	10/30 of the assumption for bonds for 2016 to 2025 + 5/30 of the assumption for bonds for 2026 to 2030 + 15/30 of the assumption for bonds for 2031 and later + 2.12% QPP hypothesis for future inflation - 0.75% to align the QPP long-term projections with a more typical holding period for individuals	10/30 (0.40%) + 5/30 (1.30%) + 15/30 (2.20%) + 2.12% - 0.75%	2.82%
Willis Towers Watson Annual Survey of Canadian Investment Perspectives	Willis Towers Watson	50% of the 50th percentile over the medium term: 2017-2020 for the 10-Year Canada Bonds (%) + 50% of the 50th percentile over the long term: 2021-2030 for the 10-Year Canada Bonds (%)	0.50 (2.80%) + 0.50 (3.30%)	3.05%
50-Year Historical Average for the DEX Universe Bond Index	50 Years Data	(1 + 50-year nominal return historical average for the DEX Universe Bond Index) ÷ (1 + historical rate of inflation) x (1 + guideline for future inflation) - 0.395% adjustment based on the annual appreciation of bonds over the past 50 years - 1 x 100	(1 + 8.05968%* ÷ 100) ÷ (1 + 4.04275% ÷ 100) x (1 + 2.03% ÷ 100) - 0.395%** - 1 x 100	5.57%
Average				3.85%

*Note: In the calculation of the 50-year historical average return, the DEX Long-Term Bond Index was used for years prior to 1980.

**Note: The 50-year historical average is being reduced by 0.395% annually to account for the appreciation in prices over the period that cannot be explained by changes in interest rates.

Supporting Data for Calculating the 2017 Projection Assumption Guideline for Canadian Equities

Source	Location of Data	Data	Calculations	Value
Actuarial Report (27th) on the Canada Pension Plan	Page 113. Table 60: Real Rates of Return by Asset Type (Before Investment Expenses)	100% of the assumption for Canadian equities for 2019 to 2046 + 2.00% CPP hypothesis for future inflation	4.70% + 2.00%	6.70%
Actuarial Valuation of the Quebec Pension Plan as at 31 December 2015	Page 75. Table 25: Real Rate of Return by Asset Category.	10/30 of the assumption for equities for 2016 to 2025 + 5/30 of the assumption for equities for 2026 to 2030 + 15/30 for the assumption for equities for 2031 and later + 2.12% QPP hypothesis for future inflation	10/30 (4.00%) + 5/30 (5.00%) + 15/30 (5.00%) + 2.12%	6.78%
Willis Towers Watson Annual Survey of Canadian Investment Perspectives	Willis Towers Watson	50% of the 50th percentile over the medium term: 2017-2020 for the S&P/TSX Composite Index (%) + 50% of the 50th percentile over the long term: 2021-2030 for the S&P/TSX Composite Index (%)	0.50 (7.00%) + 0.50 (7.00%)	7.00%
50-Year Historical Average Return for the S&P/TSX Composite Index	50 Years Data	(1 + 50-year nominal return historical average for the S&P/TSX Composite Index) ÷ (1 + historical rate of inflation) x (1 + guideline for future inflation) - 1 x 100	(1 + 9.46586% ÷ 100) ÷ (1 + 4.04275% ÷ 100) x (1 + 2.03% ÷ 100) - 1 x 100	7.35%
Average	The average is reduced by a margin of 0.50% to compensate for the variability of the long-term returns. This adjustment aligns with the outcome of a Monte Carlo analysis that approximates the probability of future Canadian equity returns by running 300,000 trial runs.			6.46%

Supporting Data for Calculating the 2017 Projection Assumption Guideline for Foreign Equities (Developed)

Source	Location of Data	Data	Calculations	Value
Actuarial Report (27th) on the Canada Pension Plan	Page 113, Table 60: Real Rates of Return by Asset Type (Before Investment Expenses)	100% of the assumption for Canadian equities for 2019 to 2046 + 2.00% CPP hypothesis for future inflation	4.70% + 2.00%	6.70%
Actuarial Valuation of the Quebec Pension Plan as at 31 December 2015	Page 75, Table 25: Real Rate of Return by Asset Category	10/30 of the assumption for equities for 2016 to 2025 + 5/30 of the assumption for equities for 2026 to 2030 + 15/30 for the assumption for equities for 2031 and later + 2.12% QPP hypothesis for future inflation	10/30 (4.00%) + 5/30 (5.00%) + 15/30 (5.00%) + 2.12%	6.78%
Willis Towers Watson Annual Survey of Canadian Investment Perspectives	Willis Towers Watson	50% of the 50th percentile over the medium term: 2017-2020 for the MSCI EAFE Index (%) + 50% of the 50th percentile over the long term: 2021-2030 for the MSCI EAFE Index (%)	0.50 (7.50%) + 0.50 (7.00%)	7.25%
50-Year Historical Average Return for the MSCI EAFE and S&P/TSX Composite Indices	50 Years Data	(1 + 50-year nominal return historical average of the MSCI EAFE and S&P/TSX Composite Indices)* ÷ (1 + historical rate of inflation) x (1 + guideline for future inflation) - 1 x 100	(1 + 9.97340% ÷ 100) ÷ (1 + 4.04275% ÷ 100) x (1 + 2.03% ÷ 100) + 1.00% - 1 x 100	7.85%
Average	The average is reduced by a margin of 0.50% to compensate for the variability of the long-term returns. This adjustment aligns with the outcome of a Monte Carlo analysis that approximates the probability of future equity returns by running 300,000 trial runs.			6.64%

* Note: The 50-year historical average return for the MSCI EAFE and S&P/TSX Composite Indices is being used to maintain the consistency with the other guidelines, where the 50-year historical return is used. This combination of indices uses the historical return on the MSCI EAFE Index since its first full calendar year of inception in 1970 to the present with the additional three years of historical average being represented by the historical average return of the S&P/TSX composite Index from 1967 through 1969 inclusive. The weighting of the S&P/TSX Composite Index will be reduced in subsequent versions of the *Projection Assumption Guidelines* until 2020, at which time a full 50-year history of the MSCI EAFE Index will be available for use.

Supporting Data for Calculating the 2017 Projection Assumption Guideline for Foreign Equities (Emerging)

Source	Location of Data	Data	Calculations	Value
Actuarial Report (27th) on the Canada Pension Plan	Page 113, Table 60: Real Rates of Return by Asset Type (Before Investment Expenses)	100% of the assumption for Canadian equities for 2019 to 2046 + 2.00% CPP hypothesis for future inflation	5.70% + 2.00%	7.70%
Actuarial Valuation of the Quebec Pension Plan as at 31 December 2015	Page 75, Table 25: Real Rate of Return by Asset Category.	10/30 of the assumption for equities for 2016 to 2025 + 5/30 of the assumption for equities for 2026 to 2030 + 15/30 for the assumption for equities for 2031 and later + 2.12% QPP hypothesis for future inflation	10/30 (4.00%) + 5/30 (5.00%) + 15/30 (5.00%) + 2.12%	6.78%
Willis Towers Watson Annual Survey of Canadian Investment Perspectives	Willis Towers Watson	50% of the 50th percentile over the medium term: 2017-2020 for the MSCI Emerging Market Index (%) + 50% of the 50th percentile over the long term: 2021-2030 for the MSCI Emerging Market Index (%)	0.50 (8.50%) + 0.50 (8.00%)	8.50%
50-Year Historical Average Return for the MSCI EAFE and S&P/TSX Composite Indices	50 Years Data	(1 + 50 year nominal return historical average of the MSCI EAFE and S&P/TSX Composite Indices)* ÷ (1 + historical rate of inflation) x (1 + guideline for future inflation) + 1.00% for equity risk premium of investing in foreign emerging markets** - 1 x 100	(1 + 9.97340% ÷ 100) ÷ (1 + 4.04275% ÷ 100) x (1 + 2.03% ÷ 100) + 1.00% - 1 x 100	8.85%
Average	The average is reduced by a margin of 0.50% to compensate for the variability of the long-term returns. This adjustment aligns with the outcome of a Monte Carlo analysis that approximates the probability of future equity returns by running 300,000 trial runs.			7.46%

* Note: The 50-year historical average return for the MSCI EAFE and S&P/TSX Composite Indices is being used to maintain the consistency with the other guidelines, where the 50-year historical return is used. This combination of indices uses the historical return on the MSCI EAFE Index since its first full calendar year of inception in 1970 to the present, with the additional three years of historical average being represented by the historical average return of the S&P/TSX composite Index from 1967 through 1969 inclusive. The weighting of the S&P/TSX Composite Index will be reduced in subsequent versions of the *Projection Assumption Guidelines* until 2020, at which time a full 50-year history of the MSCI EAFE Index will be available for use.

** Note: A 1% equity risk premium of investing in foreign emerging markets has been added to the return for the historical rate of return for Foreign Developed Market equities. This 1% risk premium aligns with the methodology used in the most recent Canada Pension Plan Actuarial Report.

Historical Rates

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Historical Projection Assumption Guidelines

	2017	2016	2015	2014	2013	2012	2011	2010	2009
Inflation	2.00%	2.10%	2.00%	2.00%	2.25%	2.25%	2.25%	2.25%	2.25%
Short term	2.90%	3.00%	2.90%	3.00%	3.25%	3.25%	3.50%	3.75%	3.75%
Fixed Income	3.80%	4.00%	3.90%	4.00%	4.25%	4.50%	4.75%	5.00%	4.75%
Canadian equities	6.50%	6.40%	6.30%	6.50%	7.00%	7.00%	7.00%	7.25%	7.25%
Foreign developed market equities	6.60%	6.80%	Foreign developed and emerging equities were not presented in the <i>Projection Assumption Guidelines</i> for the years previous to 2015.						
Emerging market equities	7.50%	7.70%							
Borrowing Rate	4.90%	5.00%	4.90%	5.00%	5.25%	5.25%	5.50%	5.75%	5.75%
Growth of the YMPE or MPE	3.00%	3.10%	3.00%	Growth in YMPE was not presented for years prior to 2015.					

Historical Rates and Standard Deviations for Sources Used in the Projection Assumption Guidelines

The Guidelines for asset classes (short-term assets, fixed income securities, and Canadian and foreign equities) are partially based on 50-year historical returns. Summarized at the bottom of the data are the historic 50-year nominal and real rates of return. The historical real rate of return is increased by the projected inflation assumption to arrive at the forward looking historical rate of return used in the calculation of each *Guideline*.

Source	T-Bills		Bonds		Canadian Equity		Foreign Equities (Developed)		Foreign Equities (Emerging)		Inflation	
	DEX Short-Term 91-Day T-Bill Index		DEX Universe Bond Index		S&P/TSX Composite Index		MSCI EAFE Index*		MSCI EAFE Index*		Bank of Canada	
	Index	Index + 1	Index	Index + 1	Index	Index + 1	Index	Index + 1	Index	Index + 1	Index	Index + 1
1960	0.033	1.033	0.122	1.122	0.018	1.018					15.700	
1961	0.029	1.029	0.092	1.092	0.327	1.327					15.700	0.000
1962	0.042	1.042	0.050	1.050	-0.071	0.929					16.000	0.019
1963	0.036	1.036	0.046	1.046	0.156	1.156					16.300	0.019
1964	0.038	1.038	0.062	1.062	0.254	1.254					16.600	0.018
1965	0.039	1.039	0.000	1.000	0.067	1.067					17.100	0.030
1966	0.050	1.050	-0.011	0.989	-0.071	0.929					17.700	0.035
1967	0.046	1.046	-0.005	0.995	0.181	1.181	0.191	1.191	0.191	1.191	18.400	0.040
1968	0.064	1.064	0.021	1.021	0.224	1.224	0.234	1.234	0.234	1.234	19.200	0.043
1969	0.071	1.071	-0.029	0.971	-0.008	0.992	0.002	1.002	0.002	1.002	20.100	0.047
1970	0.067	1.067	0.164	1.164	-0.036	0.964	-0.166	0.834	-0.166	0.834	20.300	0.010
1971	0.038	1.038	0.148	1.148	0.080	1.080	0.314	1.314	0.314	1.314	21.300	0.049
1972	0.036	1.036	0.081	1.081	0.274	1.274	0.366	1.366	0.366	1.366	22.400	0.052
1973	0.051	1.051	0.020	1.020	0.003	1.003	-0.140	0.860	-0.140	0.860	24.500	0.094
1974	0.078	1.078	-0.045	0.955	-0.259	0.741	-0.226	0.774	-0.226	0.774	27.600	0.127
1975	0.074	1.074	0.080	1.080	0.185	1.185	0.407	1.407	0.407	1.407	30.200	0.094
1976	0.093	1.093	0.236	1.236	0.110	1.110	0.031	1.031	0.031	1.031	31.900	0.056
1977	0.077	1.077	0.090	1.090	0.107	1.107	0.294	1.294	0.294	1.294	34.900	0.094
1978	0.083	1.083	0.041	1.041	0.297	1.297	0.453	1.453	0.453	1.453	37.900	0.086
1979	0.114	1.114	-0.028	0.972	0.448	1.448	0.047	1.047	0.047	1.047	41.600	0.098
1980	0.150	1.150	0.066	1.066	0.301	1.301	0.272	1.272	0.272	1.272	46.200	0.111
1981	0.184	1.184	0.042	1.042	-0.102	0.898	-0.015	0.985	-0.015	0.985	51.800	0.121
1982	0.154	1.154	0.354	1.354	0.055	1.055	0.025	1.025	0.025	1.025	56.600	0.093
1983	0.096	1.096	0.115	1.115	0.355	1.355	0.261	1.261	0.261	1.261	59.200	0.046
1984	0.116	1.116	0.147	1.147	0.076	1.076	0.146	1.146	0.146	1.146	61.400	0.037
1985	0.099	1.099	0.212	1.212	0.251	1.251	0.659	1.659	0.659	1.659	64.100	0.044
1986	0.093	1.093	0.147	1.147	0.090	1.090	0.679	1.679	0.679	1.679	66.800	0.042
1987	0.085	1.085	0.040	1.040	0.059	1.059	0.177	1.177	0.177	1.177	69.600	0.042
1988	0.094	1.094	0.098	1.098	0.111	1.111	0.177	1.177	0.177	1.177	72.300	0.039
1989	0.124	1.124	0.128	1.128	0.214	1.214	0.078	1.078	0.078	1.078	76.100	0.053
1990	0.135	1.135	0.075	1.075	-0.148	0.852	-0.230	0.770	-0.230	0.770	79.900	0.050
1991	0.098	1.098	0.221	1.221	0.120	1.120	0.120	1.120	0.120	1.120	82.900	0.038
1992	0.071	1.071	0.098	1.098	-0.014	0.986	-0.026	0.974	-0.026	0.974	84.700	0.022
1993	0.055	1.055	0.181	1.181	0.325	1.325	0.378	1.378	0.378	1.378	86.100	0.017
1994	0.054	1.054	-0.043	0.957	-0.002	0.998	0.145	1.145	0.145	1.145	86.300	0.002
1995	0.074	1.074	0.207	1.207	0.145	1.145	0.085	1.085	0.085	1.085	87.800	0.017
1996	0.050	1.050	0.123	1.123	0.283	1.283	0.069	1.069	0.069	1.069	89.700	0.022
1997	0.032	1.032	0.097	1.097	0.150	1.150	0.066	1.066	0.066	1.066	90.400	0.008
1998	0.047	1.047	0.092	1.092	-0.016	0.984	0.292	1.292	0.292	1.292	91.300	0.010
1999	0.047	1.047	-0.011	0.989	0.317	1.317	0.203	1.203	0.203	1.203	93.700	0.026
2000	0.055	1.055	0.102	1.102	0.074	1.074	-0.110	0.890	-0.110	0.890	96.700	0.032
2001	0.047	1.047	0.081	1.081	-0.126	0.874	-0.163	0.837	-0.163	0.837	97.400	0.007
2002	0.025	1.025	0.087	1.087	-0.124	0.876	-0.165	0.835	-0.165	0.835	101.100	0.038
2003	0.029	1.029	0.067	1.067	0.267	1.267	0.138	1.138	0.138	1.138	103.200	0.021
2004	0.023	1.023	0.071	1.071	0.145	1.145	0.119	1.119	0.119	1.119	105.400	0.021
2005	0.026	1.026	0.065	1.065	0.241	1.241	0.112	1.112	0.112	1.112	107.600	0.021
2006	0.040	1.040	0.041	1.041	0.173	1.173	0.264	1.264	0.264	1.264	109.400	0.017
2007	0.044	1.044	0.037	1.037	0.098	1.098	-0.053	0.947	-0.053	0.947	112.000	0.024
2008	0.033	1.033	0.064	1.064	-0.330	0.670	-0.288	0.712	-0.288	0.712	113.300	0.012
2009	0.006	1.006	0.054	1.054	0.351	1.351	0.125	1.125	0.125	1.125	114.800	0.013
2010	0.005	1.005	0.067	1.067	0.176	1.176	0.026	1.026	0.026	1.026	117.500	0.024
2011	0.010	1.010	0.097	1.097	-0.087	0.913	-0.100	0.900	-0.100	0.900	120.200	0.023
2012	0.010	1.010	0.036	1.036	0.072	1.072	0.147	1.147	0.147	1.147	121.200	0.008
2013	0.010	1.010	-0.012	0.988	0.130	1.130	0.310	1.310	0.310	1.310	122.700	0.012
2014	0.009	1.009	0.088	1.088	0.105	1.105	0.037	1.037	0.037	1.037	124.500	0.015
2015	0.006	1.006	0.035	1.035	-0.083	0.917	0.190	1.190	0.190	1.190	126.500	0.016
2016	0.005	1.005	0.017	1.017	0.211	1.211	-0.025	0.975	-0.025	0.975	128.400	0.015
50-Year Nominal Average: 1967 - 2016	6.185%		8.060%		9.466%		9.973%		9.973%		4.043%	
50-Year Real Average: 1967 - 2016	2.059%		3.861%		5.212%		5.700%		5.700%		N/A	
50-Year Real Average Increased by Future Inflation Assumption	4.130%		5.968%		7.347%		7.845%		7.845%		N/A	
50-Year Standard Deviation: 1967-2016	4.251%		7.744%		16.383%		20.852%		20.852%		3.250%	

Note: Values in each column entitled "Index" are the annual rate of rate earned by the index for that year. They are written in Decimal Form for ease of use in computing geometric returns which requires 1 to be added to the return.

	T-Bills	Bonds	Canadian Equity	Foreign Equities (Developed)	Foreign Equities (Emerging)	Inflation
Source	DEX Short-Term 91-Day T-Bill Index	DEX Universe Bond Index	S&P/TSX Composite Index	MSCI EAFE Index*	MSCI EAFE Index*	Bank of Canada

Rolling Average of Rates and Standard Deviations for Sources Used in the Projection Assumption Guidelines

Source	T-Bills		Bonds		Canadian Equity		Foreign Equities (Developed)		Foreign Equities (Emerging)		Inflation		
	DEX Short-Term 91-Day T-Bill Index		DEX Universe Bond Index		S&P/TSX Composite Index		MSCI EAFE Index*		MSCI EAFE Index*		Bank of Canada		
	Geometric Return	Standard Deviation	Geometric Return	Standard Deviation	Geometric Return	Standard Deviation	Geometric Return	Standard Deviation	Geometric Return	Standard Deviation	Geometric Return		Standard Deviation
1961-2010	6.568%	3.880%	8.017%	7.750%	10.053%	16.685%	0.102	21.633%	0.102	21.633%	4.108%		3.222%
1962-2011	6.528%	3.926%	8.027%	7.751%	9.232%	16.631%	0.097	21.640%	0.097	21.640%	4.155%		3.177%
1963-2012	6.462%	3.991%	7.997%	7.766%	9.545%	16.444%	0.098	21.403%	0.098	21.403%	4.133%		3.197%
1964-2013	6.407%	4.047%	7.875%	7.864%	9.495%	16.432%	0.102	21.354%	0.102	21.354%	4.120%		3.207%
1965-2014	6.347%	4.106%	7.928%	7.860%	9.219%	16.296%	0.101	21.162%	0.101	21.162%	4.112%		3.213%
1966-2015	6.279%	4.173%	8.001%	7.801%	8.888%	16.504%	0.102	20.963%	0.102	20.963%	4.084%		3.230%
1967-2016	6.185%	4.251%	8.060%	7.744%	9.466%	16.383%	0.100	20.852%	0.100	20.852%	4.043%		3.250%

Note: The 50-year historical average return for the MSCI EAFE and S&P/TSX Composite Indices is being used to maintain the consistency with the other Guidelines where the 50 year historical return is used. This combination of indices uses the historical return on the MSCI EAFE Index since its first full calendar year of inception in 1970 to the present with the additional three years of historical average being represented by the historical average return of the S&P/TSX Composite Index +1% from 1967 through 1969 inclusive. The weighting of the S&P/TSX Composite Index will be reduced in subsequent versions of the Projection Assumption Guidelines until 2020, at which time a full 50 year history of the MSCI EAFE Index will be available for use.

Willis Towers Watson Annual Survey of Canadian Investment Perspectives

	Short Term: 2016					Medium Term: 2017-2020					Long Term: 2021-2030							
	No. of Obs.	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile	No. of Obs.	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile	No. of Obs.	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile
Macroeconomic Indicators																		
Canada																		
Real GDP growth (%)	21	0.0	1.5	1.8	2.1	2.5	15	0.5	1.9	2.0	2.5	3.1	15	0.5	2.0	2.0	2.9	3.0
CPI Inflation (%)	19	0.8	1.5	1.8	2.0	2.0	14	0.5	1.8	2.0	2.0	3.0	14	1.8	2.0	2.0	2.0	3.0
Target Overnight Rate (%)	16	0.2	0.5	0.5	0.5	0.8	11	1.0	1.3	1.5	2.1	2.5	9	1.4	2.0	2.5	2.5	3.3
CAD per U.S. Dollar	17	0.7	0.7	0.8	0.8	0.9	12	0.7	0.7	0.8	0.8	0.9	11	0.7	0.8	0.8	0.9	1.0
Unemployment Rate (%)	15	6.0	6.5	7.0	7.0	8.0	12	5.5	6.1	6.5	7.1	8.0	11	5.0	6.0	6.2	7.0	7.5
Average Weekly Earnings	10	2.0	2.0	2.5	3.0	4.2	8	2.0	2.3	3.0	3.3	4.0	7	2.5	3.0	3.0	3.5	3.8
United States																		
Real GDP growth (%)	21	2.0	2.4	2.5	2.6	2.8	14	1.0	2.2	2.5	3.0	3.3	14	1.0	2.0	2.2	3.0	3.5
CPI Inflation (%)	20	0.1	1.5	1.9	2.0	2.1	12	1.0	1.7	2.0	2.0	2.2	13	2.0	2.0	2.0	2.0	2.5
Federal Funds Rate (%)	16	0.5	0.5	0.8	1.0	1.3	12	0.9	1.5	2.0	2.7	3.5	11	1.1	2.0	2.5	3.5	4.0
Unemployment Rate (%)	14	4.5	4.7	5.0	5.0	6.9	11	4.5	4.6	5.0	5.0	5.0	10	4.8	5.0	5.1	5.5	6.0
WTI Oil Price (US\$)	17	50	52	55	60	65	12	50	60	65	73	80	13	65	70	75	75	95
Financial Indicators																		
3-Month T-Bills (%)	19	0.4	0.5	0.6	1.0	1.1	17	0.7	1.2	1.5	2.0	3.0	17	1.5	1.7	2.5	2.5	4.4
5-Year Canada Bonds (%)	17	0.6	1.1	1.3	1.7	2.0	15	1.2	1.6	2.0	2.5	3.0	15	1.8	2.4	2.6	3.0	4.0
10-Year Canada Bonds (%)	19	1.0	1.7	2.0	2.3	3.0	17	2.1	2.5	2.8	3.0	4.0	17	2.3	3.0	3.3	4.0	5.0
30-Year Canada Bonds (%)	17	2.0	2.3	2.5	2.7	3.4	15	2.3	3.0	3.0	3.5	4.0	15	2.3	3.5	3.8	4.0	6.0
S&P/TSX Composite Index (%)	20	-9.9	4.3	7.0	9.5	15.0	18	1.8	5.0	7.0	7.5	11.5	18	3.9	5.0	7.0	7.0	9.5
S&P 500 Index (%)	21	2.0	5.0	6.5	8.0	15.0	19	2.0	6.0	7.5	9.0	11.5	21	5.0	6.0	7.0	8.0	10.0
MSCI EAFE Index (%)	18	-12.0	4.0	7.0	8.0	16.0	17	2.0	6.0	7.5	8.6	13.0	18	3.7	6.0	7.0	7.5	9.0
MSCI Emerging Market Index (%)	16	-10.0	4.5	6.7	10.0	15.0	15	5.0	7.0	8.5	12.0	13.0	17	7.0	7.8	8.5	10.0	12.0
Stock Market Returns																		
Canada	21	0.0	4.0	6.0	9.0	15.0							21	4.0	5.0	7.0	7.0	9.5
UK	12	-10.0	3.5	5.5	7.3	13.0							14	3.9	6.0	7.0	8.0	13.1
Eurozone	16	-10.0	4.0	7.3	8.5	25.0							17	3.0	6.5	7.0	8.0	10.9
Asia - Pacific	13	-8.0	4.0	6.0	8.0	16.0							12	4.0	5.5	6.8	8.0	10.0
Real																		
Target Overnight Rate (%)	15	-1.6	-1.5	-1.2	-1.0	-0.3	11	-1.5	-1.0	0.1	0.5	1.0	9	-0.8	0.0	0.2	0.5	1.3
10-Year Canada Bonds (%)	17	-0.3	-0.2	0.3	0.4	1.5	12	-0.5	0.3	0.6	1.0	2.5	12	0.6	1.0	1.2	1.3	3.0