

Eternal Employment Financial Feasibility Study

2017-08-14



ERIK PENSER BANK

Assumptions

- Available amount: 6 MSEK
- Time until first payment: 7 years
- Current wage: 21 600 SEK/month (corresponding to labour costs of 350 500 SEK annually), to be upward adjusted at time of employment



Historical risk and return

- The annual return and standard deviation of Swedish stocks¹ in the last 20 years has been 10,5% and 20,0%, respectively.
- The annual return and standard deviation of AP7 Equity Fund² in the last 7 years has been 15,3% and 14,4% respectively.

1 Swedish stocks are represented by Stockholm Benchmark Index (SBX Index) which consists of a selection of the largest and most traded stocks at NASDAQ OMX Stockholm. The weight of each constituent is based on a free float market capitalization, which means that only the part of the share capital that is considered to be available for trading is included in the index. Risk (standard deviation) and return are computed over the interval 1996-09-30 to 2017-06-30.

2 Since inception in 2010, AP7 is the state alternative to the private investment funds offered within the Swedish premium pension system. Risk (standard deviation) and return are computed over the interval 2010-05-31 to 2017-06-30.



Calculations, coverage of payments

- The table to the right illustrates which yearly returns in the first 7 years and subsequently that are required to sustain wage payments for the foreseeable future.
- First, we let the initial amount (6 MSEK) grow for 7 years.
- Then, we use the sum of an infinite geometric series to calculate the value of all future payments (note that the rate of return on capital need to exceed rate of wage growth).
- We divide the initial amount (after growing) by the sum of the infinite series to see to what extent we can cover future wage payments.

Yearly rtn.
first 7 yrs

Yearly return after 7 years

	4%	6%	8%	10%	12%	14%	16%	18%	20%
4%	14%	48%	80%	112%	142%	171%	199%	227%	253%
6%	16%	55%	92%	128%	162%	196%	228%	259%	289%
8%	18%	62%	105%	145%	185%	223%	260%	295%	329%
10%	21%	71%	119%	165%	210%	253%	295%	336%	375%
12%	23%	80%	135%	188%	239%	288%	335%	381%	425%
14%	26%	91%	153%	212%	270%	326%	379%	431%	481%
16%	30%	103%	172%	240%	305%	368%	428%	487%	543%
18%	34%	116%	194%	270%	344%	414%	483%	549%	612%
20%	38%	130%	219%	304%	387%	466%	543%	617%	689%



Calculations, time sustaining payments

- The table to the right illustrates for how many years wage payments can be sustained as a function of annual returns in the first 7 years and subsequently.
- Similar to the case where we calculated the extent we can cover future wage payments (last slide), but we set initial amount (after growing) equal to the sum of the infinite series and solve for year.

Yearly rtn.
first 7 yrs

		Yearly return after 7 years								
		4%	6%	8%	10%	12%	14%	16%	18%	20%
4%	18	23	35	OK	OK	OK	OK	OK	OK	OK
6%	21	28	54	OK	OK	OK	OK	OK	OK	OK
8%	25	35	OK	OK	OK	OK	OK	OK	OK	OK
10%	29	45	OK	OK	OK	OK	OK	OK	OK	OK
12%	33	59	OK	OK	OK	OK	OK	OK	OK	OK
14%	39	88	OK	OK	OK	OK	OK	OK	OK	OK
16%	45	OK	OK	OK	OK	OK	OK	OK	OK	OK
18%	52	OK	OK	OK	OK	OK	OK	OK	OK	OK
20%	61	OK	OK	OK	OK	OK	OK	OK	OK	OK



Probability of success: Collective bargaining wages

Assumptions reminder

- Available amount: 6 MSEK
- Time until first payment: 7 years
- Current wage: 21 600 SEK/month (corresponding to labour costs of 350 500 SEK annually)
- Annual return and risk of 10,5% and 20,0% for Swedish stocks, and 15,3% and 14,4% for AP7 Equity Fund.

Additional assumption

3,2% yearly wage increase, consistent with outcomes of historical wage negotiations.

Probability of success

Swedish stocks: The probability of sustaining wage payments for 120 years or more is 57%.

AP7 Equity Fund: The probability of sustaining wage payments for 120 years or more is 74%.

Yearly return after 7 years

	4%	6%	8%	10%	12%	14%	16%	18%	20%
Yearly rtn. first 7 yrs	4%	6%	8%	10%	12%	14%	16%	18%	20%
	14%	48%	80%	112%	142%	171%	199%	227%	253%
	16%	55%	92%	128%	162%	196%	228%	259%	289%
	18%	62%	105%	145%	185%	223%	260%	295%	329%
	21%	71%	119%	165%	210%	253%	295%	336%	375%
	23%	80%	135%	188%	239%	288%	335%	381%	425%
	26%	91%	153%	212%	270%	326%	379%	431%	481%
	30%	103%	172%	240%	305%	368%	428%	487%	543%
	34%	116%	194%	270%	344%	414%	483%	549%	612%
	38%	130%	219%	304%	387%	466%	543%	617%	689%

Yearly return after 7 years

	4%	6%	8%	10%	12%	14%	16%	18%	20%
Yearly rtn. first 7 yrs	4%	6%	8%	10%	12%	14%	16%	18%	20%
	18	23	35	OK	OK	OK	OK	OK	OK
	21	28	54	OK	OK	OK	OK	OK	OK
	25	35	OK	OK	OK	OK	OK	OK	OK
	29	45	OK	OK	OK	OK	OK	OK	OK
	33	59	OK	OK	OK	OK	OK	OK	OK
	39	88	OK	OK	OK	OK	OK	OK	OK
	45	OK	OK	OK	OK	OK	OK	OK	OK
	52	OK	OK	OK	OK	OK	OK	OK	OK
	61	OK	OK	OK	OK	OK	OK	OK	OK



Probability of success: Inflation adjusted wages

Assumptions reminder

- Available amount: 6 MSEK
- Time until first payment: 7 years
- Current wage: 21 600 SEK/month (corresponding to labour costs of 350 500 SEK annually)
- Annual return and risk of 10,5% and 20,0% for Swedish stocks, and 15,3% and 14,4% for AP7 Equity Fund.

Additional assumption

1,9% yearly wage increase, consistent with outcomes of historical wage negotiations.

Probability of success

Swedish stocks: The probability of sustaining wage payments for 120 years or more is **60%**.

AP7 Equity Fund: The probability of sustaining wage payments for 120 years or more is **78%**.

Yearly return after 7 years

	4%	6%	8%	10%	12%	14%	16%	18%	20%
Yearly rtn. first 7 yrs	40%	76%	112%	145%	178%	210%	240%	269%	298%
6%	46%	87%	127%	166%	203%	239%	274%	308%	340%
8%	52%	99%	145%	189%	232%	273%	313%	351%	388%
10%	59%	113%	165%	215%	264%	310%	355%	399%	441%
12%	67%	128%	187%	244%	299%	352%	403%	453%	500%
14%	76%	145%	212%	276%	339%	399%	456%	512%	566%
16%	86%	164%	240%	312%	382%	450%	515%	579%	640%
18%	97%	185%	270%	352%	431%	507%	581%	652%	721%
20%	109%	208%	304%	396%	485%	571%	654%	734%	811%

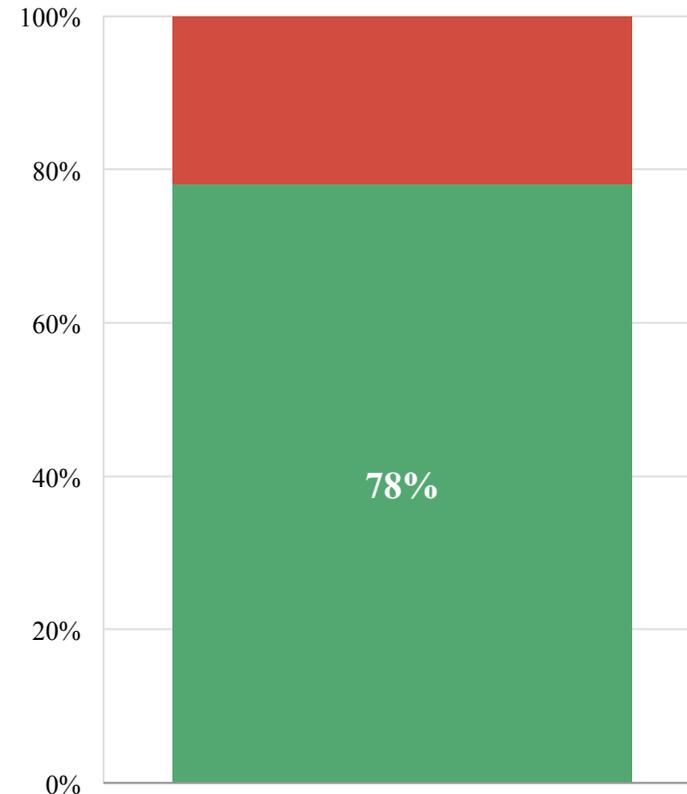
Yearly return after 7 years

	4%	6%	8%	10%	12%	14%	16%	18%	20%
Yearly rtn. first 7 yrs	24	36	OK	OK	OK	OK	OK	OK	OK
6%	29	51	OK	OK	OK	OK	OK	OK	OK
8%	35	132	OK	OK	OK	OK	OK	OK	OK
10%	43	OK	OK	OK	OK	OK	OK	OK	OK
12%	53	OK	OK	OK	OK	OK	OK	OK	OK
14%	69	OK	OK	OK	OK	OK	OK	OK	OK
16%	94	OK	OK	OK	OK	OK	OK	OK	OK
18%	164	OK	OK	OK	OK	OK	OK	OK	OK
20%	OK	OK	OK	OK	OK	OK	OK	OK	OK



Conclusion: Probability of success for Eternity

- To calculate the probability of succeeding in sustaining payments for 120 years or more, we build on the same calculations as in the last slide (time sustaining payments).
- Instead of fixed rates of return, we simulate the yearly returns as normally distributed random variables with given mean and standard deviation.
- The probability is expressed as a percentage between 0-100%.
- The historical risk and return of AP7 Equity Fund gives a 78% probability of sustaining wage payments for eternity.



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