

DO NOT delete this red banner and this worksheet.

You should use this worksheet to "consolidate all your deliverable results and charts".

a) See Project documentation Step #18 for **Sample Results** for instructions.

b) See also **Phase4 Step #18 The Entire Project's Deliverables** for instructions.

c) And see project description **Page 2 "Grading policy"** regarding how this worksheet's results are linked to your other worksheets.

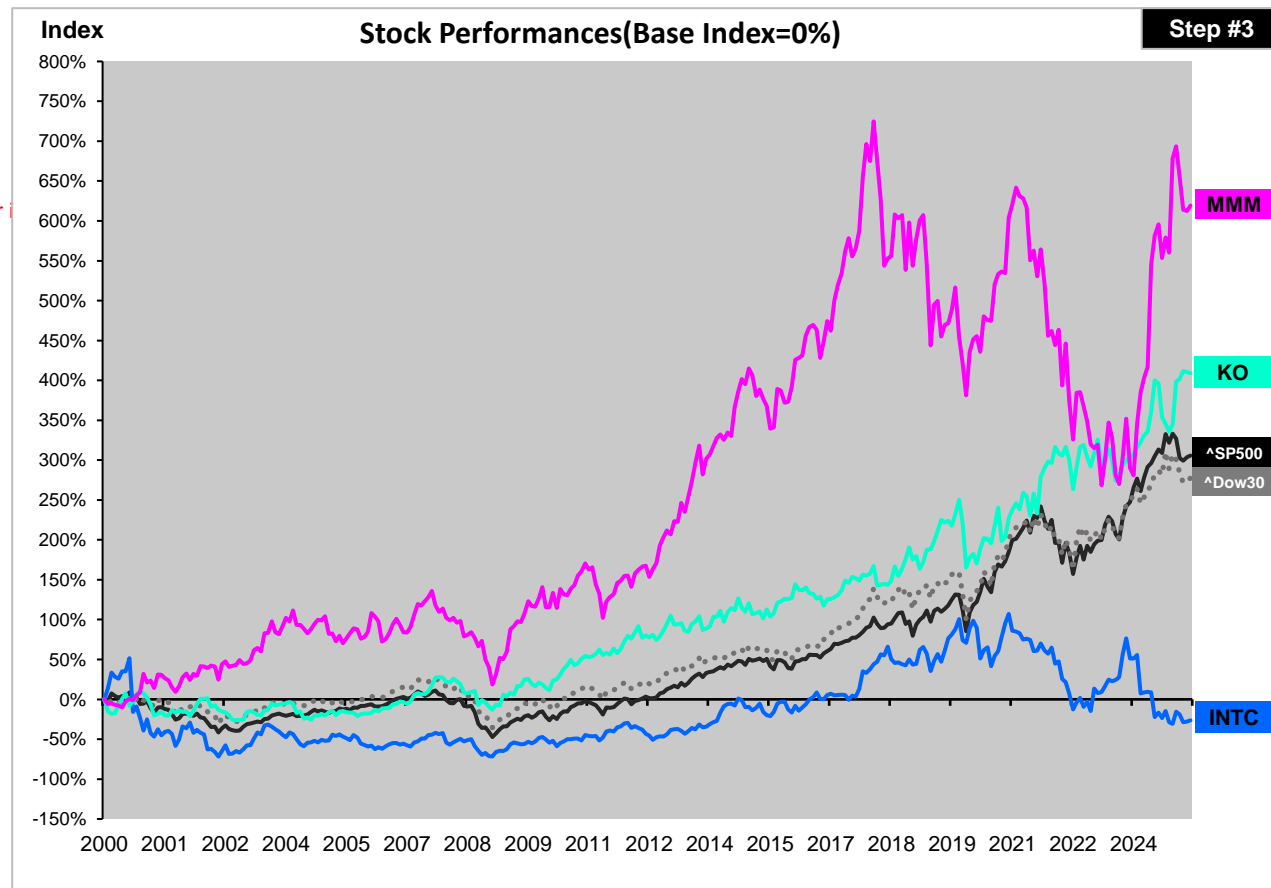
Why? The instructor grades from this worksheet. Although you are free to create additional worksheets to organize your calculations for various Steps in the project, those calculated results must be linked back to this Deliverables worksheet to consolidate the required results

Makes it easier for grader to "trace" the calculated values back to its original source and provide feedback for sources of error

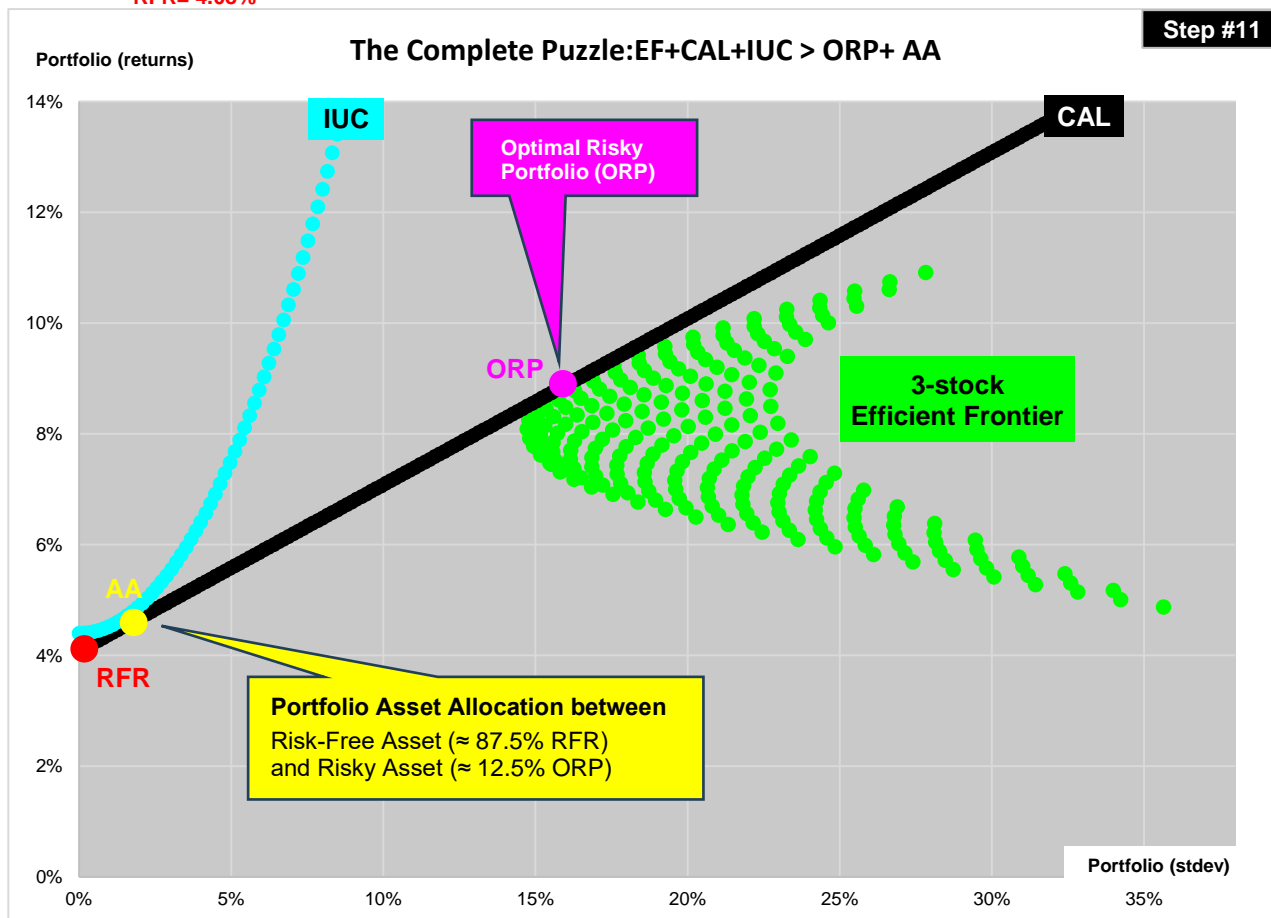
DO NOT cut/paste calculated values/plots for your other worksheet to this Deliverables worksheet.

But cell-link them from those other worksheets to this **Deliverables** worksheet.

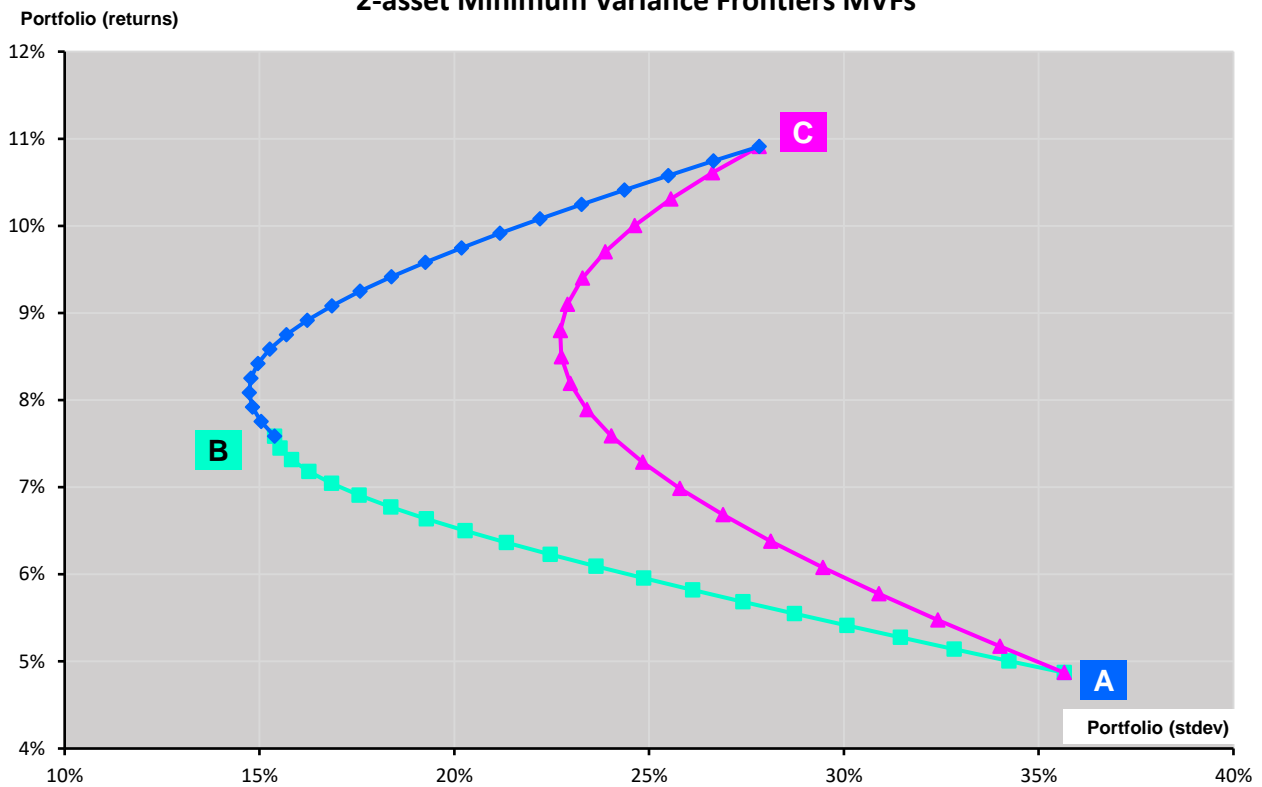
So, place/arrange your Deliverables below ...



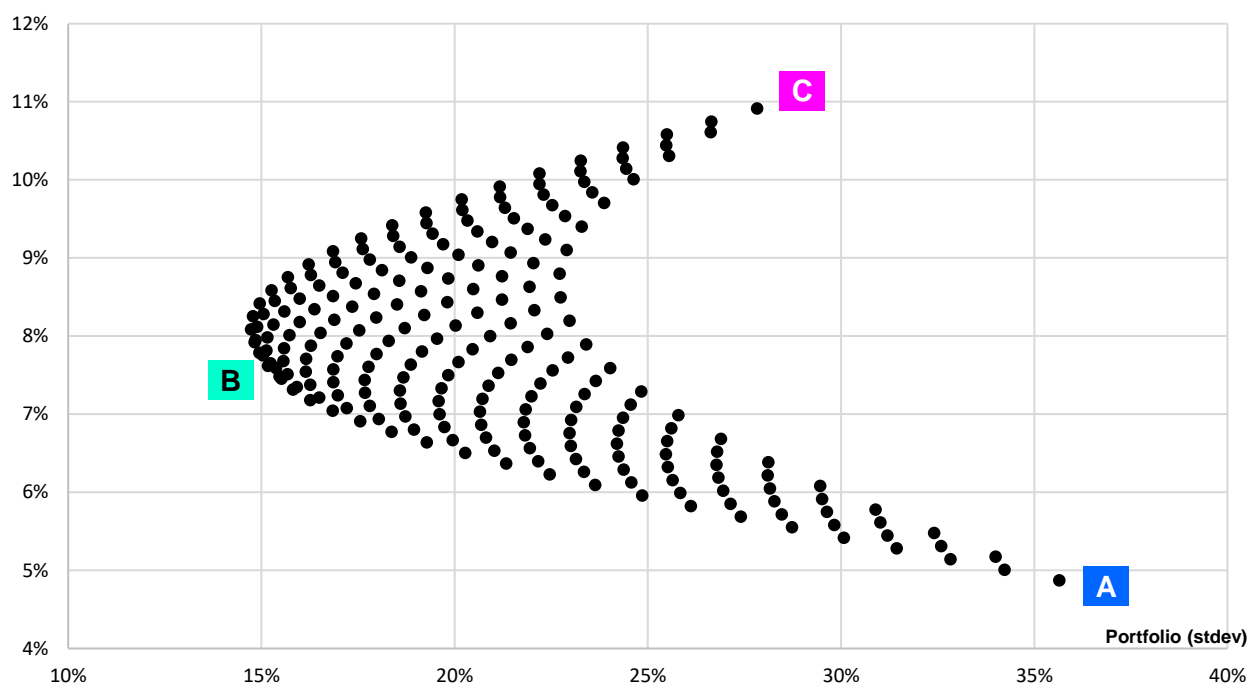
RFR= 4.08%



2-asset Minimum Variance Frontiers MVFs



3-asset Portfolio Minimum Variance Frontier MVF and Efficient Frontier EF

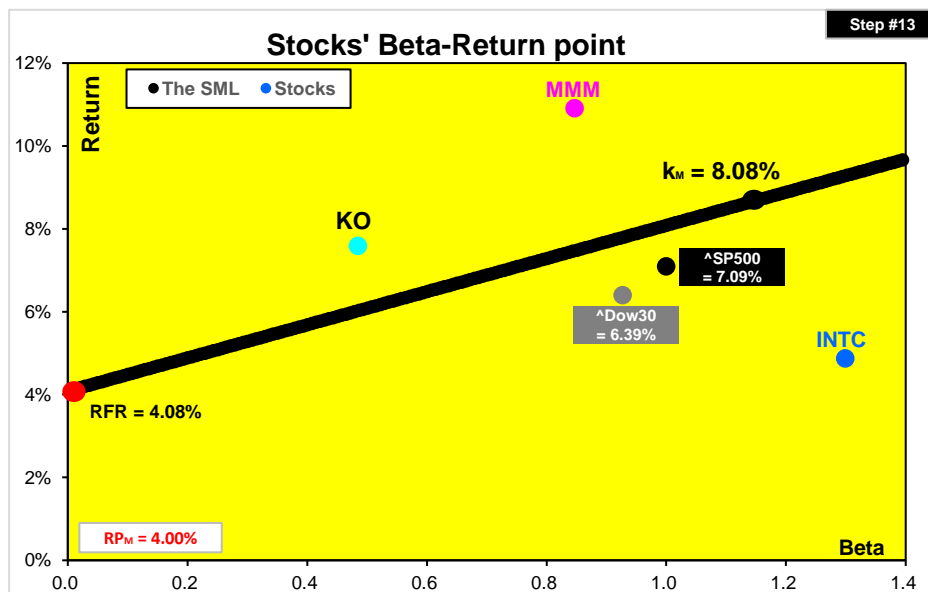


Step #6		Annual Stock Prices Adjusted Close (\$)					
Date	Year	^SP500	^Dow30	WhatsX?	INTC	KO	MMM
01/01/2000	-	-	-	-	-	-	-
01/01/2001	2000	-2.04%	-0.49%	13.62%	-25.11%	2.30%	21.19%
01/01/2002	2001	-17.26%	-8.89%	7.41%	-5.05%	-22.88%	2.46%
01/01/2003	2002	-24.29%	-18.81%	7.70%	-55.15%	-6.00%	14.48%
01/01/2004	2003	32.19%	30.22%	4.81%	95.62%	24.19%	29.49%
01/01/2005	2004	4.43%	0.02%	4.07%	-25.98%	-13.86%	8.58%
01/01/2006	2005	8.36%	3.57%	1.62%	-4.04%	2.34%	-11.87%
01/01/2007	2006	12.36%	16.17%	4.30%	0.62%	19.00%	4.59%
01/01/2008	2007	-4.15%	0.23%	8.98%	2.64%	26.39%	9.72%
01/01/2009	2008	-40.09%	-36.75%	2.54%	-37.20%	-25.50%	-30.56%
01/01/2010	2009	30.03%	25.83%	8.45%	55.52%	31.41%	54.70%
01/01/2011	2010	19.76%	18.12%	4.80%	14.03%	19.50%	12.03%
01/01/2012	2011	2.04%	6.23%	8.48%	27.47%	10.55%	1.18%
01/01/2013	2012	14.15%	9.72%	2.48%	-17.60%	13.39%	19.09%
01/01/2014	2013	18.99%	13.26%	-0.05%	21.29%	4.48%	30.36%
01/01/2015	2014	11.92%	9.34%	6.59%	38.91%	12.12%	29.68%
01/01/2016	2015	-2.74%	-4.07%	-0.58%	-3.29%	7.72%	-4.51%
01/01/2017	2016	17.45%	20.63%	1.36%	22.61%	0.00%	18.88%
01/01/2018	2017	23.91%	31.64%	2.03%	34.44%	18.33%	46.66%
01/01/2019	2018	-4.24%	-4.40%	1.97%	0.34%	4.63%	-17.92%
01/01/2020	2019	19.28%	13.03%	9.85%	39.06%	25.18%	-18.12%
01/01/2021	2020	15.15%	6.11%	4.63%	-11.01%	-14.73%	14.84%
01/01/2022	2021	21.57%	17.17%	-3.11%	-9.77%	30.70%	-2.49%
01/01/2023	2022	-9.72%	-2.98%	-8.55%	-39.82%	3.48%	-27.74%
01/01/2024	2023	18.86%	11.92%	2.06%	56.00%	0.08%	-13.06%
01/01/2025	2024	24.66%	16.76%	1.99%	-54.29%	9.97%	99.62%
06/01/2025	2025	-6.34%	-7.39%	1.89%	6.38%	14.45%	-7.59%

Step #6	<annual risk-returns>					
Avg	7.09%	6.39%	3.82%	4.87%	7.59%	10.91%
Stdev	17.38%	15.17%	4.50%	35.65%	15.38%	27.83%

Step #4, #12	<monthly Betas & Correls>					
Beta	1.00	0.93	0.03	1.30	0.49	0.85
Intercept	-	0.00	0.00	0.00	0.00	0.00
R-square	-	0.90	0.01	0.33	0.18	0.35
Correl	^SP500	^Dow30	WhatsX?	INTC	KO	MMM
^SP500		0.95	0.12	0.57	0.42	0.59
^Dow30			0.08	0.56	0.48	0.68
WhatsX?				0.07	0.16	0.06
INTC					0.13	0.32
KO						0.35

Step #15	Various Risk-Adjusted Measures of Returns [Step #15]						
Measure	"Market"	^Dow30	WhatsX?	INTC	KO	MMM	RFR
Actual	7.09%	6.39%	3.82%	4.87%	7.59%	10.91%	4.08%
CAPM	8.08%	7.79%	4.21%	9.27%	6.02%	7.47%	4.08%
Jensen	-0.99%	-1.40%	-0.39%	-4.40%	1.57%	3.44%	<= "alpha"
Treynor	0.03	0.02	-0.08	0.01	0.07	0.08	
Sharpe	0.17	0.15	-0.06	0.02	0.23	0.25	
M2	0.07	0.07	0.03	0.04	0.08	0.08	
IR	n/a	n/a	n/a	-0.08	0.04	0.16	



KO, MMM are above the SML, means that they would be considered under-valued

INTC is below the SML, means that it would be considered over-valued

^SP500 and ^Dow30 are significantly over-valued relative to the SML.

Year	Annual Dividends	dividend growth
2000	\$0.3400	-
2001	\$0.5400	58.82%
2002	\$0.4000	-25.93%
2003	\$0.4400	10.00%
2004	\$0.5000	13.64%
2005	\$0.5600	12.00%
2006	\$0.6200	10.71%
2007	\$0.6800	9.68%
2008	\$0.7600	11.76%
2009	\$0.8200	7.89%
2010	\$0.8800	7.32%
2011	\$0.9400	6.82%
2012	\$1.0200	8.51%
2013	\$1.1200	9.80%
2014	\$1.2200	8.93%
2015	\$1.3200	8.20%
2016	\$1.4000	6.06%
2017	\$1.4800	5.71%
2018	\$1.5600	5.41%
2019	\$1.6000	2.56%
2020	\$1.6400	2.50%
2021	\$1.6800	2.44%
2022	\$1.7600	4.76%
2023	\$1.8400	4.55%
2024	\$1.9400	5.43%
2025	\$2.0400	5.15%
Average =		8.11%

Stock Valuation Using DDM (with constant dividend growth gc) Phase3 Step #14

Projections and assumptions

D0 =	\$2.0400
gc =	8.11%
kd =	5.84%
RPM =	4.00%
ke =	9.84%

based on Moody's Credit Rating A1
Market Risk Premium
ke ~ kd + RPM

Rating	Yields
0	Aaa 5.47%
1	Aa1 5.56%
2	Aa2 5.66%
3	Aa3 5.75%
4	A1 5.84%
5	A2 5.93%
6	A3 6.03%
7	Baa1 6.12%
8	Baa2 6.21%

<https://www.moodys.com/entity/185500/overview>

Notation:

Inputs

$$PV(stock) = \frac{D_1}{k_e - g_c} = \frac{D_0(1 + g_c)}{k_e - g_c}$$

assumed discount rate ke	k1	9.34%
	k2	9.59%
	ke	9.84%
	k4	10.09%
	k5	10.34%

Dividends

D0	\$2.0400	\$2.0400	\$2.0400	\$2.0400	\$2.0400	\$2.0400
D1	\$2.0400	\$2.0686	\$2.0971	\$2.1257	\$2.1542	\$2.1828

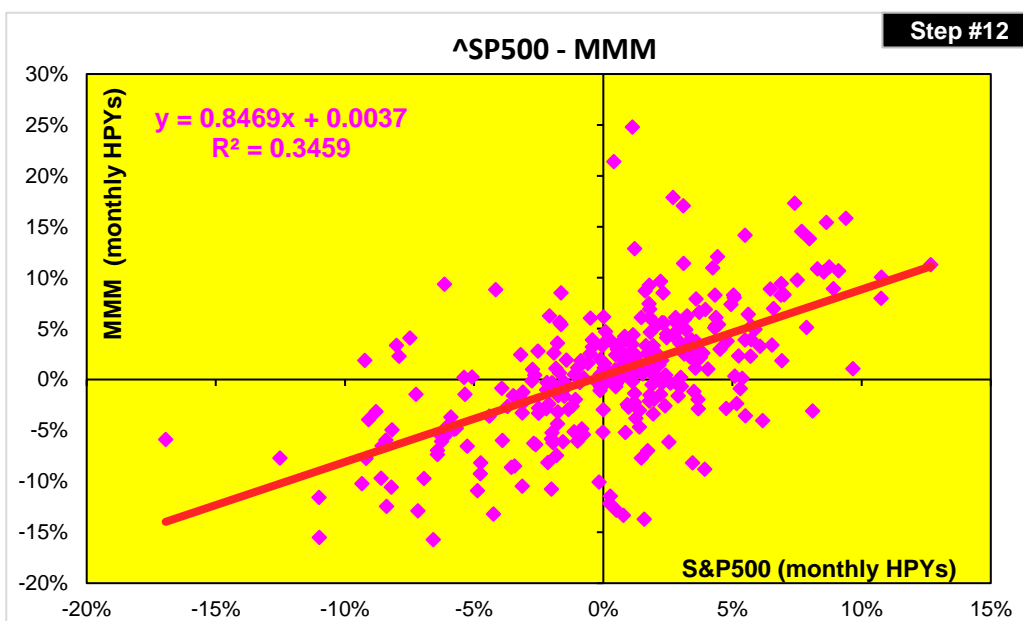
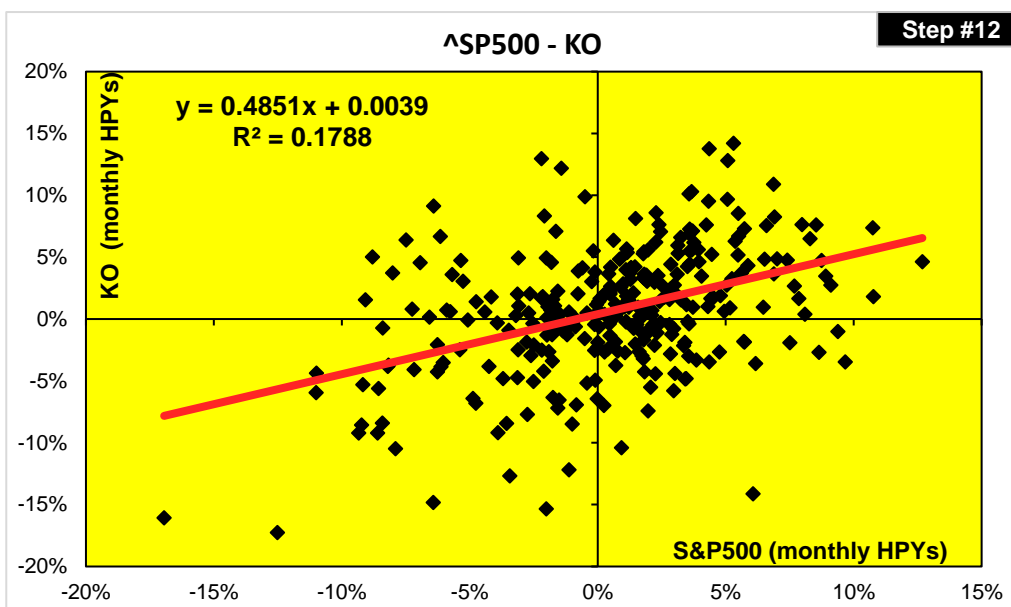
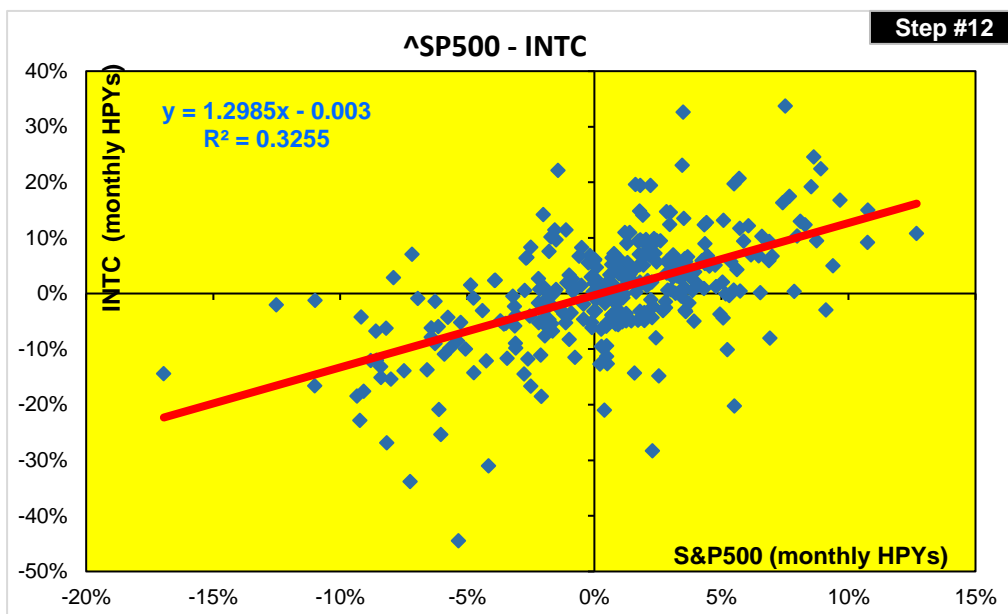
assumed dividend growth rates gc						
gc0	gc1	gc2	gc3	gc4	gc5	
0.00%	1.40%	2.80%	4.20%	5.60%	7.00%	
\$21.84	\$26.05	\$32.07	\$41.36	\$57.60	\$93.28	
\$21.27	\$25.26	\$30.89	\$39.44	\$53.99	\$84.28	
\$20.73	\$24.51	\$29.79	\$37.69	\$50.81	\$76.86	
\$20.22	\$23.80	\$28.77	\$36.09	\$47.98	\$70.64	
\$19.73	\$23.14	\$27.81	\$34.62	\$45.45	\$65.35	

DDM Valuation V0

<06/01/2025>

actual stock price:

P0 = \$72.12

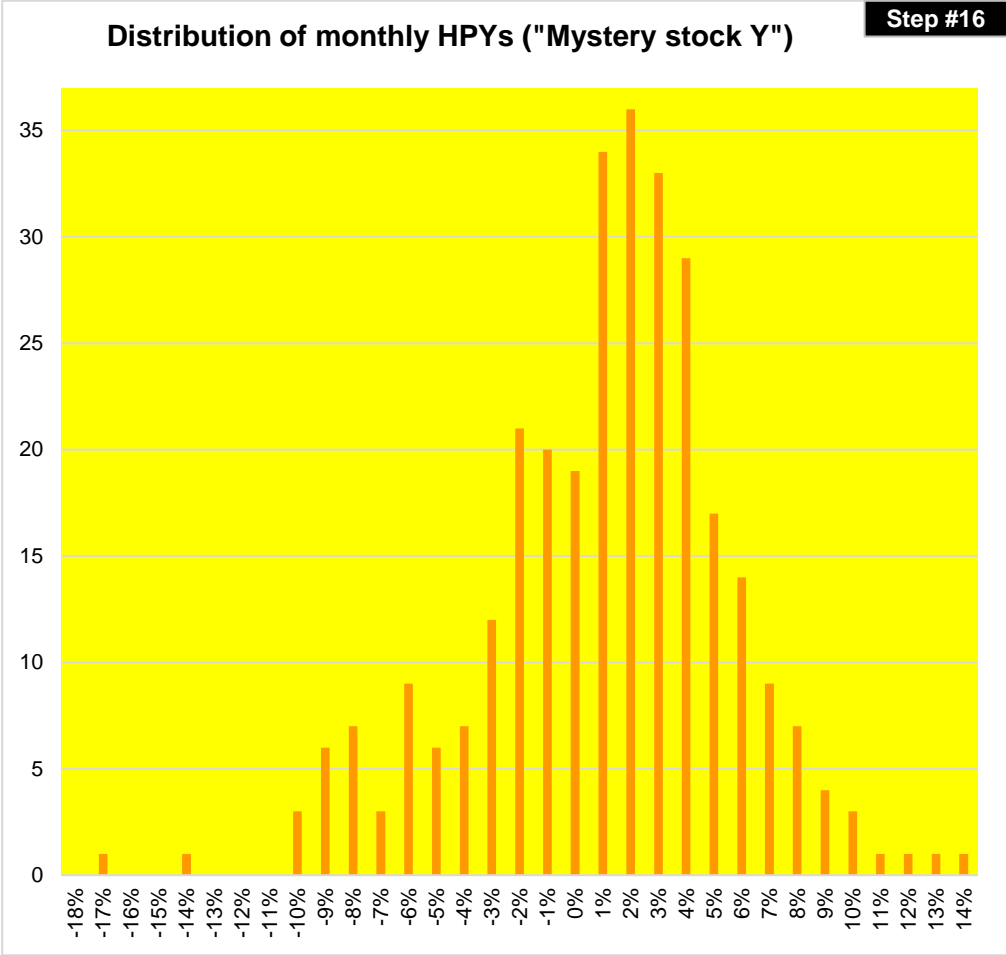


Step #16: Histogram Analysis of Monthly HPYs: is a stock's returns normally distributed?

MinHPY	MaxHPY	Mystery
-17.74%	13.38%	Stock Y

BinStart	BinEnd	BinWidth
-18%	14%	1%

Bin	Frequency
-18%	0
-17%	1
-16%	0
-15%	0
-14%	1
-13%	0
-12%	0
-11%	0
-10%	3
-9%	6
-8%	7
-7%	3
-6%	9
-5%	6
-4%	7
-3%	12
-2%	21
-1%	20
0%	19
1%	34
2%	36
3%	33
4%	29
5%	17
6%	14
7%	9
8%	7
9%	4
10%	3
11%	1
12%	1
13%	1
14%	1
TOTAL:	305



Step #16