ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

MGT-482 Principles of Finance Assignment 1

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1 Part 1

Table TAB1 and figure FIG1 show that the equally-weighted portfolio has a very low volatility (between the lowest of the stocks) and a return equals to the mean of all the stocks it's composed by. Hence, with small risk, we can expect a goor return average.

	Mean annual return	Annual standard deviation
AAPL	0.295204681	0.330266353
C	-0.061165009	0.519979071
GE	0.074013637	0.289231592
JNJ	0.099082103	0.140028396
JPM	0.121412471	0.300971212
MSFT	0.122237352	0.249548908
ORCL	0.143860162	0.24154256
PFE	0.083478109	0.189454886
PG	0.069765875	0.153931446
T	0.09555937	0.173152936
WFC	0.134926001	0.319754747
XOM	0.059770094	0.164580417
Portfolio	0.103178737	0.177393884

Table 1: Annual return and annual standard deviation for each stock and the equally-weighted portfolio

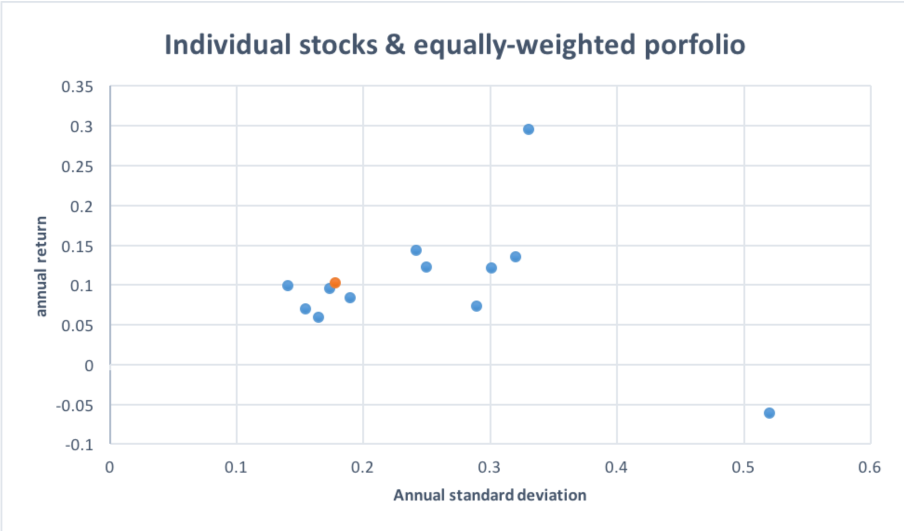

Figure 1: *Comparison between individual stocks return and variation and equally-weighted portfolio containing all of these stocks.*

2 Part 2

Comparing tables TAB2 and TAB3 we notice that short sales allow use to decrease the volatility of a portfolio. The figure FIG2 illustrates this behavioure, indeed, we can see that for a same return the curve is shifted one the left, which means lower standard deviation of the return.
Let's notice that in table TAB2 there are no weights provided for a portfolio return of 40% because the Excel Solver was not able to find a solution. Indeed, a look at table TAG1 show us that the stock with more return is AAPL, with a return of 29.52% then, even by having a portfolio containing 100% of this stock we cannot acchieve the desired 40% of return.

	0.9	0.11	0.13	0.15	0.2	0.25	0.3	0.4
AAPL	0.0243	0.0990	0.1731	0.2532	0.4990	0.7472	1.0000	-
C	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-
GE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-
JNJ	0.3786	0.4426	0.5049	0.5419	0.4158	0.1309	0.0000	-
JPM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-
MSFT	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-
ORCL	0.0000	0.0002	0.0002	0.0002	0.0002	0.0000	0.0000	-
PFE	0.0255	0.0182	0.0108	0.0000	0.0000	0.0000	0.0000	-
PG	0.1645	0.1068	0.0458	0.0000	0.0000	0.0000	0.0000	-
T	0.2064	0.1939	0.1816	0.1546	0.0000	0.0000	0.0000	-
WFC	0.0000	0.0143	0.0318	0.0501	0.0850	0.1219	0.0000	-
XOM	0.2008	0.1250	0.0518	0.0000	0.0000	0.0000	0.0000	-

Table 2: Weight of each stock for optimal portfolio with *no short sales* constraint

	0.9	0.11	0.13	0.15	0.2	0.25	0.3	0.4
AAPL	-0.0345	0.0133	0.0603	0.1042	0.2198	0.3354	0.4499	0.6786
C	-0.0481	-0.0834	-0.1190	-0.1546	-0.2434	-0.3320	-0.4213	-0.5994
GE	-0.1844	-0.1906	-0.1969	-0.2031	-0.2185	-0.2342	-0.2501	-0.2830
JNJ	0.3143	0.3555	0.3965	0.4307	0.5270	0.6247	0.7196	0.9100
JPM	0.0333	0.0484	0.0659	0.0792	0.1174	0.1558	0.1926	0.2663
MSFT	0.0331	0.0294	0.0264	0.0203	0.0099	-0.0015	-0.0019	-0.0019
ORCL	0.0029	0.0030	0.0038	0.0218	0.0375	0.0535	0.0668	0.0934
PFE	0.0291	0.0288	0.0262	0.0264	0.0260	0.0218	0.0228	0.0214
PG	0.2435	0.1945	0.1459	0.1013	-0.0175	-0.1355	-0.2552	-0.4943
T	0.2435	0.2331	0.2229	0.2095	0.1807	0.1529	0.1216	0.0617
WFC	0.0877	0.1293	0.1700	0.2107	0.3129	0.4158	0.5178	0.7225
XOM	0.2796	0.2388	0.1981	0.1535	0.0483	-0.0565	-0.1626	-0.3754

Table 3: Weight of each stock for optimal portfolio with no constraint

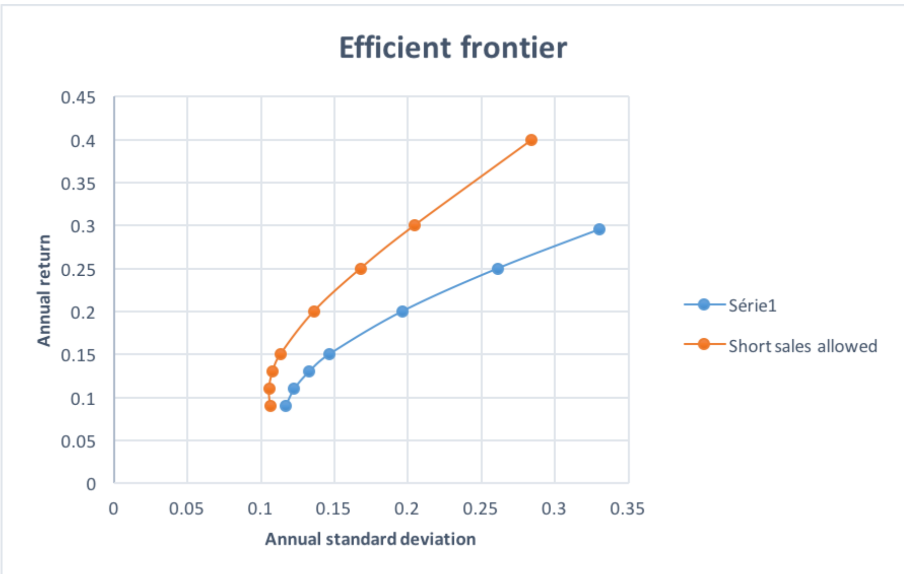

Figure 2: *Efficient frontiers for constrained and non-constrained portfolio.*

3 Part 3

	Constante	Slope	Slope t-stat	adj. R^2	n. obs.	Jensen's α	$E[R_i]$
AAPL	0.0186	1.2145	7.2404	0.3035	119	0.0229	0.0672
C	-0.0167	2.3711	10.3059	0.4714	119	0.0107	0.1122
GE	-0.0012	1.5061	13.8316	0.6173	119	0.0089	0.0785
JNJ	-0.0012	1.5061	13.8316	0.6173	119	0.0089	0.0785
JPM	0.0053	0.6034	9.2967	0.4199	119	-0.0026	0.0434
MSFT	0.0051	1.0336	8.6950	0.3873	119	0.0058	0.0602
ORCL	0.0065	1.1132	10.5183	0.4816	119	0.0088	0.0633
PFE	0.0032	0.7586	8.2347	0.3615	119	-0.0016	0.0495
PG	0.0032	0.5250	6.5148	0.2599	119	-0.0063	0.0404
T	0.0052	0.5727	6.2508	0.2439	119	-0.0034	0.0423
WFC	0.0053	1.2198	7.6430	0.3273	119	0.0097	0.0674
XOM	0.0020	0.6034	7.2086	0.3016	119	-0.0059	0.0434

Table 4: Correlation and statistical analysis of the stock with S&P500.

The β slope coefficient represent the correlation between return of the S&P 500 index and return of each of the stocks. I.e. for a grow in return of 10% in S&P 500 index and AAPL $\beta\% = 1.2$, this means a growth of 12% of the AAPL return.
Adj. R^2 is a statistical value that gives us the trust we can have in the β coefficient. The higher R^2 is, the more correlation exists between S&P 500 and the stock, the more we can expect both of them to have the same behaviour.
Jensen?s α measures the performance of the stock during the regression period. To compute it, we used the following formula :

$$Jensens\alpha = \alpha_i - rf \cdot (1 - \beta_i)$$

Its value can be interpreted as follows :

- $\alpha > 0$, then the stock did better than expected
- $\alpha < 0$, then the stock did worse than expected
- $\alpha = 0$, then the stock did exactly as expected

Looking at the expected return of the stocks and using the formula:

$$r_{premium} = return - r_f$$

a 4.5% risk premium seems reasonable.