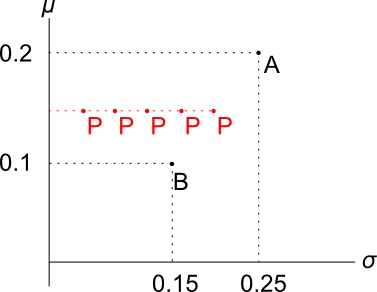
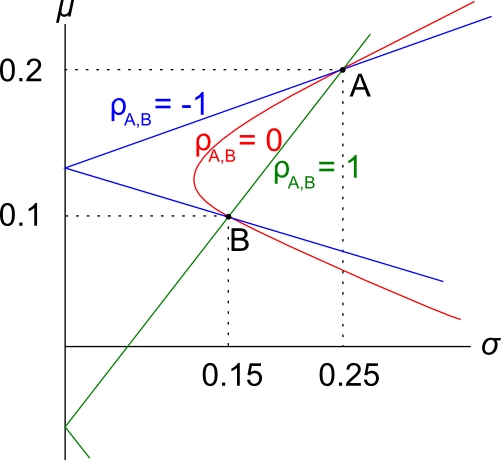
***Portfolios and Diversification***

Let P be a $100 portfolio with $50 invested in A and $50 in B.

* Therefore P is an equal-weighted portfolio in A and B. So:

,

* Return will be exactly halfway at 0.15.
* Standard deviation is likely to be less than halfway (0.2) due to diversification - we didn’t “put all of our eggs in one basket”.
* So P will be somewhere along the dashed red line. The standard deviation of P depends on the **correlation** between A and B.

******

***How Correlation Affects Diversification***

* ******, lots of diversification since A and B move in opposite directions.
* , diversification since A and B move independently and will sometimes cancel each other out.
* , no diversification at all since A and B move with each other in the same ratio. In this case .

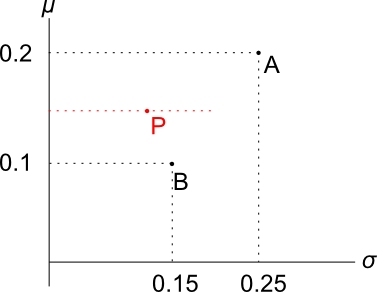
***Portfolio Return and Variance***

Portfolio return for stocks with weights :

Note that the weights must sum to one:

Portfolio variance for **2** stocks with weights and :

***Portfolio Return and Variance Example***

**Question:** Portfolio P in the diagram has a weight of 0.5 in A and 0.5 in B. The correlation between A and B is 0.05. Find the return and variance of portfolio P.

**Answer:**

Since , portfolio variance is:

and

So:

Notice that the standard deviation of P is less than both A and B’s standard deviation. This shows how diversification can lower risk.