



Andreas Krause

Optimal portfolios

Portfolio choice

- ▶ Assets can be characterised by their **expected returns**

- ▶ Assets can be characterised by their expected returns and **risk**

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Portfolio choice

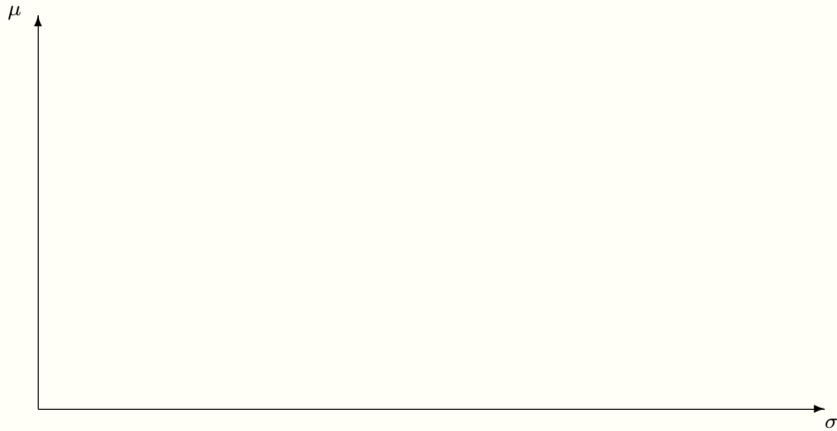
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Portfolio choice

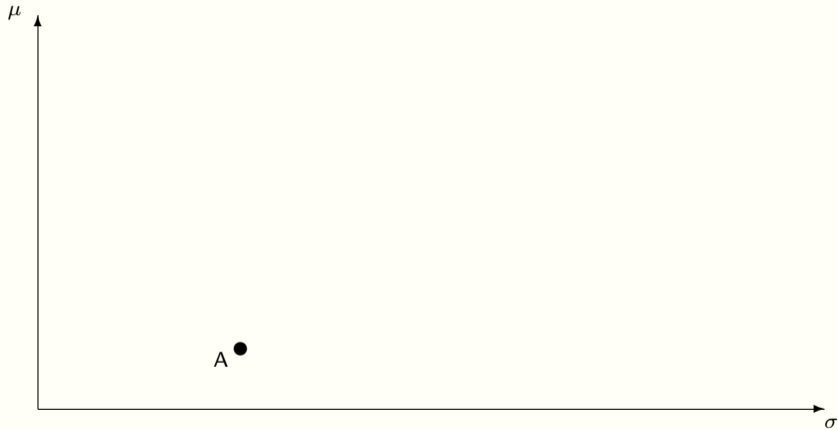
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Portfolios with two assets

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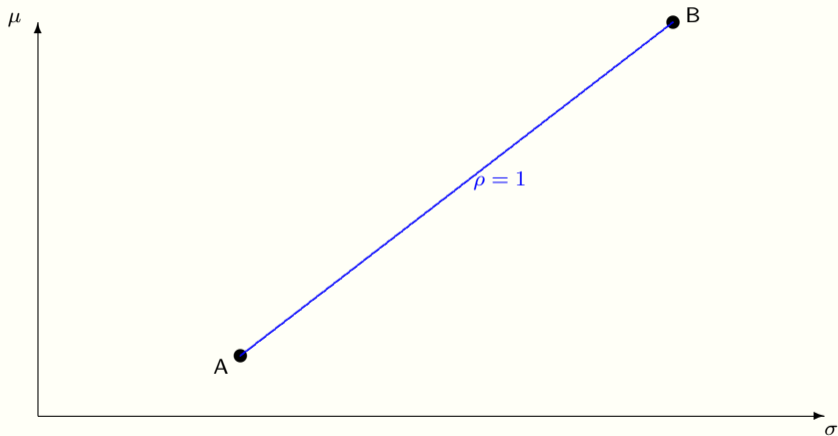
Portfolios with two assets



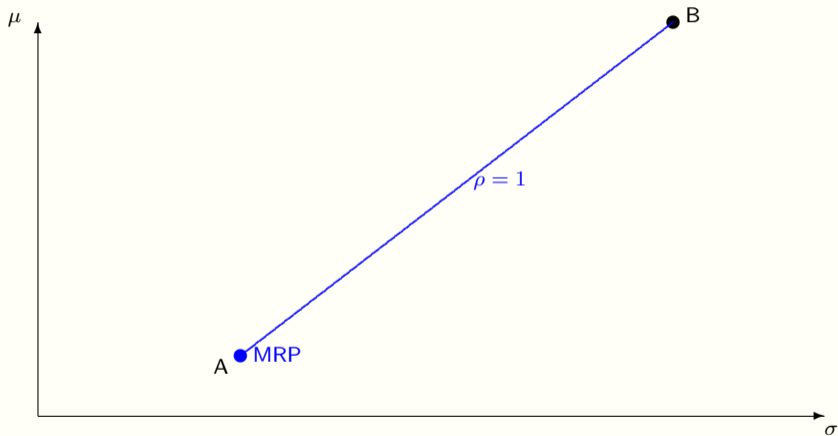
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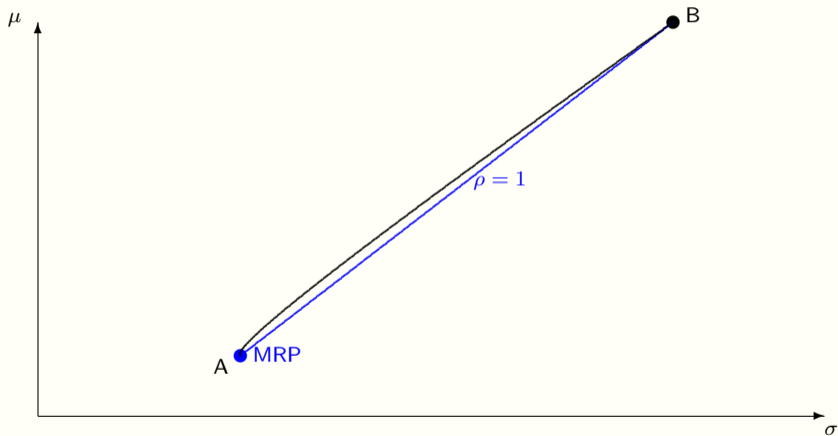
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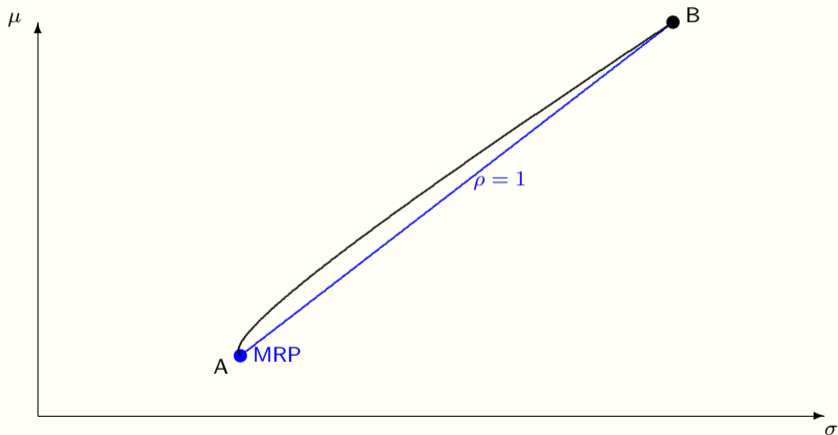
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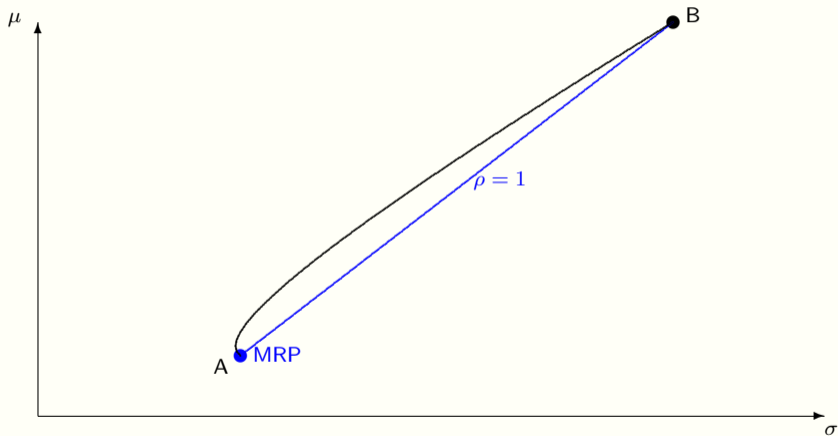
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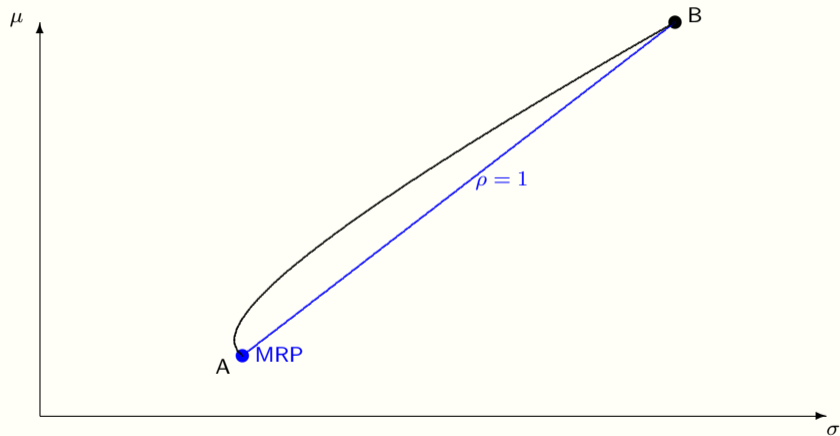
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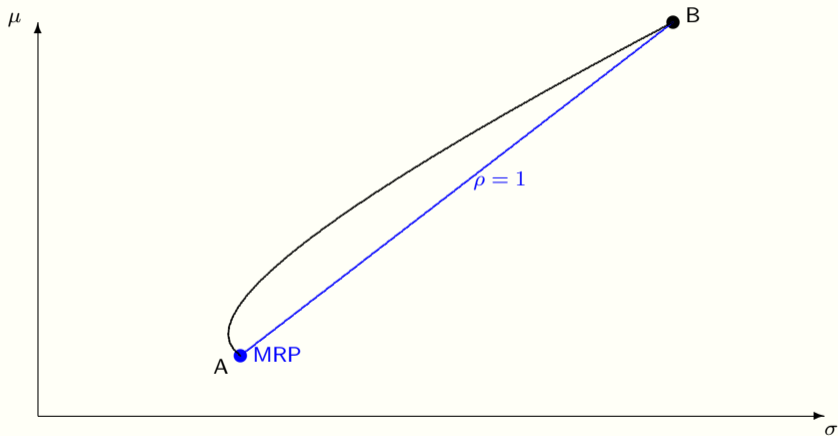
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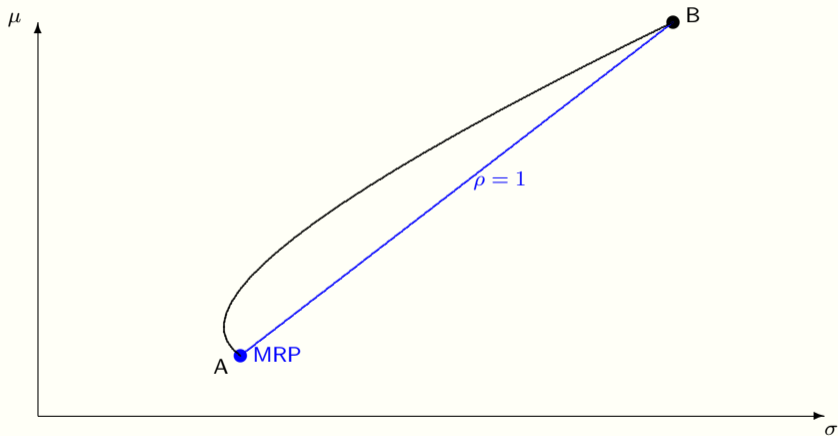
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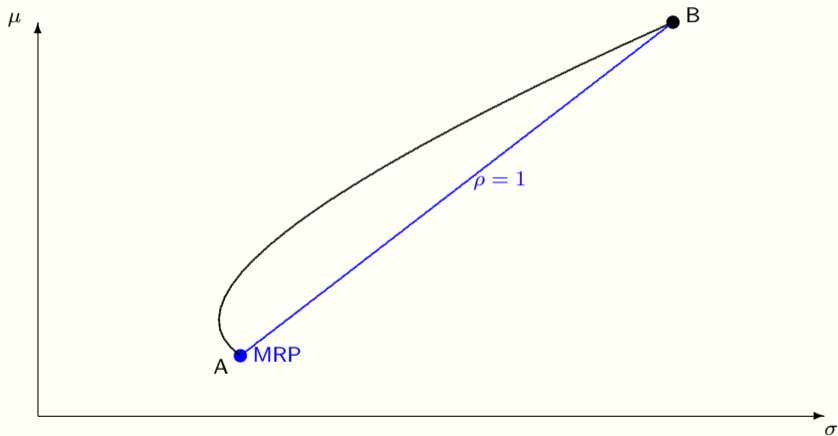
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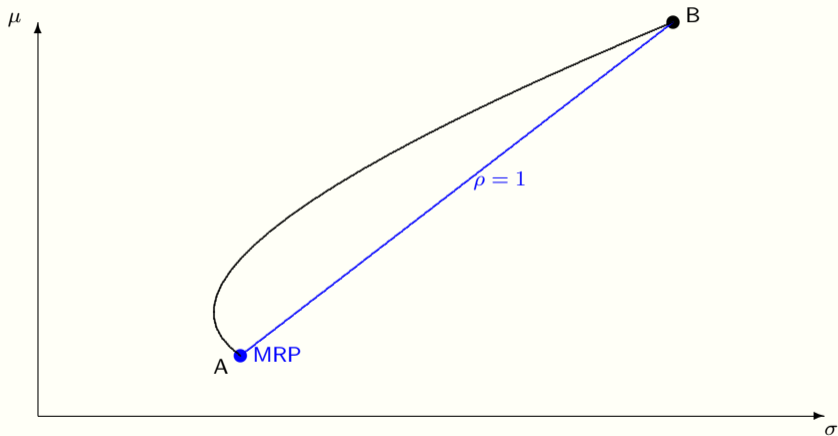
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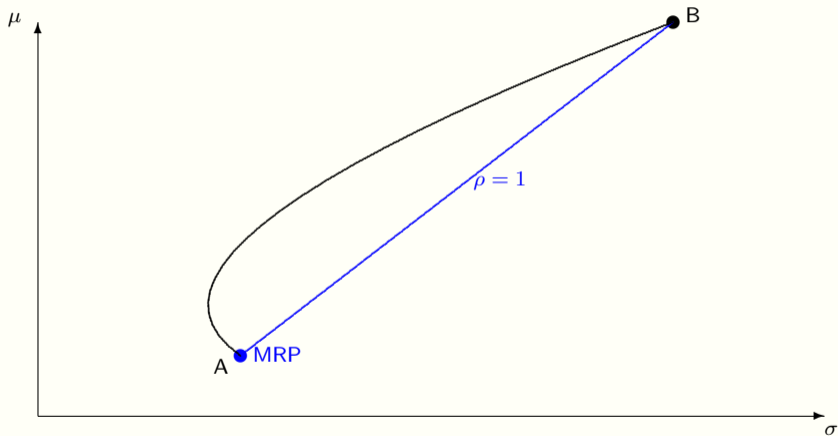
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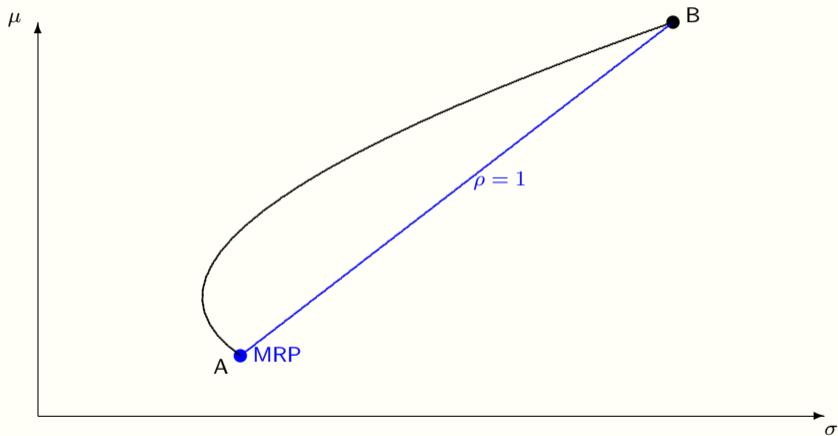
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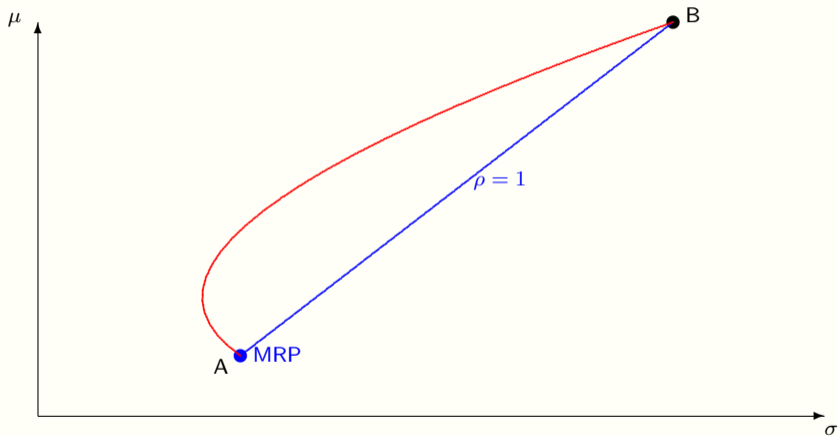
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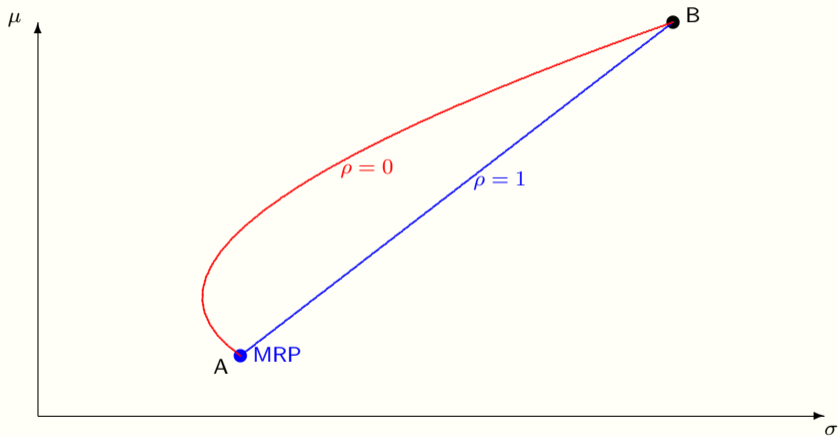
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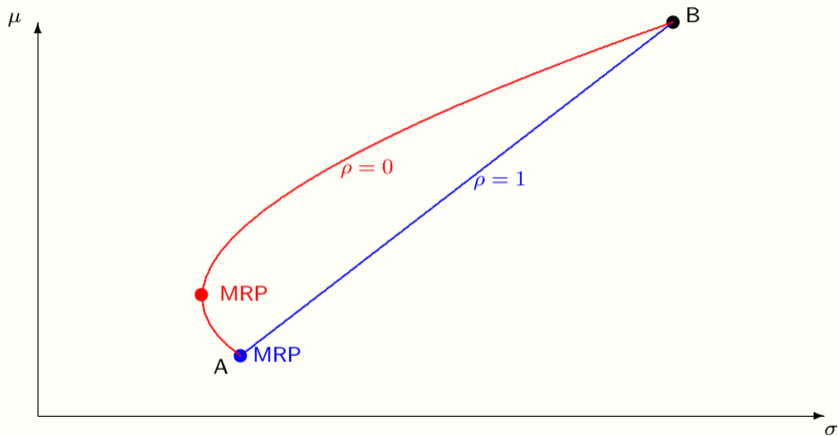
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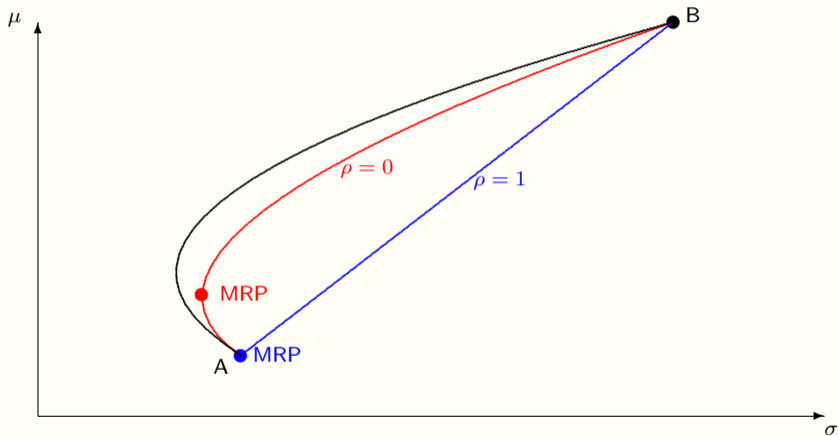
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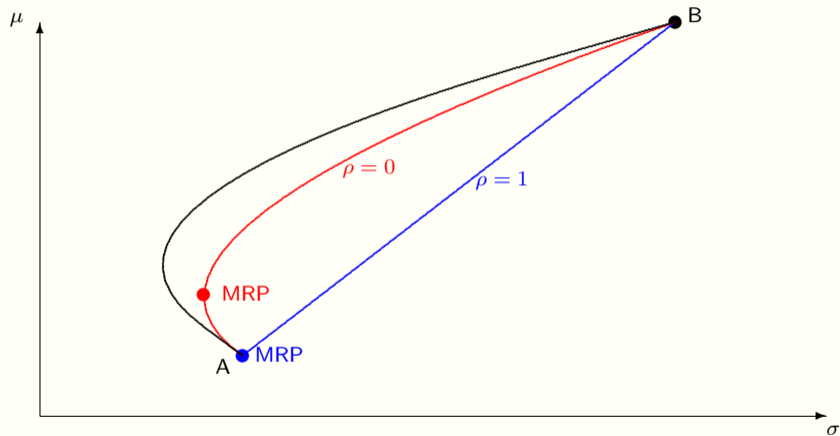
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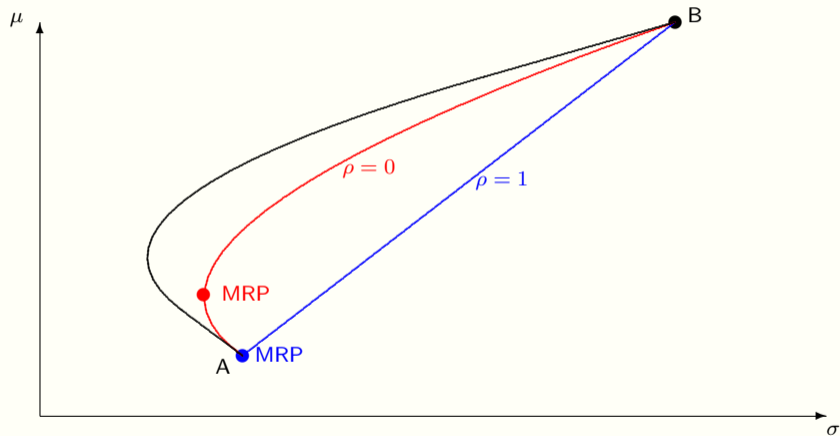
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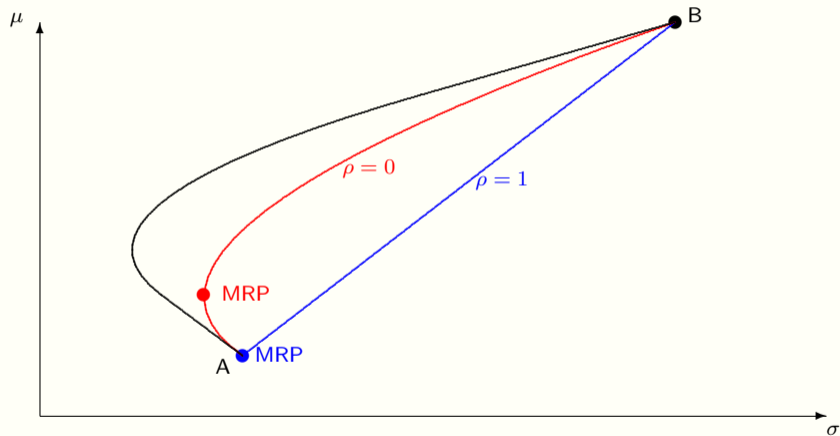
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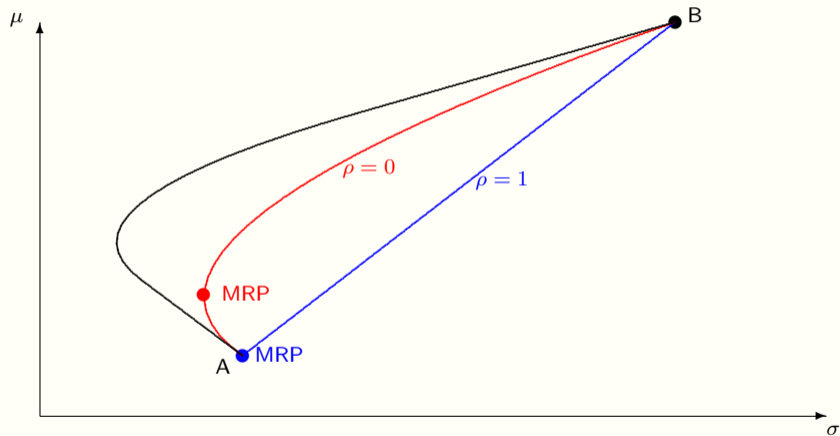
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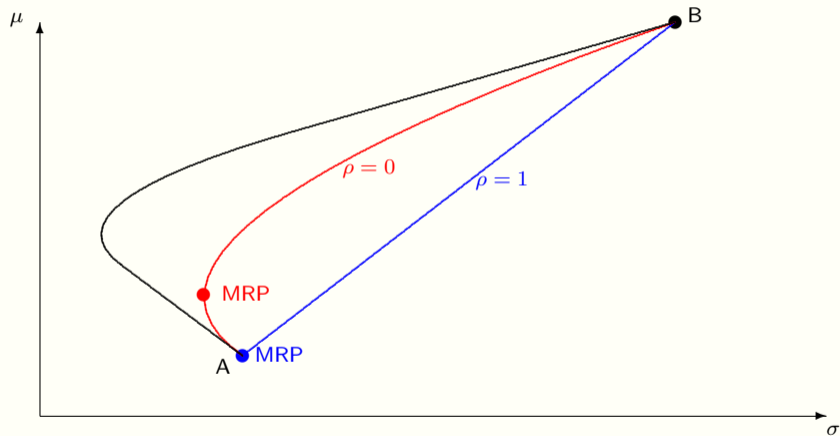
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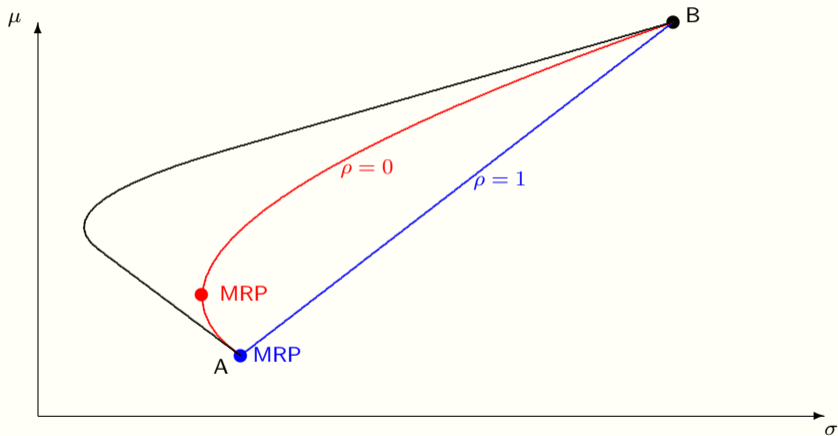
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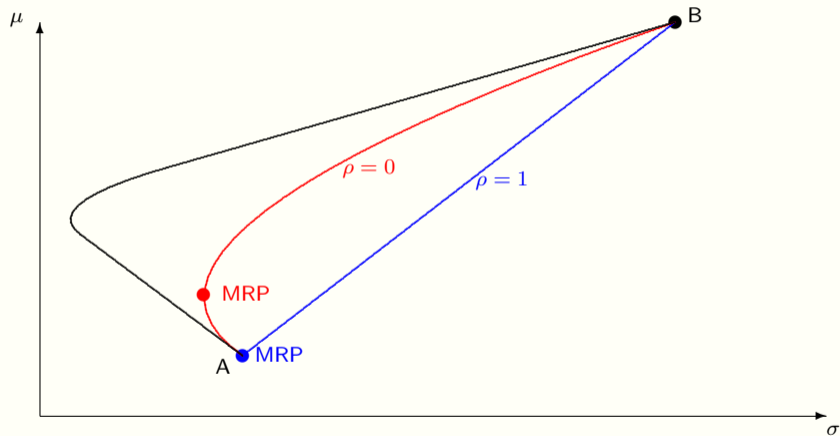
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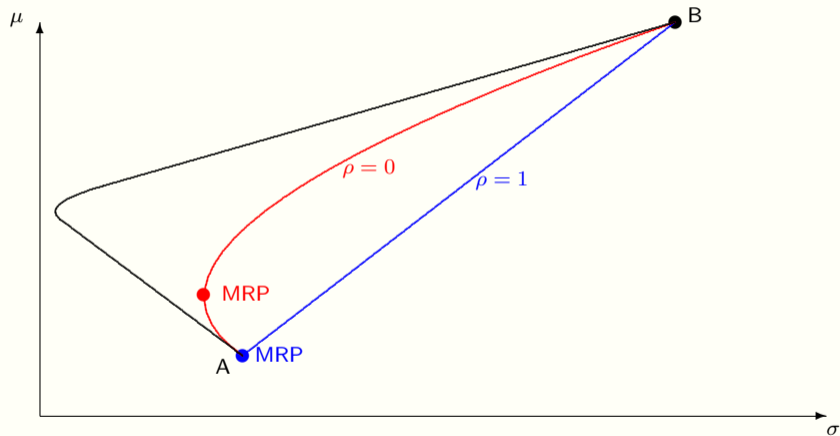
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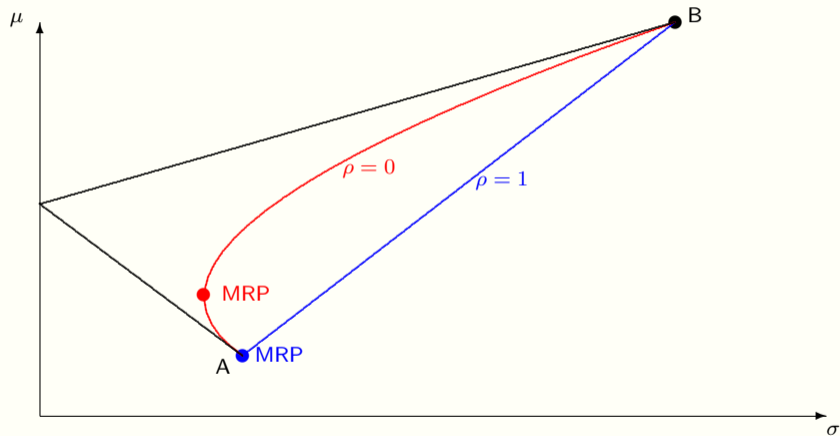
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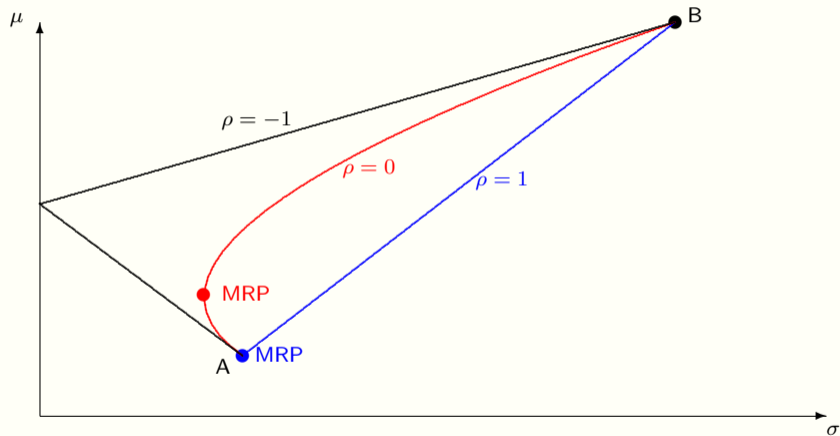
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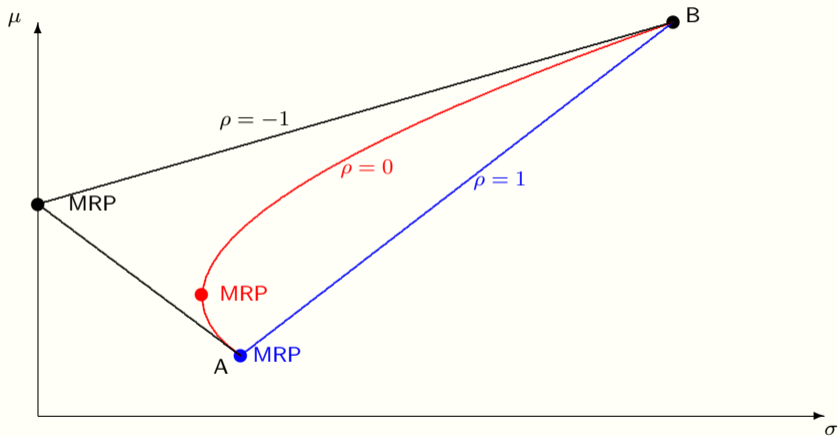
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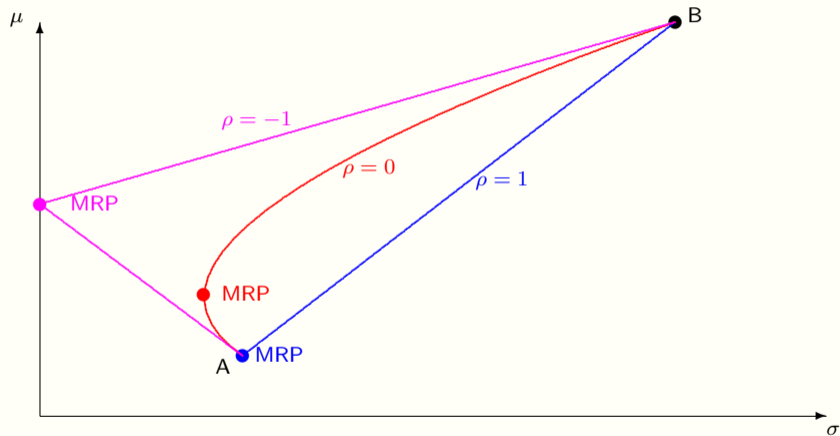
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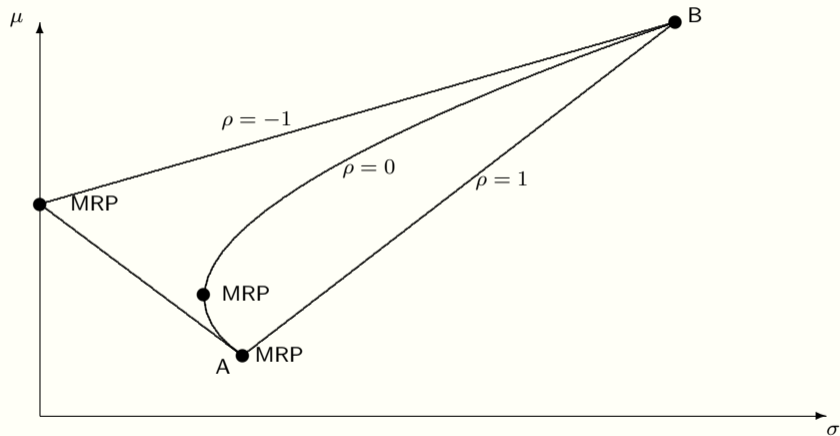
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Correlation of assets and portfolio risk

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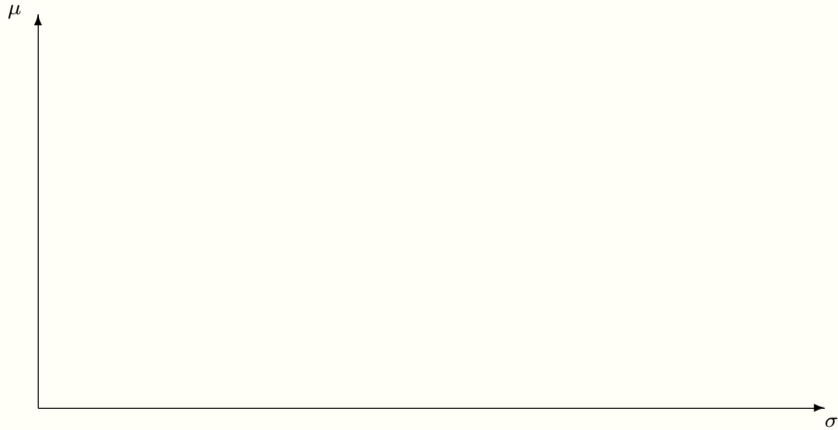
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Portfolio with more assets

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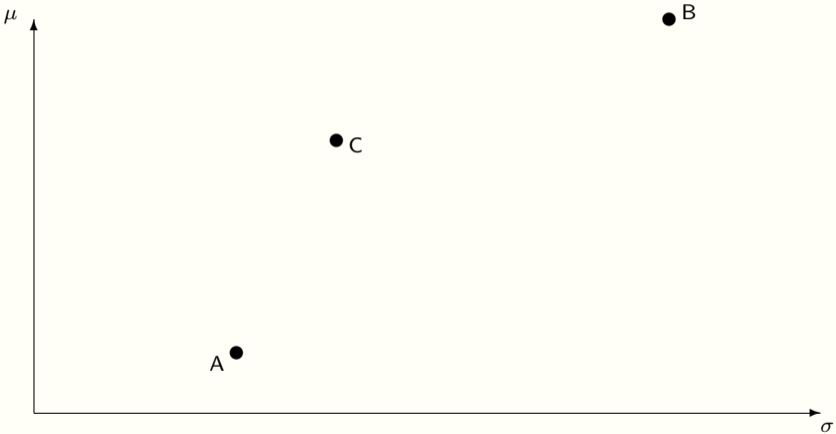
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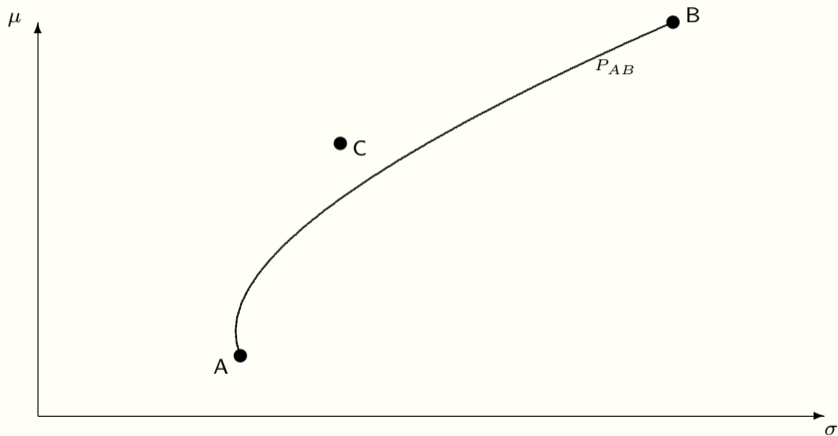
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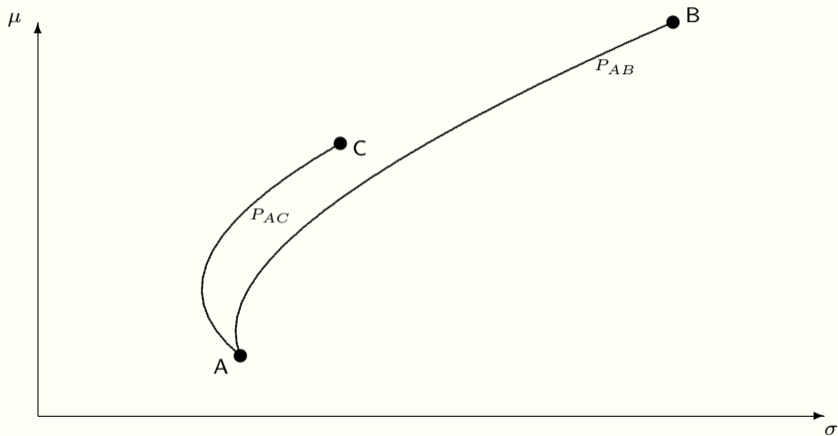
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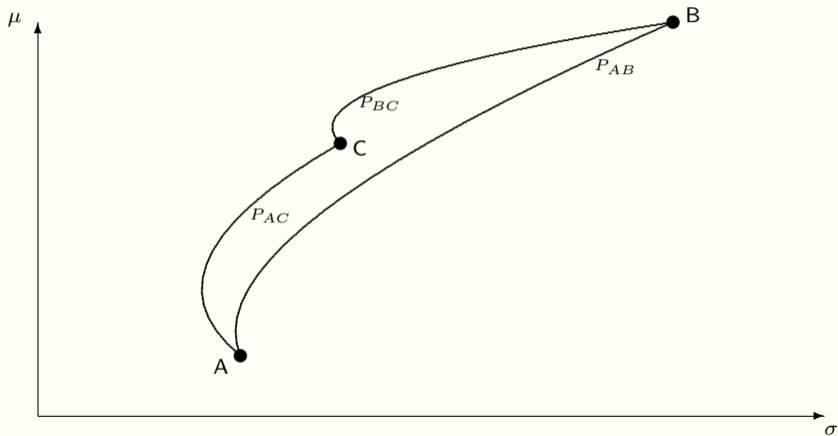
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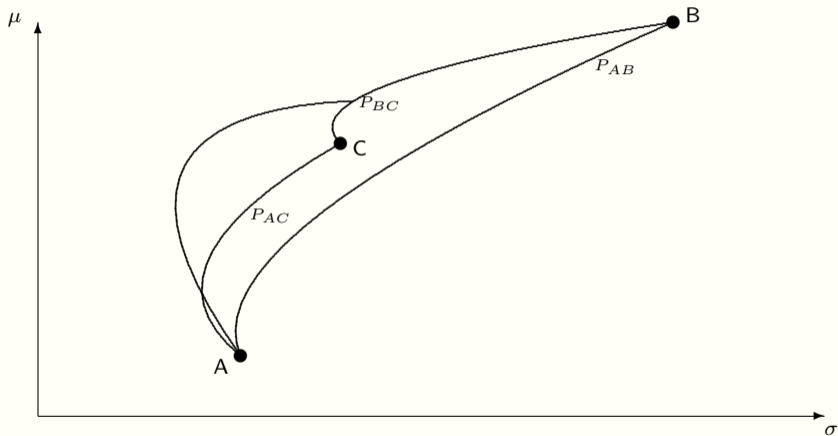
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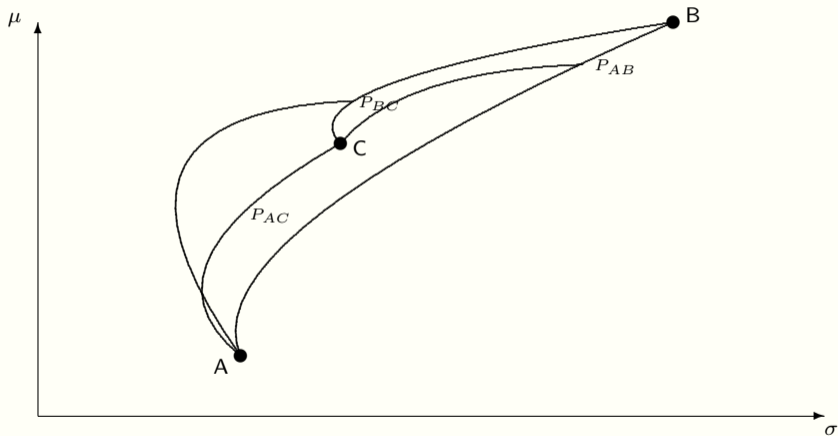
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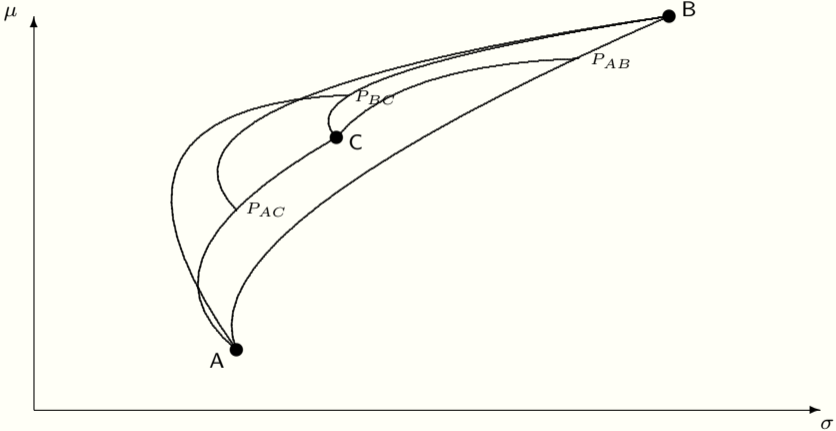
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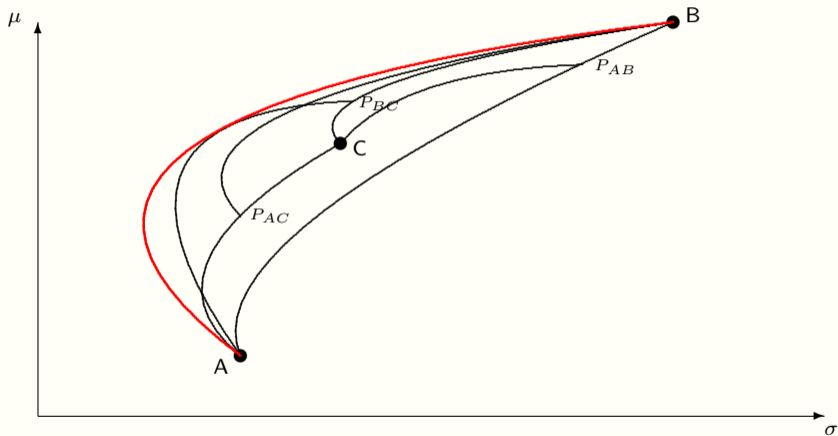
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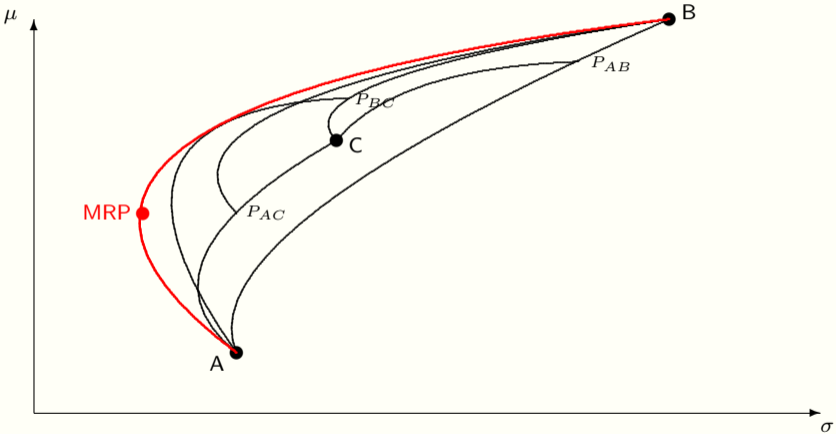
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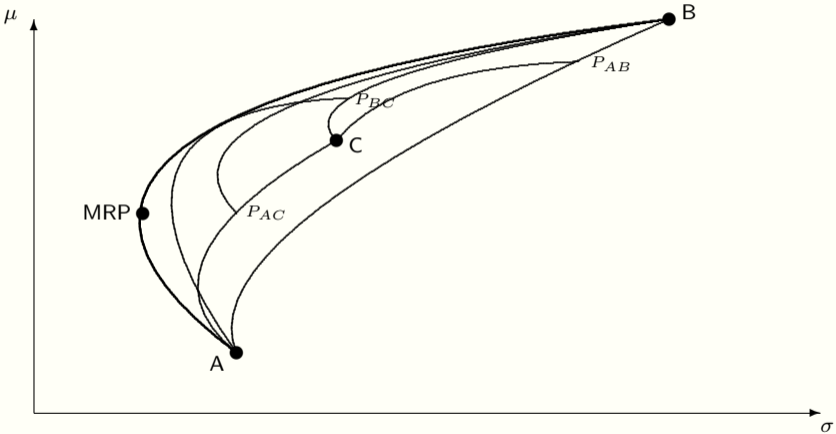
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The effect of diversification

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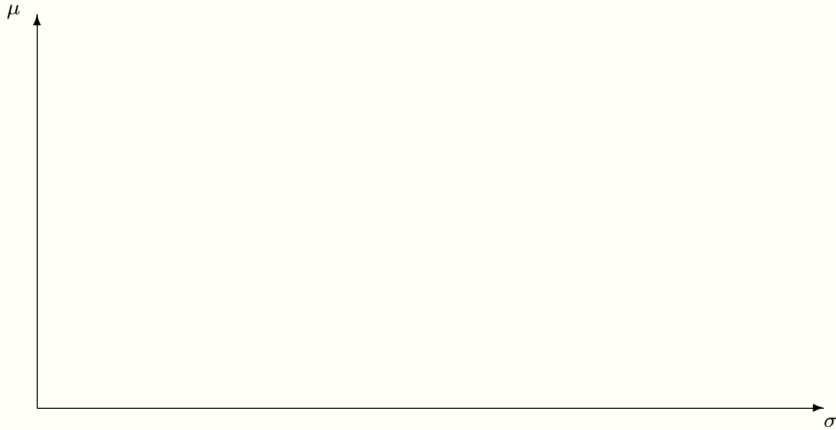
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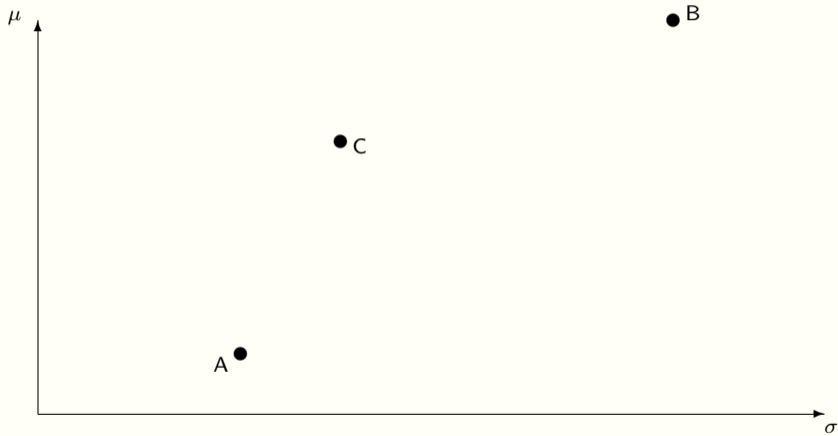
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The optimal portfolio

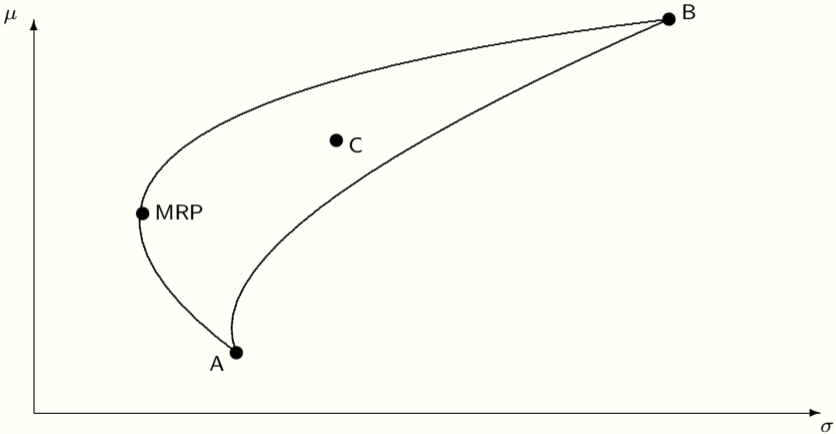
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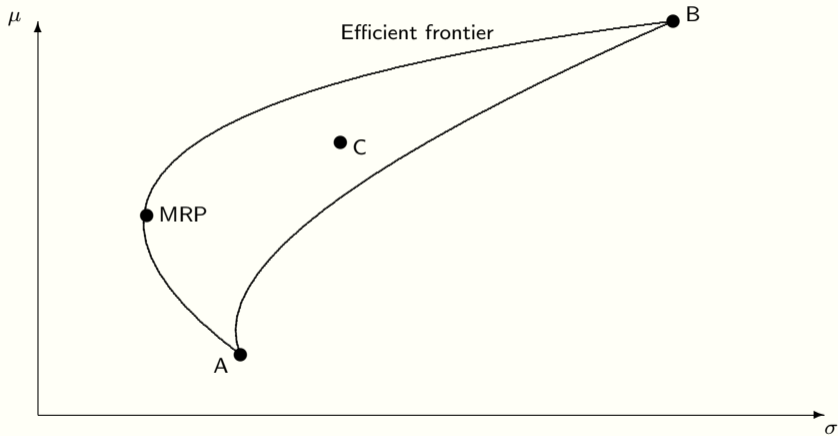
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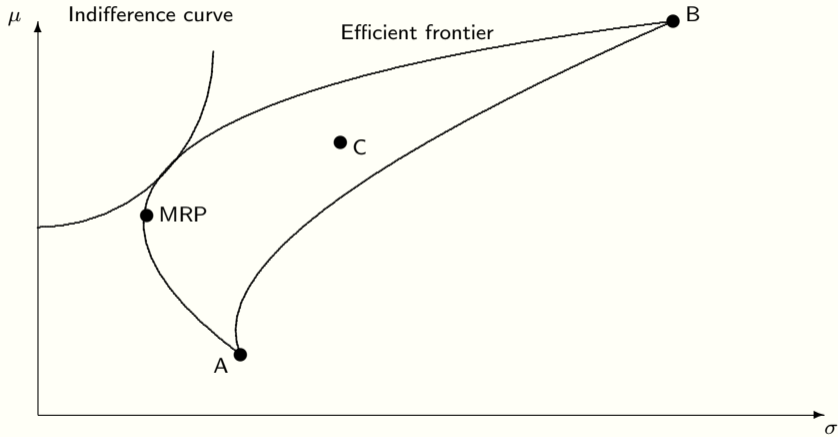
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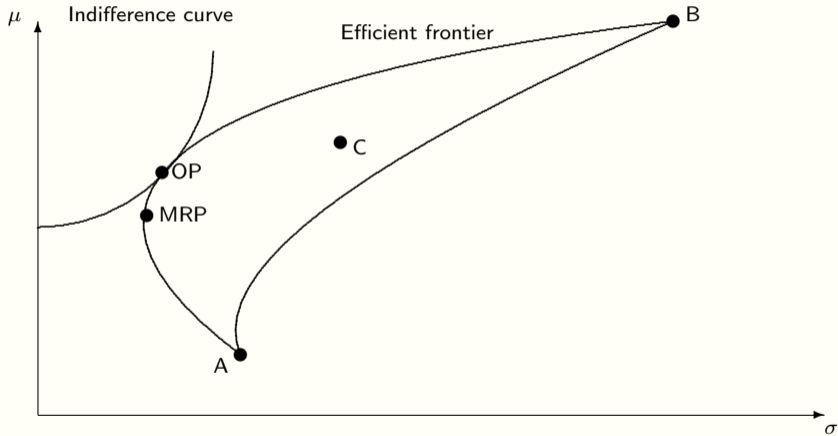
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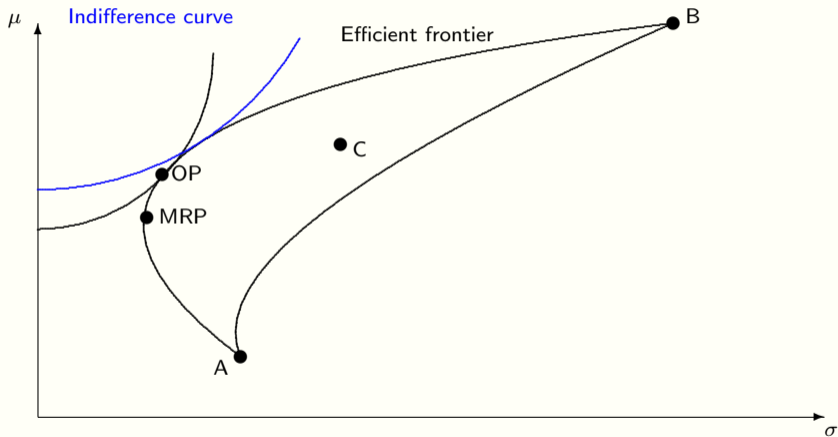
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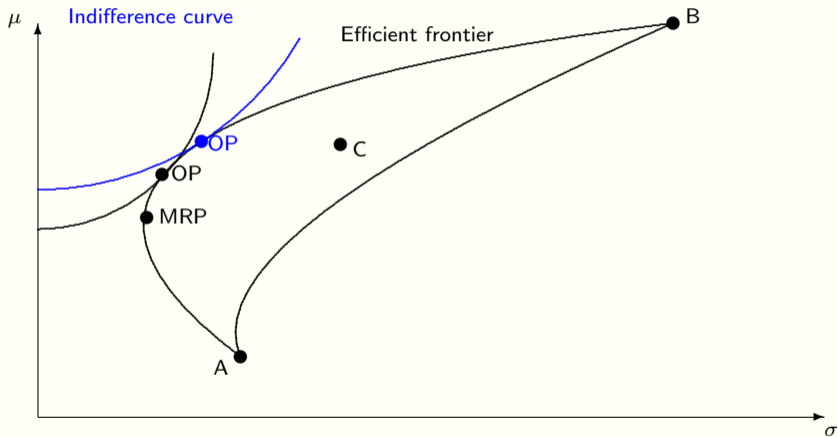
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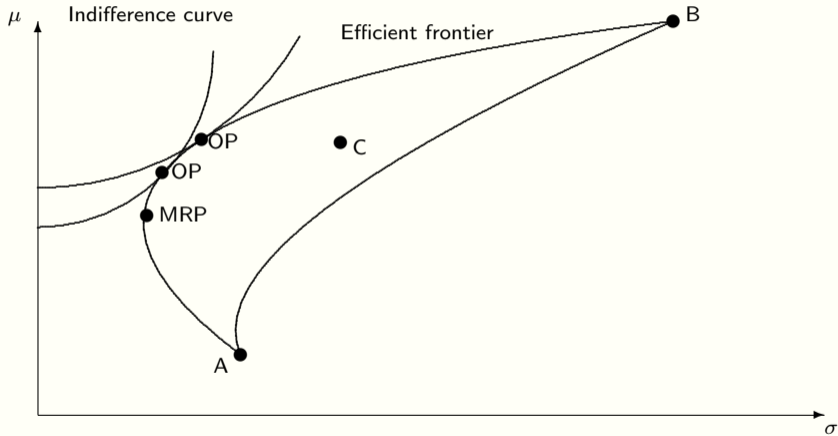
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Optimal portfolios with risky assets

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Optimal portfolios with risky assets

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Optimal portfolios with risky assets

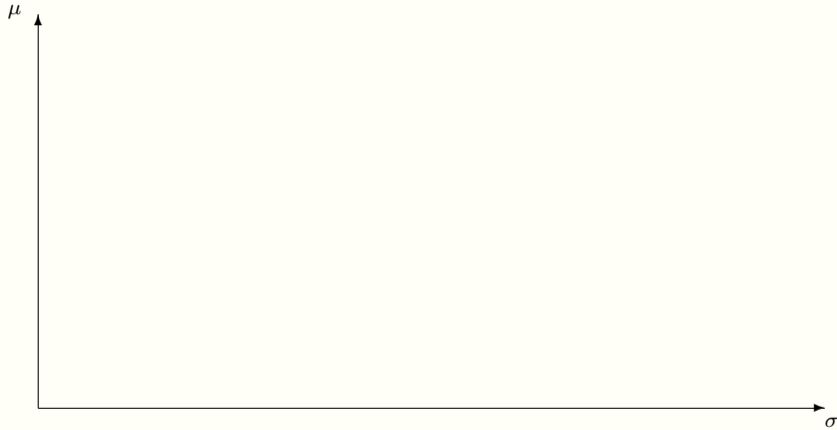
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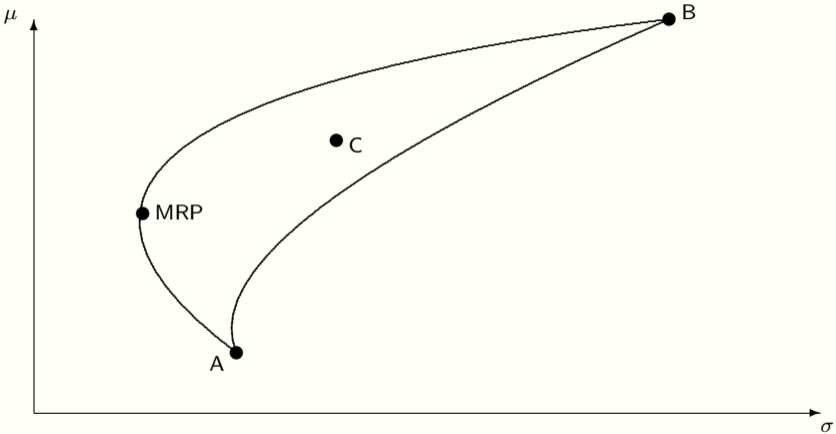
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Portfolios with a risk-free asset

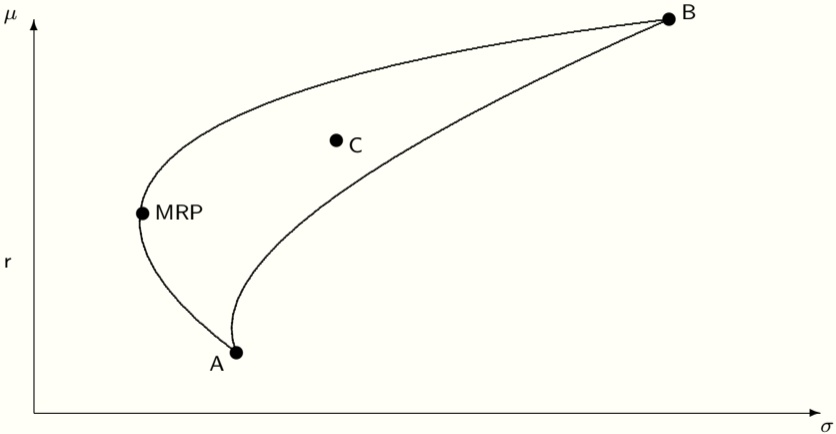
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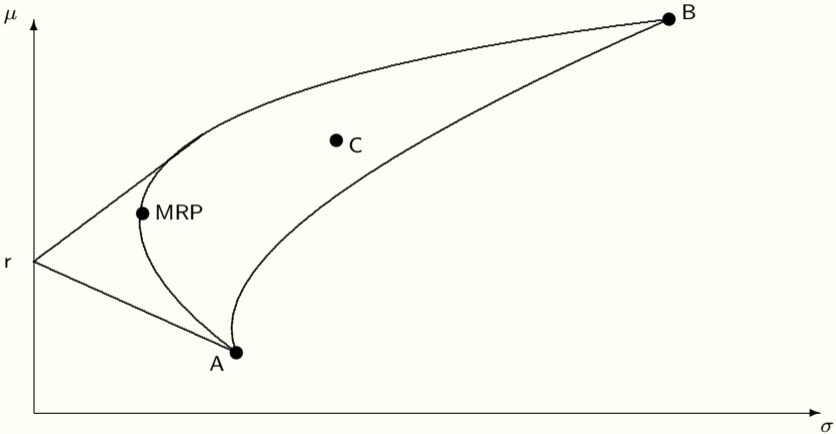
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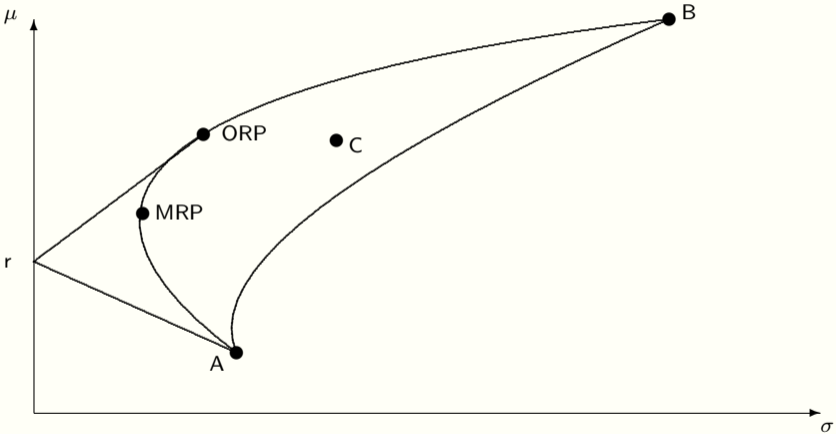
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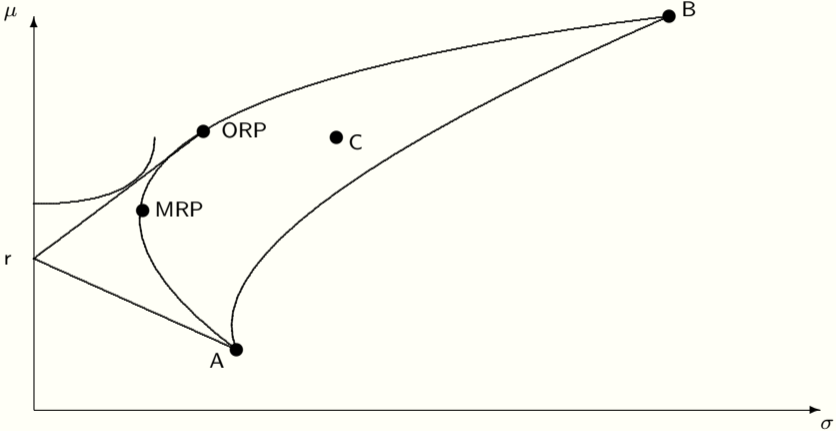
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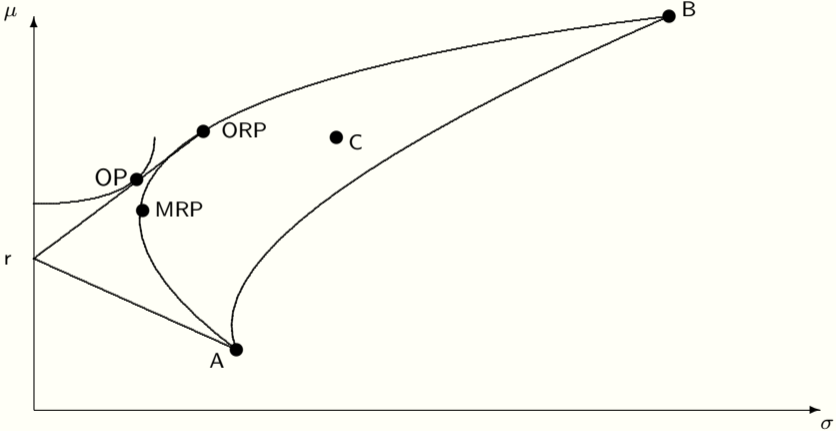
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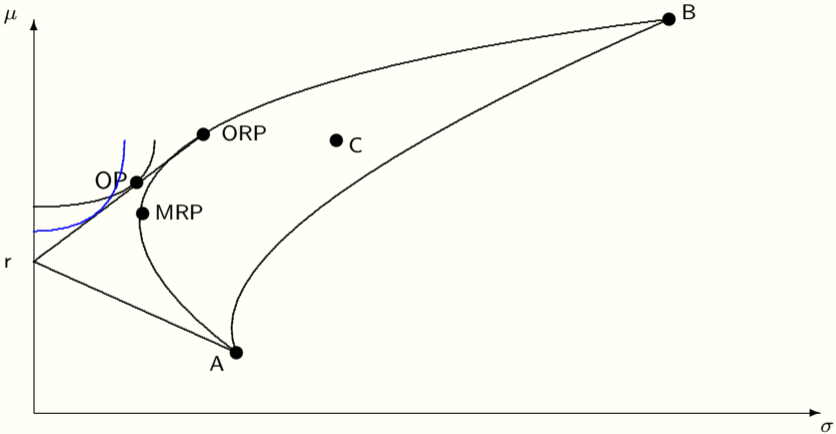
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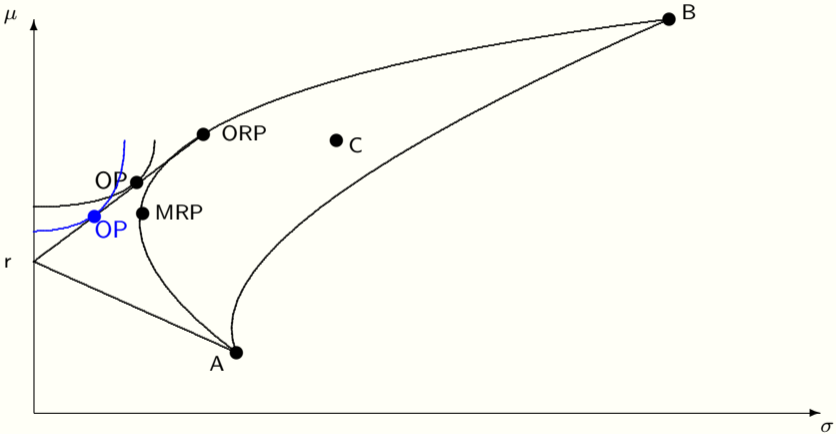
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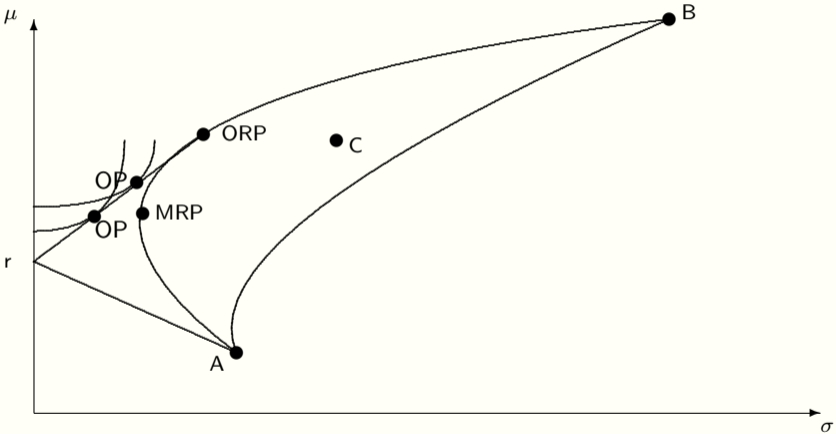
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Portfolios with a risk-free asset



Optimal risky portfolio

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- ▶ A risk-free asset has **no risk**

Optimal risky portfolio

- ▶ A risk-free asset has no risk and **no covariance** with any asset

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- ⇒ The efficient frontier with a risk-free assets is a **straight line**

Optimal risky portfolio

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- ⇒ The efficient frontier with a risk-free assets is a straight line
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- ▶ Only the weights of the risk-free asset and the optimal risky portfolio depends on **individual preferences**

Separation theorem

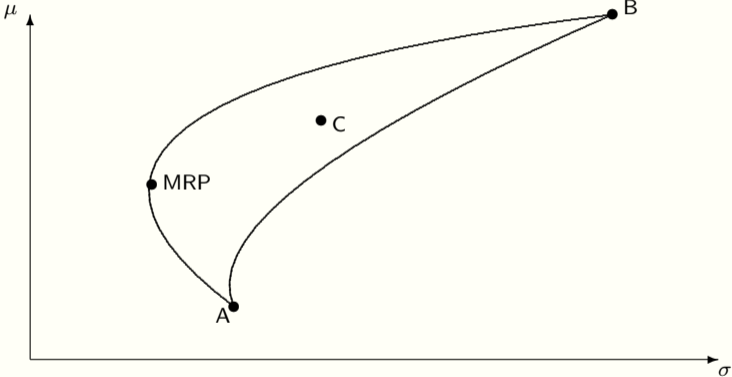
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Optimal portfolio with short sales

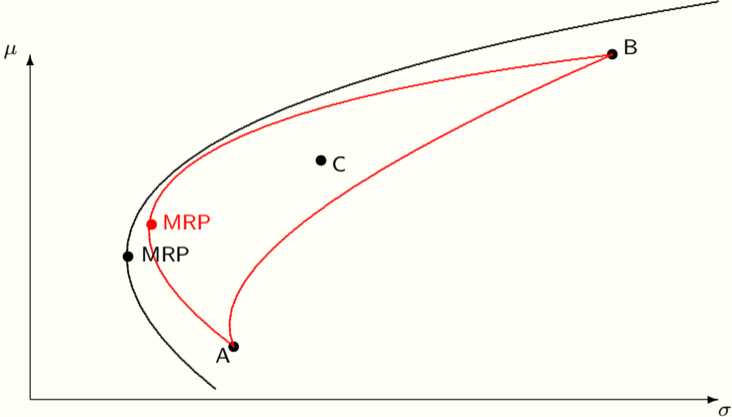
Optimal portfolio with short sales



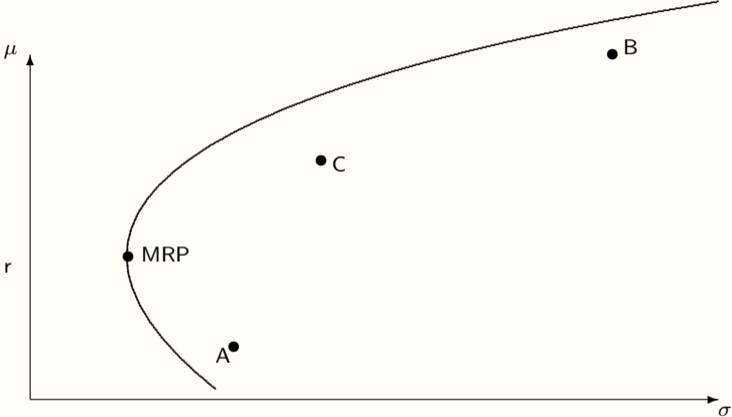
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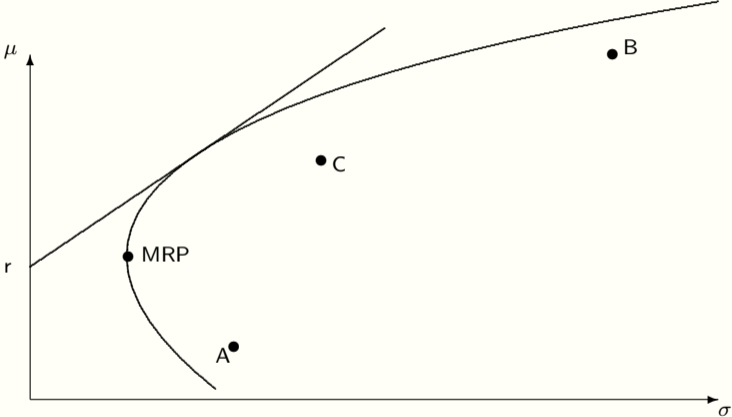
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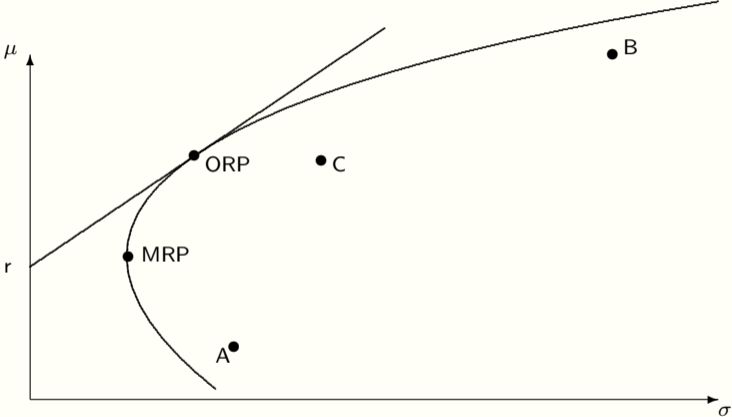
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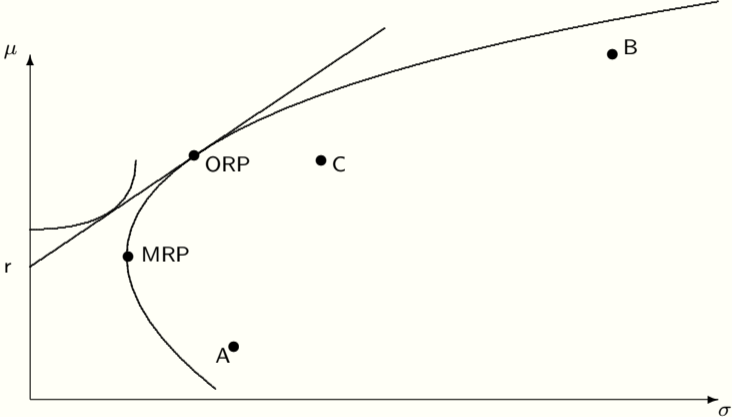
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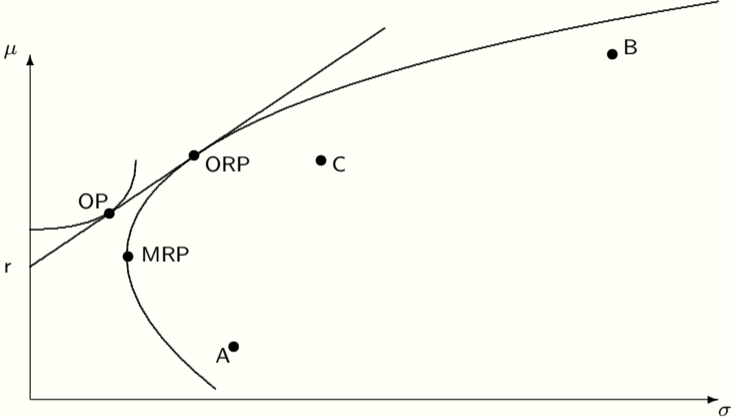
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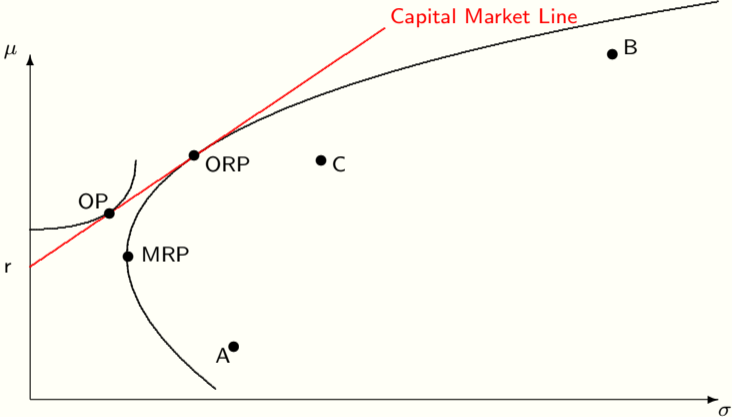
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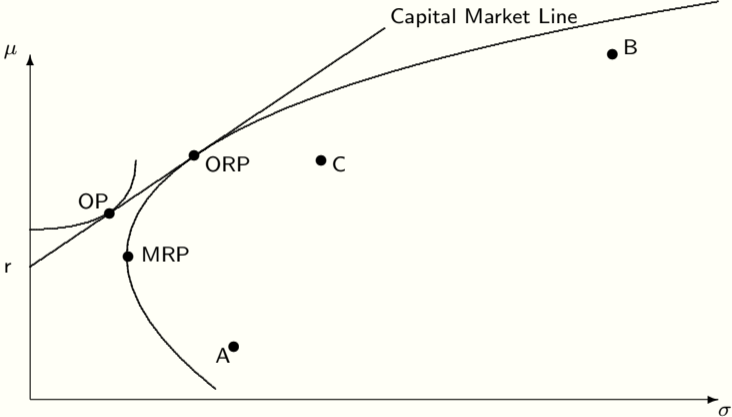
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The effect of short sales

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- ▶ You obtain a loan in form of the asset, sell it for cash, then have to **repay the asset** in the future

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- ▶ Short-sales are occurring if an asset is sold without holding it, giving a negative weight
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The effect of short sales

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