ECON 233 Finance 1- Week 4

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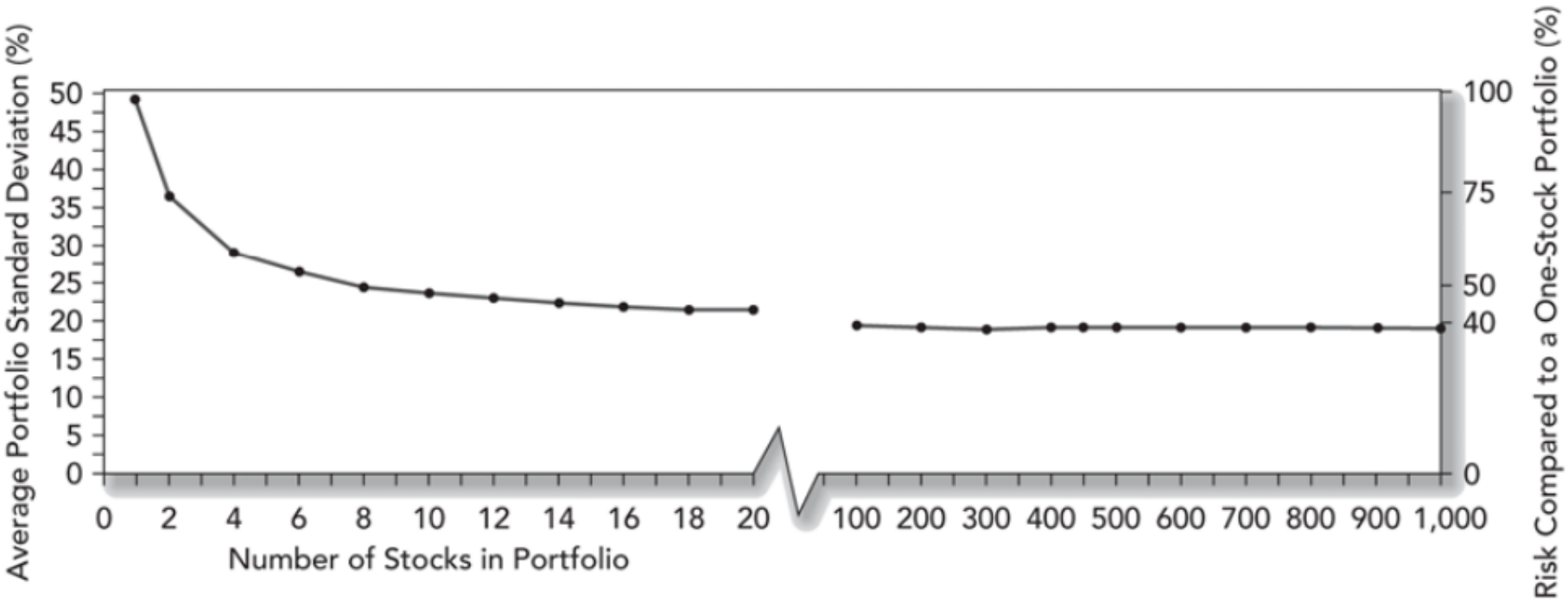
Portfolio Diversification

- Main Principle - Don't put all your eggs in one basket.
- Combining assets can lead to higher returns with at least the same or lower risk.
- Risk can be of two types
  - Idiosyncratic Risk or diversifiable risk
  - Systematic or undiversifiable risk
- Diversification - hold enough kinds of assets so that a random bad day of one can be offset by a random good day of another.
- Only left with systematic risk.

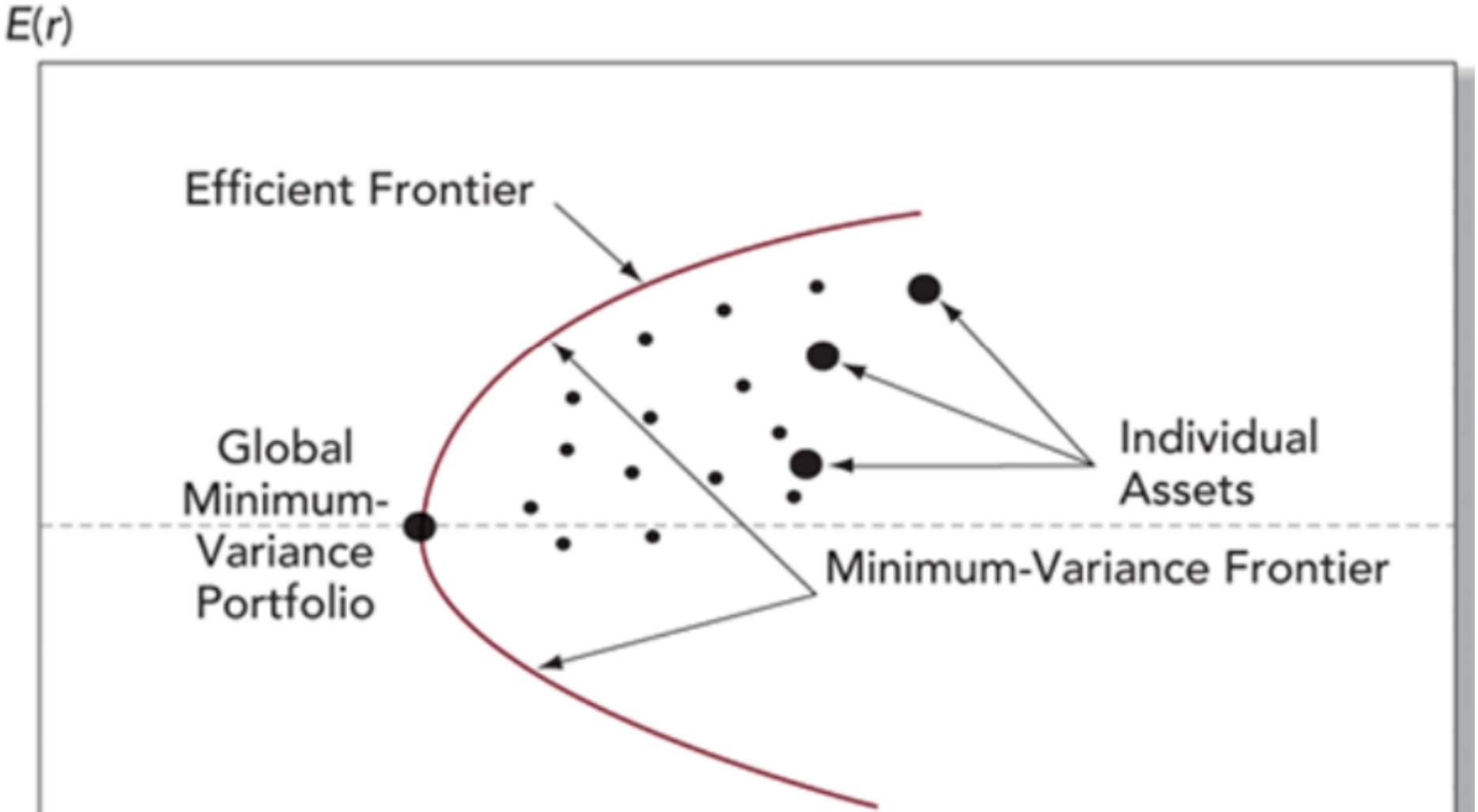
Why can diversification eliminate some risk and not all risk?

- Portfolio diversification can only eliminate diversifiable risk.
- This is the idiosyncratic risk that is specific to individual assets. - e.g., News of acquisition, quarterly earnings, lawsuits, scandals, CEO changing etc.
- Holding enough diverse assets so that sudden bad quarterly earnings report of one company is offset by a more than expected good earnings report by another company.
- **What cannot be diversified?** - Systematic shocks like Covid, FOMC announcements, Capital control announcements etc.

Too diversified?



Why Choose portfolios or Assets on the Efficient Frontier?



Portfolios on the efficient frontier dominate all other portfolios

Why do we maximize the Sharpe ratio when we do portfolio optimization?

- **Sharpe Ratio** - $\frac{r_p - r_f}{\sigma_p}$ - Returns per unit of risk.
- Maximizing Sharpe Ratio means maximising the returns for every unit of risk you take.
- In the universe of assets and portfolios, where do you always want to be? **On the efficient Frontier**
- r_f is fixed. Sharpe ratio of anything is the slope of the line from r_f to said asset.
- You always want to be at the most efficient point (on the frontier) that gives you the maximum reward per unit of risk.

Separation Property

- Your "best" portfolio is a combination of **Two independent parts**.
- **Optimal Risky Portfolio** calculation depends on the universe of available assets and the risk free rate where you maximize the Sharpe Ratio.
- Ideally under perfect information, this is same for everyone.
- Choosing the best (for you) combination of ORP and risk free asset is a **separate** decision based on your personal risk appetite.

Markowitz Portfolio Optimization problem

- **Part 1** - To find the Optimal Risky Portfolio, you take as given the universe of available assets and their expected returns $E(r_i)$, risk σ_i and covariances σ_{ij}.
- $\text{Max}_w\ S_p = \dfrac{E(r_p) - r_f}{\sigma_p}$ where $r_p = \sum_{i=1}^{N} w_i r_i$ and $\sigma_p^2 = \sum_i \sum_j w_i w_j \sigma_{ij}$
- Such that $\sum_{i=1}^{N} w_i = 1$
- **Part 2 -** Given the ORP, each investor chooses a combination of the risky portfolio and T-Bill based on their risk appetite.
- $\text{Max}_\lambda\ U(\lambda) = E[r_c] - \dfrac{1}{2} A \sigma_c^2$, where $r_c = \lambda r_p + (1 - \lambda) r_f$.