

EC371 Economic Analysis of Asset Prices**Portfolio selection: the basics**

	Assets							
	1	2	3	...	n			
State 1	v_{11}	v_{12}	v_{13}	...	v_{1n}	W_1	$u(W_1)$	π_1
State 2	v_{21}	v_{22}	v_{23}	...	v_{2n}	W_2	$u(W_2)$	π_2
State 3	v_{31}	v_{32}	v_{33}	...	v_{3n}	W_3	$u(W_3)$	π_3
	\vdots	\vdots	\vdots	\vdots	\vdots	\vdots	\vdots	\vdots
State ℓ	$v_{\ell 1}$	$v_{\ell 2}$	$v_{\ell 3}$...	$v_{\ell n}$	W_ℓ	$u(W_\ell)$	π_ℓ
Price	p_1	p_2	p_3	...	p_n			

v_{kj} : payoff on asset j if state k occurs.

$r_{kj} \equiv \frac{v_{kj}}{p_j} - 1$: rate of return on asset j in state k .

When a portfolio of assets, (x_1, x_2, \dots, x_n) , is chosen, the investor is assumed to know the values of all the payoffs and the prices but *not* which state will occur.

Terminal wealth in state k : $W_k = v_{k1}x_1 + v_{k2}x_2 + \dots + v_{kn}x_n$.

(Note that W_k depends on the investor's portfolio, i.e. on the 'action'.)

von Neumann-Morgenstern (or Bernoulli) utility in state k : $u(W_k)$.

(Notice that $u(\cdot)$ does not depend on the state.)

Probability (the investor's personal, subjective probability) of state k : π_k .

Expected utility:

$$E[u(W)] \equiv \pi_1 u(W_1) + \pi_2 u(W_2) \dots + \pi_\ell u(W_\ell)$$

EUH: The investor is assumed to **choose a portfolio to maximize expected utility**, subject to an initial wealth constraint:

$$p_1 x_1 + p_2 x_2 + \dots + p_n x_n = A.$$