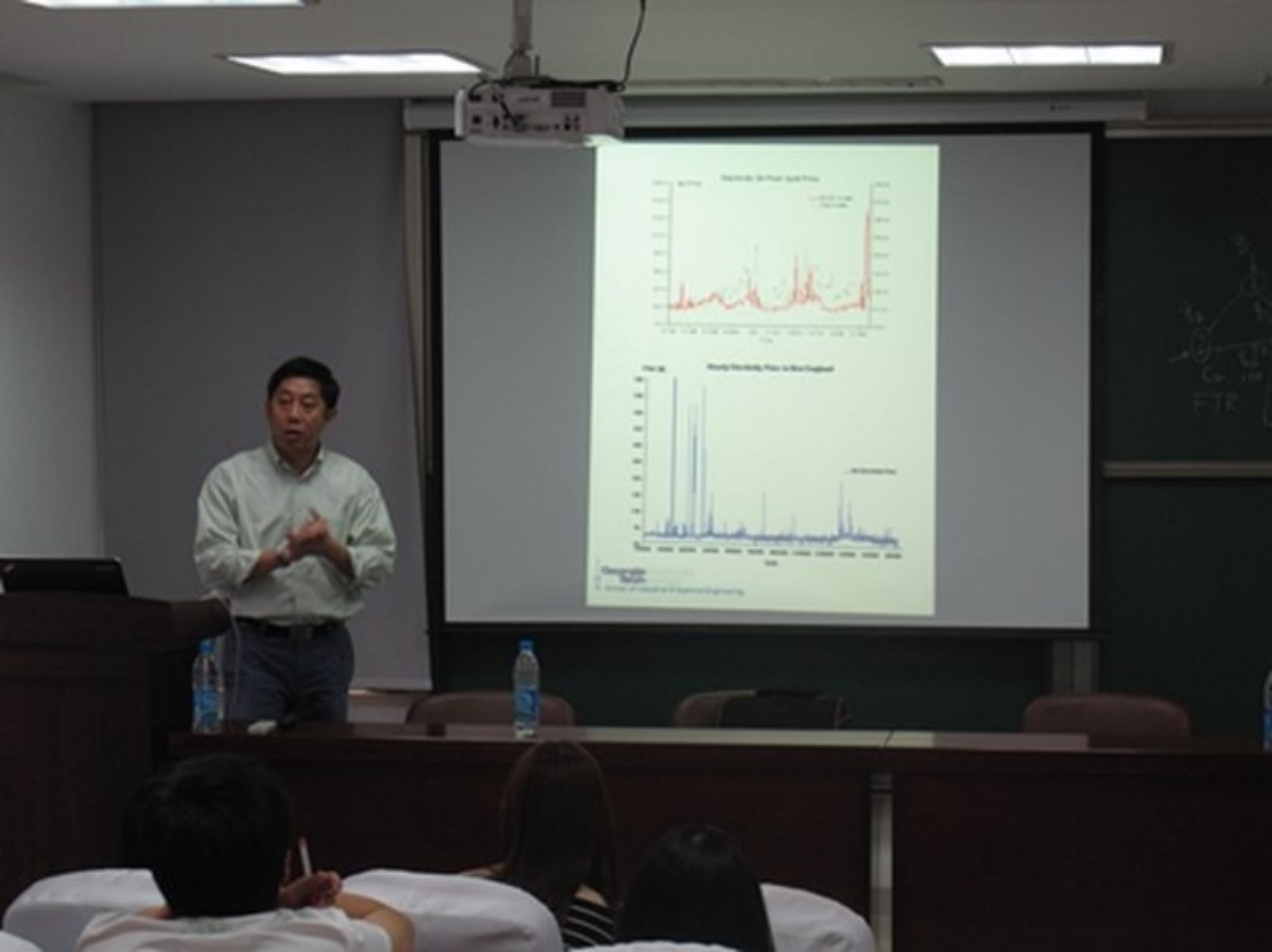
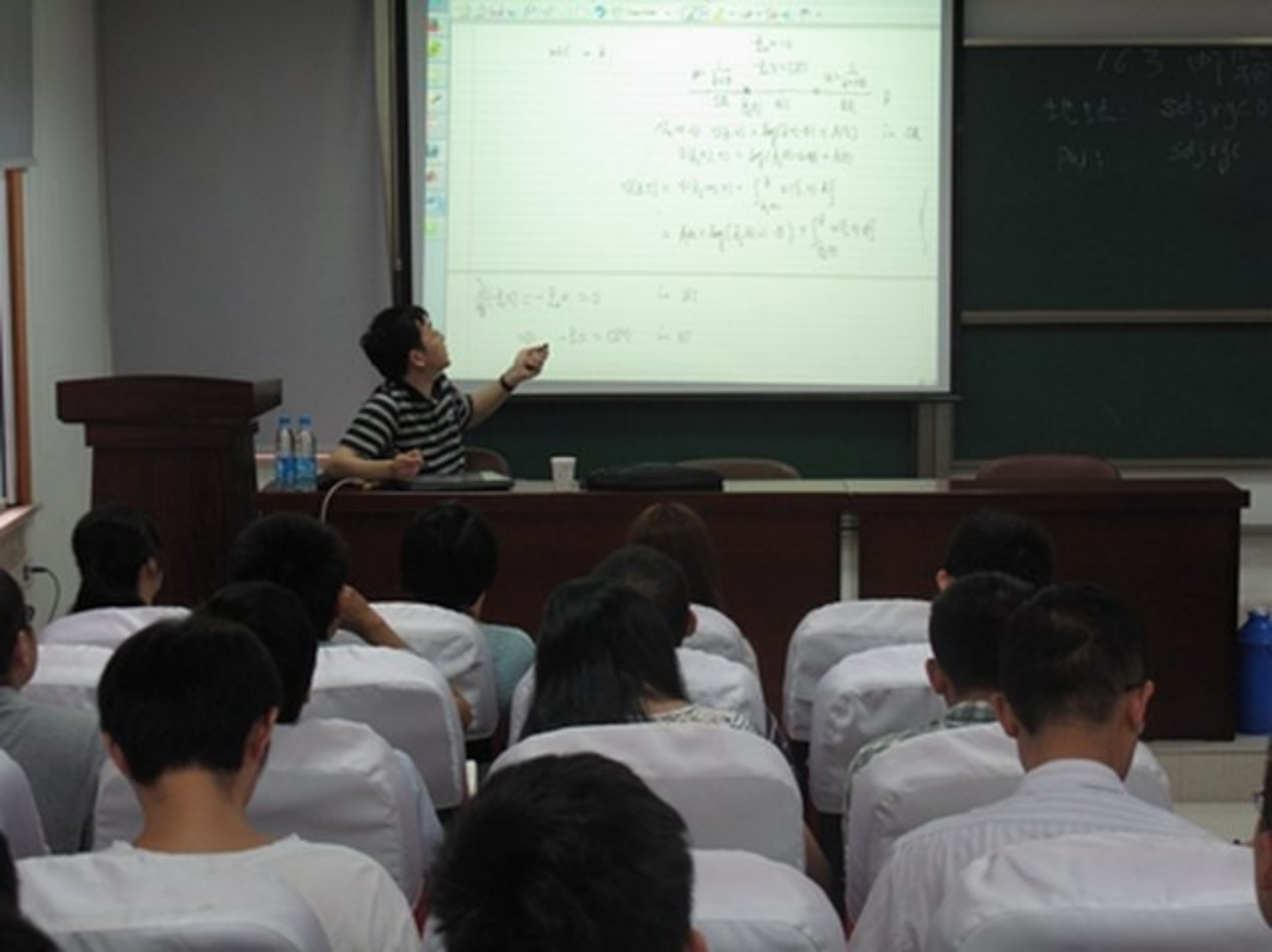
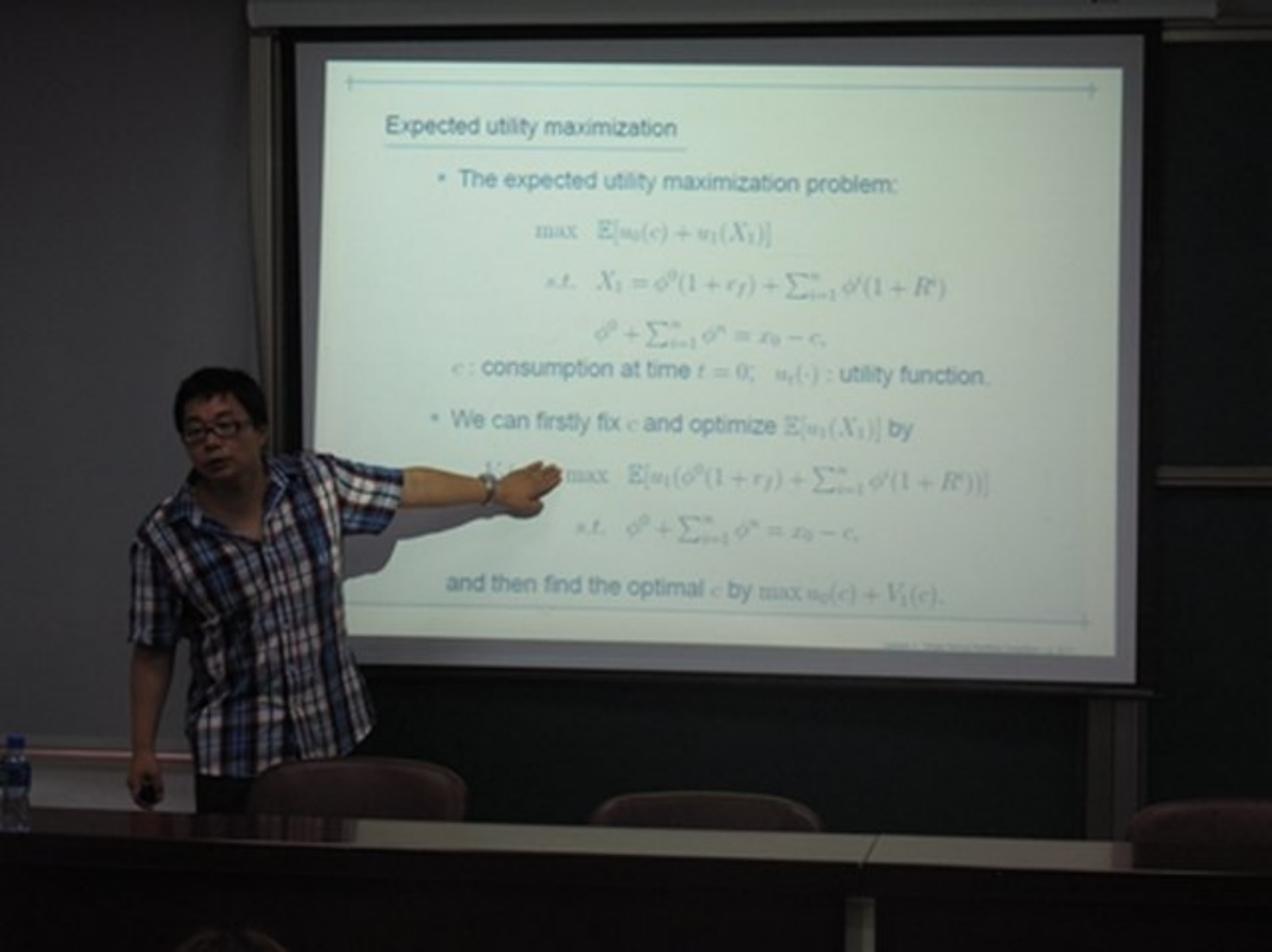

Portfolio selection
• Portfolio Selection: to find the best investment strategy in some financial market.
• Individuals make decision according to
- market environment: assets and price processes;
- feasible decisions: trading rules and constraints;
- criterion for comparison/optimality.

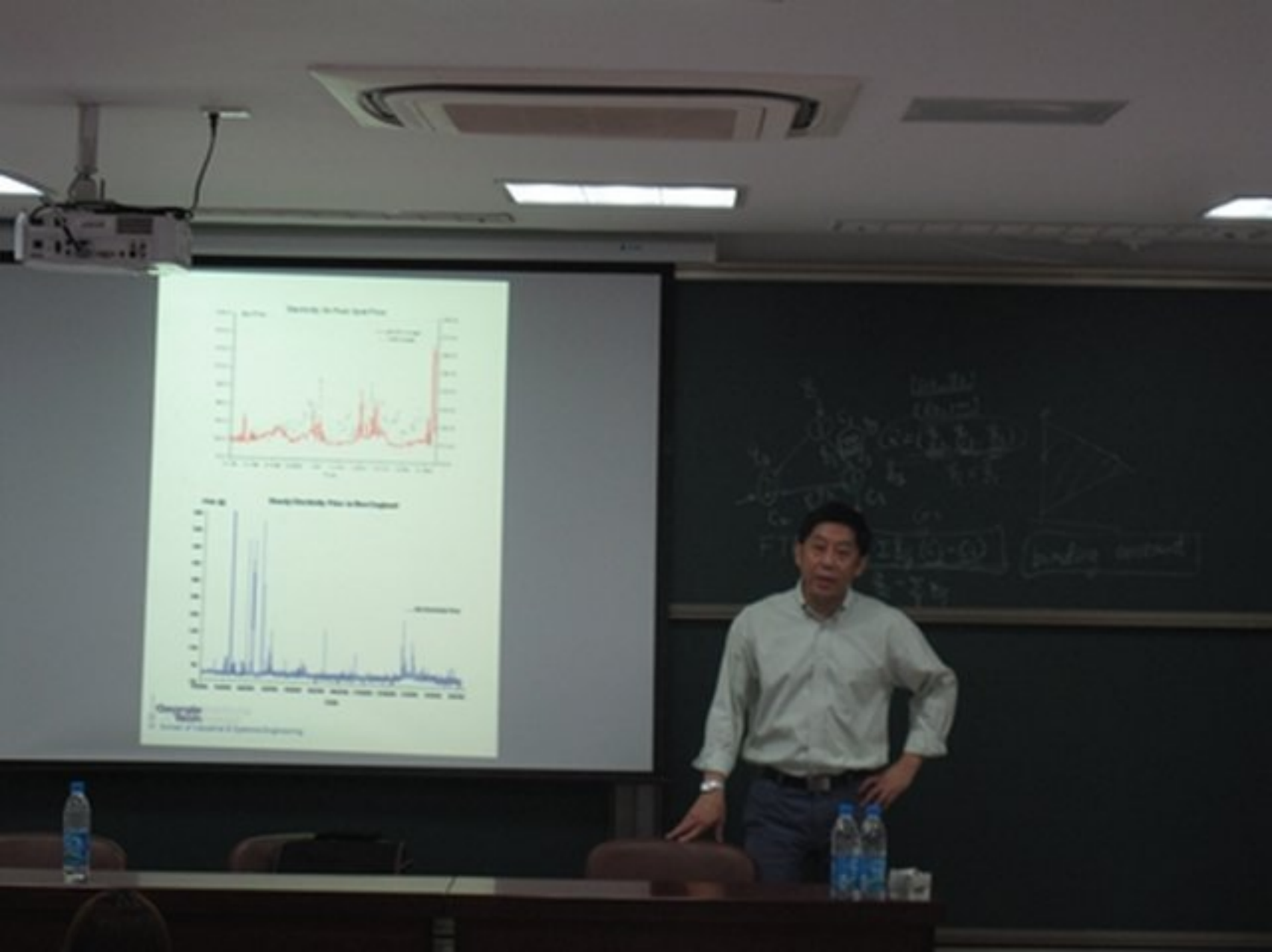



High-frequency trading and dark markets
- New challenges for financial mathematics -
Humboldt-Universität zu Berlin
Department of Mathematics
and
School of Business and Economics




Expected utility maximization
• The expected utility maximization problem:
$\max \quad \mathbb{E}[u_0(c) + u_1(X_1)]$
$s.t. \quad X_1 = \phi^0(1 + r_f) + \sum_{i=1}^{n} \phi^i(1 + R^i)$
$\phi^0 + \sum_{i=1}^{n} \phi^n = x_0 - c,$
c : consumption at time $t = 0$; $u_t(\cdot)$: utility function.
• We can firstly fix c and optimize $\mathbb{E}[u_1(X_1)]$ by
$\max \quad \mathbb{E}[u_1(\phi^0(1 + r_f) + \sum_{i=1}^{n} \phi^i(1 + R^i))]$
$s.t. \quad \phi^0 + \sum_{i=1}^{n} \phi^n = x_0 - c,$
and then find the optimal c by $\max u_0(c) + V_1(c)$.


How are modern markets organized?
• traders submit orders to a Limit Order Book ("market place")
• market orders ("liquidity consumption")
• order to buy/sell at the best available price
• immediate execution
orders ("liquidity provision"):
• order to buy/sell at a pre specified limit price
• future execution
• unexecuted orders are stored in an LOB
• may orders are cancelled before execution
• often, orders are flagged (name, fill-or-kill, ...)




能源市场的前沿问题：市场设计
、资产定价与套期保值
Frontier research in energy markets: market
design, asset pricing and hedging
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