ANATOMY OF BUBBLES AND CRISES

1. DESIGN OF THE COURSE

- We will read about historical examples of runups and sudden collapses of asset values, looking for patterns common across the examples.
- We will study some mathematical models of asset markets. Models of well-functioning asset markets imply that prices in those markets will surprise us, sometimes in a major way.
- Thinking about the historical examples and the models, do we see reasons for regulatory intervention in these markets? Is there a role for monetary policy in controlling bubbles or preventing crashes? (Should Greenspan have "popped the dotcom bubble?")
- I need to find out what you already know about calculus (multiple integrals), probability (random variables, joint distributions, probability density functions, the normal distribution) and asset pricing (efficient markets, stock price as random walk, asset prices as discounted present values, "market measures".

2. MINIMAL DEFINITIONS OF CRASH AND BUBBLE

- Crash: A rapid fall in prices of some asset or class of assets.
- Bubble: A rise in, or high level of, asset prices that seems not to be justifiable on the basis of any reasonable estimate of the returns the asset will generate.

3. COMMON CHARACTERISTICS OF CRASHES

- In some, but not all, cases, preceded by what is commonly seen as a bubble.
- A large volume of trading.
- Liquidity problems.
- Defaults and bankruptcies
- The large volume of trade comes in part from the forced unwinding of leveraged positions.
- In some cases, interventions to limit damage: suspension of trading, special lender-of-last-resort credit facilities.
- In some cases, an overhang of wounded financial institutions to be "unwound" (US S&L, Japan).

4. COMMON CHARACTERISTICS OF BUBBLES

- The asset being traded has something "new" about it, so that investors can believe that its rapid rise in value represents the spread of information about the

asset's high potential return, and that they personally are among the earlier to recognize this new opportunity.

- There are some informed commentators who are saying that the asset(s) are over-valued.
- Followed by a crash. [Are bubbles just those periods of optimism that turn out in hindsight to have been a mistake?]
- Asset purchases are leveraged: investors borrow in order to invest, and credit to do so is readily available.
- Participants in the market are very aware of the rate of growth of prices and of the capital gains component of their income from the asset. They are buying in part because they project further rapid growth in the asset price.
- Participation increases rapidly, with investors drawn in by the observed history of strong capital gains.
- Some participants agree that the asset prices are higher than justifiable by non-capital-gains returns, but believe that they can "get in and get out", profiting temporarily from capital gains, but avoiding the eventual crash.
- There is chicanery and fraud, which is uncovered after the bubble is over. One form of chicanery: the Ponzi scheme.

5. SOME HISTORICAL EXAMPLES

- Tulip Mania
- The South Sea Bubble
- John Law's bank.
- The Crash of 1929
- The Japanese bubble and its aftermath
- The Asian crises of the 90's
- The attacks on, and dismantlement of, the European ERM.
- The US S&L crisis
- The US dotcom boom

6. QUESTIONS WE WILL BE ASKING

- Do all, or some, bubbles and crashes indicate a market "malfunction"?
- If so, how do we tell when there is a bubble or crash, or whether the one we identify represents a malfunction?
- What, if anything, should be done to prevent, end, or mitigate the consequences of bubbles and crashes?

7. ASSET PRICES AND NO-ARBITRAGE CONDITIONS

- Arbitrage opportunity: A chance to make a profit, with zero risk, by buying and selling at market prices.
- Example: futures contracts on foreign exchange, treasury bills. Francs now (t) at x_t dollars. Francs delivered for dollars at $t + s$ available x_{t+s}^t dollars. French government debt pays interest rate r over $(t, t + s)$. US government debt pays interest rate ρ. Two ways to invest your dollars without risk: A $1 US T-bill, or

$1/x_t$ French T-bills, together with a futures contract for $-x_{t+s}^t(1+rs)/x_t$. The US T-bill delivers $1 + \rho s$ dollars, and if this does not match $x_{t+s}^t(1+rs)/x_t$, one can make money for certain by undertaking one of these transactions in a positive direction, the other negative. This is called "covered interest parity". In freely functioning exchange markets, there are essentially no profit opportunities like this.

8. CRUDE EFFICIENT MARKETS THEORY

- This is not a true arbitrage argument.
- The idea is that the expected profits from holding an asset over any given span of time should be approximately zero. Otherwise the asset is an attractive investment, and its price should be driven up until expected profits are zero.
- With positive interest rates, it's not that $E_t[P_{t+1} - P_t]$ should be zero, but that $E_t[P_{t+1}/R - P_t]$ should be zero.
- At small time intervals, R is so close to one that we sometimes ignore it.
- These profit opportunities are *not* risk free.