HAMS and Stylized Facts in FM

Giorgio Ricchiuti
www.grarchive.net
giorgio.ricchiuti@unifi.it

Computational Economics

- Zeeman 1974;
- Goldman (1980);
- Frankle and Froot (1986, 1990);
- Day and Huang (1990);
- Chiarella (1992);
- Brock and Hommes (1997, 1998);
- Farmer (2002), Joshi (2002);
- and so on...

1. Group of Agents with different strategies (Fundamentalists, Chartists, Noise traders, Bias traders, Naive)

- Fundamentalists: $p^e_{t+1} = p^f$
- Adaptive: $p^e_{t+1} = wp_{t-1} + (1-w)p^e_t$
- TrendFollowing (chartist): $p^e_{t+1} = p_{t-1} + \gamma(p_{t-1} - p_{t-2})$. Weak ($\gamma = 0.4$) or Strong ($\gamma = 1.3$)
- Anchoring and Adjustment: $p^e_{t+1} = 0.5(p^f + p_{t-1}) + (p_{t-1} - p_{t-2})$

2. Fixed quotas vs. Evolutionary switching mechanisms

- Fixed quotas: Agents cannot change the strategy adopted
- Variable quotas: Agents may change according to some rule

3. Walrasian Auctioner vs. Market Maker

- Walrasian Auctioner: $Demand = Supply$
- Market Maker: $p_{t+1} = p_t + f(ED)$

- Financialization of the economy;
- Financial markets are a powerful channel of anticipation and dissemination of economic crises. Are they the cause of it?

- **Stylized facts** are common properties across a wide range of time periods and markets.
- If one accepts that empirical evidences exist, independently observed across many instruments, market and time periods, then one can build a model able to understand them and, perhaps, to identify some common properties present in different market structures.
- The result of more than half a century of empirical studies on financial time series indicates that, although political events or announcements are different in the different markets, common movements exist which are independent from the situations they happen in.

- **Absence of autocorrelations**: the asset returns are often non-autocorrelated. In other words, prices follow a martingale, and successive price changes are mutually uncorrelated.
- **Leptokurtosis**: the time series of the returns have a leptokurtic distribution, that is, a distribution where the mass of probability on the tails is higher than that present in the case of a normal pdf. It means that an excess of kurtosis exists.
- **Gain/loss asymmetry**: high probability of loss in the stock market have a higher probability than high positive returns. It means a negative skewness.

- **Volatility clustering**: different measures of volatility display a positive autocorrelation over several days, which quantifies the fact that high-volatility events tend to cluster in time.

- **Fat tails**: The unconditional distribution of returns seems to display a power-law, with a tail index which is finite, higher than two and less than five. In particular this excludes stable laws with infinite variance and the normal distribution. However the precise form of the tails is difficult to determine.

- **Long run memory**: the autocorrelation function of absolute returns decays slowly as a function of the time lag, roughly as a power law with an exponent $\beta \in [0.2, 0.4]$

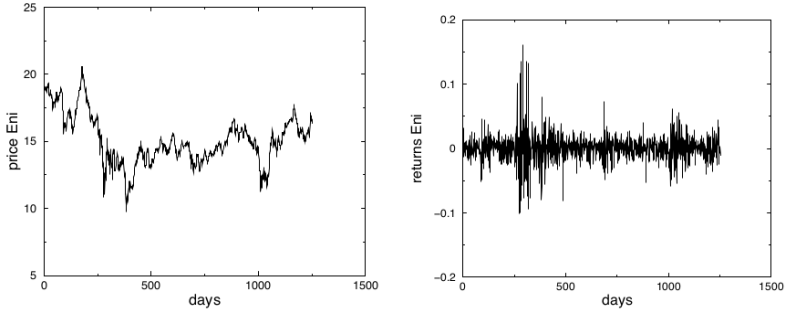

Figure: Daily time series of the ENI (left side) and ENI return (right side)

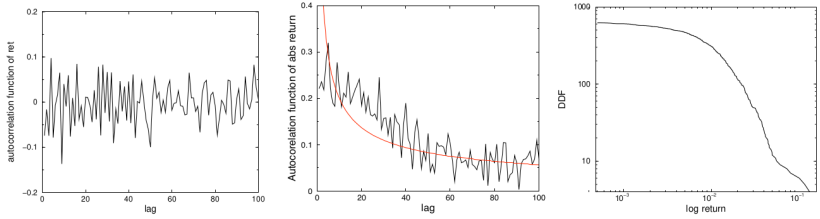

Figure: Autocorrelation function of return (left side) of the absolute value of return (middle) and decumulative distribution function of the return.

Skewness: -0.625; Kurtosis 10.192. A measure of fat tails is provided by the Hill exponent. Empirically the tail exponent is found to take values between 2 and 4. In this case H $= 3.1$. A measure of long term memory is provided by the modified R/S analysis, where the parameter β allows to discriminate between short and long term memory. If only short memory is present β converges to $1/2$ while with long memory, it converges to a value larger than $1/2$. In the case of the ENI $\beta = 0.73$.

- An HAMS Toy-model;
- The discrete choice
- BH model 1998 with some issues
- Empirical Validation and Lab Experiments