Multiscaling behaviour of Transition Economies before and after 1998 Russian Financial Crisis

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Abstract

The influence of 1998 Russian financial crisis on statistical properties of the currencies in transition economies has been studied. Essential changes before and after crisis were discovered. All effects are essentially nonlinear and differ from ones in the advanced economies.

Summary

As it has been shown, economic impact of russian financial crisis had large impact on the scaling behaviour in russian and ukrainian economies.

The main conclusions can be itemized as follows:

1) There are three different scaling domains for almost all of the countries. Among developed countries first two domains are almost the same from scaling point of view, countries in transition are presented more rich picture. There is no unique crossover point for all countries. Instead of that, the change in scaling behaviour appeared in different time horizonts for different country (see Table III for details).

2) there are six different areas in $(logN, q)$ variables where the behaviour is the same inside one area, but very different from area to area. $\xi_q(q)$ dependencies are almost linear in these areas, but slope coefficients are different. There is a crossover regime for $\xi_q(q)$ dependency in the vicinity of $q = 1$ for all countries. The same behaviour is valid for all countries.

3) Both Germany and Japan have TSMT–like behaviour of $\xi_q(q)$ dependencies in all data subsets with $0 < q < 1$ and in first scaling domain.

   For these $(q, logN)$ Ukraine has decreasing slope coefficient from $\sim 0.6q$ before crisis, $\sim 0.4q$ during crisis, and $\sim 0.3q$ after crisis.

   Russia in the same $(q, logN)$ area has another behaviour with large values before $(\sim 0.75q)$ crisis while having almost TSMT–like value during crisis $(\sim 0.43q)$ and after $(\sim 0.43q)$.

4) For higher moments in the same scaling domain I Germany has values for all subsets near TSMT value, while Japan has lower values in between TSMT and turbulent flow model.

   Ukraine has low values before crisis $(\sim 0.21q)$. During crisis and after Ukraine has almost zero values. Russia has extremely low values $(\sim (-0.3 - 0.3)q)$ for all subsets.

5) Based on $\mu(I)$ parameter $(n < 100)$ for growth rate (see Table IV), we can see anomalously high values during crisis for Russia $(\mu(I) \sim 2.0)$ but not for Ukraine $(\mu(I) \sim 0.0)$.

6) Autocorrelations becoming zero in each data subset. This effect gives us an arguments toward the presence of low–dimensional deterministic chaos, but we have extremely short datasets and additional investigations have to be done.

7) Power spectra have a different and rather complex picture. Starting ffom almost flat spectra ($\gamma \sim 0$) which corresponds to white noise, $\gamma(n)$ has essentially nonlinear curve with values in the range $-4 < \gamma < 0$ and correspondent Hurst exponent in the range $-2.5 < H < 1$. Asymptotically, for large n (greater than 1–2 years), γ is close to the value for Classical Brownian motion ($\gamma \sim 2$, $H \sim 0.5$). For short–term returns ($n = 1$) spectra are almost flat and corresponds the gaussian white noise. The origin of this effect still has to be understood. Now we have an arguments toward the presence of colour noise in datasets. Another possible origin of this effect is nonlinear dynamical system.