Infographics: Patterns of Information Flows Sharing and Volatility Spillovers
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Abstract. It's commonplace, that information drives prices. Can we infer the impact of information by just observing prices? Can we observe regime changes during crises, when markets are overwhelmed with waves of fear and greed? What happens in the aftermath? We estimate information flows on the world markets by modeling volatility of regional stock indexes. Then we estimate VAR models for volatilities and use the capabilities of 'circlize' package from statistical environment 'R project' to visualize patterns of exposure and auto-determinism of information processes in global stock markets.

Аннотация. Общеизвестно, что ценой движет информация. Можем ли мы оценить эффект информационного воздействия, наблюдая цены? Меняется ли это воздействие в кризисы и бумы, когда рынки захлестывают эмоциональные волны? Что происходит после? Мы оцениваем информационный процесс на мировых рынках, моделируя волатильность региональных фондовых индексов, строим модели векторной авторегрессии и используем возможности пакета circlize статистической среды R project для визуализации информационных процессов на мировых фондовых рынках.

Key words: Information flows, volatility spillovers, volatility, crises.

HOW TO READ OUR INFOGRAPHICS

Each chord diagram shows the pattern of sharing information flows between traders on Eurasian and American markets, formed during certain period of time. Each sector represents one regional market; the radius of the sector is proportional to the radius of the "influence" of the market in the overall system. Links capture spillovers of information flows; the thicker the link, the more the information process is determined by another process. If the link points to a market it stems, it means that the information of previous periods continues to have an impact on the volatility of the current (i.e., there is a possible indication of the market inefficiency in the weak form.)

Periods are bounded by major market events (primarily, market crashes). Across periods flow regimes are changing significantly. Thus, we get seven periods:

POSSIBLE INTERPRETATION

I.1996 – VII.1997 – US dot-com bubble inflates. We see that the information flows on the world markets are practically independent; moreover, markets seem to be close to the efficiency at least in the weak form, since virtually no memory is observed in volatility. It is not the case for Russia, where volatility does have a memory. In addition, Hong Kong equity traders largely follow the news from the US market.

VIII.1997 – IV.1999 – Asian/Russian crises. The pattern changes dramatically: from now on there is volatility memory, which may mean that the market does not have time to "digest" the information during current trading session, and an increase (decrease) in previous sessions of volatility affects the current volatility. This pattern is typical for all markets. Interestingly, during the Asian/Russian crisis it is US information process, which leads the others: news flow firstly affects the volatility of the equity index in the US, and only then is transferred to Asian and Russian markets. The only thing, which US stock traders follow, is news from the gold market, which could be regarded as a sign of a flight to quality. Unfortunately, we were unable to

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* Инфографика: разделение информационных потоков и переливы волатильности.

capture the relationship of information flows with Thailand market, where Asian crisis was born.

IV.1999 – III.2000 – a short period of relative calm before dotcom crash. Markets again are unlinked, but the memory of volatility remains as a legacy of stormy (at least for financial markets) finale of the XX century.

III.2000 – I.2004 – the dotcom bubble crash. Expectedly, US stock market is playing the first fiddle (but the degree of separation of information flows is much less than the one during Asian/Russian crisis). To a large extent the flow of information from the US market is shared by traders in Asian securities. The role of the information flow of the European markets is rising (period coincides with introduction of the euro): flow is shared by traders in gold, as well as Singapore and Hong Kong equity. Information flows in China, Thailand, Russia and Indonesia are practically unaffected by the world's news (of course, indices experienced a sharp drop during the period, but volatility was only determined by its lagged values).

I.2004 – I.2007 – the second period of relative calm. Regional information flows are again closed in on itself. Perhaps the remaining links could be explained by traders habit formation. It is interesting, that Indian information flows seem to be exposed to Indonesian one.

I.2007 – V.2009 – Lehman Brothers. The information flow from United States begins to dominate strongly again; our model captures exposure of the Philippines information flow. Indonesian information flow now defines the Philippines as well; there is also a slight but reliable information exposure of Hong Kong to Indonesian information process. Gradually the influence of the news flow in Europe and the United States to Hong Kong is reduced; perhaps the reason is increased integration with the Asian market.

V.2009 – III.2013 – Aftermath. As always after a crisis, information flows are closed in on itself. There is gradually increasing integration within the Asian markets. However, information flows of Russia and China remain largely independent.

OUR DATA AND METHOD

We use daily data from Bloomberg on major stock indices of US, Germany, India, Russia, China, Indonesia, Philippines, Thailand, Korea, Singapore, and Hong Kong, as well as continuous data for oil and gold futures. Data gaps caused by national holiday's non-synchronicity were linearly interpolated. Returns were normalized across means using standard deviations.

We estimate GARCH using 'rugarch' package for R project. Our model specification follows Bollerslev (1986) standard GARCH model with Johnson's parameterized SU distribution. We estimate VAR model using 'vars' package; the lag is chosen as maximum lag, suggested by VARselect procedure, based on various information criteria. For info graphics we use only VAR components with p-values less than 0.0001; the intercepts, as well as coefficient signs, are ignored.

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