Relationship between implied volatility and the underlying in major international stock markets

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We examine the relationship between implied volatilities and the underlying stock market indices. In particular, we proceed in two steps: (i) first, we estimate the correlation between changes in implied volatilities and the underlying stock index returns (ii) and, than, compute the correlation between implieds and stock index quotes. The goal is to seek for similarities/differences between the two approaches.

Our analysis includes daily quotes of six implied volatilities (VIX, VXD, VAEX, VBEL, VCAC and VFTSE) and the correspondingly underlying stock indices (S&P 500, DJIA 30, AEX 25, BEL 20, CAC 40 and FTSE 100), covering the period January 3rd, 2000 – April 1st, 2011. We demonstrate that changes in implied volatilities and returns are negatively correlated (S&P 500/VIX is the highest negative correlated pair while BEL 20/VBEL is the lowest), as well, as implieds and the corresponding underlying index quotes (BEL 20/VBEL displays the highest negative correlation, whereas FTSE 100/VFTSE exhibits the lowest). In order to refine our analysis we also investigate how these correlations differ across bullish and bearish periods. To this end, we divide the full sample in four distinct sub-periods: (i) 1st sub-period – from March 2000 to end 2002; (ii) 2nd sub-period – from beginning 2003 to end 2006; (iii) 3rd sub-period -, from beginning 2007 to end 2008 and, (iv) last sub-period – from beginning 2009 to mid 2011. Although evidence is mixed, a few regularities arise: As a rule, negative correlations are found to be higher for all sub-periods, than when we simply consider the full sample. Further, for the 1st and 2nd sub-periods, BEL 20/VBEL and FTSE 100/VFTSE exhibits the weakest correlations, whilst for the remainder ones, S&P 500/VIX and DJIA/VXD display the smallest ones.