

Integration of the Brazilian stock market

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Abstract

This paper investigates stock market integration between the Brazilian and the US stock markets for three different periods by applying statistical tests. The tests conducted in this paper are based on an approach developed by Engle and Granger, which allows testing for linear cointegration. The result of the tests indicate that no linear cointegration was found in any of the periods. The conclusion is that investors can diversify their portfolio by investing into the Brazilian stock market.

Executive summary

In this paper stock market integration will be investigated. Studies that deal with stock market integration have recently gained a lot of attention, especially if it comes to emerging markets. The latest financial crisis has once again strengthened the demand for diversification opportunities. Hence investors are looking for possibilities to diversify their portfolios. By investing into emerging markets, diversification can be achieved to some degree. In order to determine the extent of the diversification possibilities, markets are being tested for integration. If stock markets are not integrated, a potential for diversification clearly exists.

The concentration in this paper lies on the Brazilian and the US stock markets. The data used for Brazil is represented by the Bovespa, the one for the US by the S&P 500. In total three time periods were checked for cointegration. First from January 1996 until June 2011, based on monthly data, further the periods 2005 – 2006 and 2007 – 2008 were chosen, being the periods right before and during the latest financial crisis. The data for these two periods is based on daily data.

A lot of different approaches and tests exist to test for market integration. The approach used in this paper was developed by Engle and Granger: It allows testing for linear cointegration. The first step is to test the time series for unit roots. If they have a unit root, they are said to be non-stationary: they follow a random walk. The unit root tests were conducted according to Dickey and Fuller. The results obtained by these test then were checked by another approach which allows testing for unit roots, developed by Phillips and Perron. Having a unit root and being integrated of order one is necessary for the Engle-Granger approach to work. After testing the Bovespa and S&P 500 for unit roots, the regression between those indices is done. The residuals of the regressions are obtained and again tested for a unit root. If there is no unit root present (hence the residuals are stationary) or if the residuals are white noise, then linear cointegration exists, according to the Engle-Granger approach.

The results from above tests indicate that there is no linear cointegration according to the Engle-Granger approach. Even though both the Bovespa and S&P 500 were found to be integrated of order one in all the periods, the residuals are neither stationary nor white noise. This means that there is no linear cointegration between the Bovespa and the S&P 500 in the periods chosen. The fact that there is no linear cointegration between these two indices creates an opportunity for diversification. If US investors not only invest into the US stock market but also invest parts of their assets in the Brazilian stock market, they can receive diversification benefits. This is of course also the case for Brazilian investors when a part of their portfolio is invested in the US stock market.

The results of such empirical tests have to be considered carefully. Studies conducted in reference to stock market integration often have different results. This can be lead back to several reasons: Different approaches and statistical models are used, different indices are chosen, some tests are based on daily, some on monthly data etc.

This is why the empirical results of this paper have to be treated with caution. The approach developed by Engle and Granger, which was used in this paper, only tests for linear cointegration. Another limit to this test is that the time series have to be integrated of the same order. There are other approaches which are more flexible and which not only test for linear cointegration, but also take non-linear cointegration into account.

The conclusion of this paper is that there is no linear cointegration between the Bovespa and the S&P 500 when the Engle-Granger approach is used. But these results have to be looked at carefully: By using other approaches or other time periods it is possible that different results are found.