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On measuring synchronization of bulls and bears: The case of East Asia ☆

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Abstract

This paper implements estimation and testing procedures for comovements of stock market "cycles" or "phases" in Asia. We extend the Harding and Pagan [Harding, D., Pagan, A.P., 2006. Synchronization of cycles. Journal of Econometrics 132 (1), 59–79] test for strong multivariate nonsynchronization (SMNS) between business cycles to a test that allows for an imperfect degree of multivariate synchronization between stock market cycles. Moreover, we propose a test for endogenously determining structural change in the bivariate and multivariate synchronization indices. Upon applying the technique to five Asian stock markets we find a significant increase in the cross country comovements of Asian bullish and bearish periods in 1997. A power study of the stability test suggests that the detected increase in comovement is more of a sudden nature (i.e. contagion or "Asian Flu") instead of gradual (i.e. financial integration). It is furthermore argued that stock market cycles and their propensity toward (increased) synchronization contain useful information for both investors, policy makers and financial regulators.

JEL classification: C19; E32; F36

Keywords: Cycle synchronization; Emerging stock markets; Structural change; Block bootstrap

1. Introduction

In the past couple of years, financial economists have extensively documented the empirical features of stock market returns such as clusters of volatility and heavy tails, see e.g. Embrechts et al. (1997). That stock prices typically exhibit periods of persistent rises or falls, i.e., so-called "bulls" and "bears", has been recognized by the financial practitioners for a long time but has attracted much less attention from the academic community.[1] Accordingly, the potential for stock markets to be simultaneously bullish or bearish across geographical borders has also stayed

[1] Traditionally, there are two perspectives on stock market bulls and bears. First, they may be induced by irrational "animal spirit" (or sentiment that is unrelated to any rational expectations of future fundamental values), see e.g. Summers (1986), Shiller (2000) or Anderson et al. (2003). These papers argue that prices can sometimes display seemingly persistent deviations from their long-run equilibrium values. Another view states that, although market sentiment can drive prices away from fundamentals in the short run, proportional differences between market prices and fundamentals are kept within bounds and stock markets exhibit a long-run relation between prices and fundamentals, see e.g. DeLong (1992), Siegel (1998) or Coakley and Fuertes (2006). Our research does not fit in either of these two strands of the literature as we do not aim to disentangle the causes of stock market bulls and bears.

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underexposed. The main objective of this paper will therefore be to provide a framework for measuring synchronization between stock market cycles and examine how it has evolved over time.[2]

Measuring stock market cycles and their cross border synchronization is of potential interest for both investors and policy makers. First, it is common sense that investors rebalance their portfolios by purchasing "cheap" stocks during bearish periods and selling "expensive" stocks when stock markets are bullish. The question arises, however, how to optimally time this portfolio rebalancing. Technical analysts typically time their buying and selling decisions by means of graphs. A more thorough statistical analysis of bulls and bears can help investors to further improve the timing of their investment decisions. The above discussion suggests that the duration of a stock cycle constitutes the natural time horizon for a "single-cycle" or "short-term" investor (or, alternatively, constitutes the natural time horizon for portfolio rebalancing in case of a "multi-cycle" or "long-term" investor). Thus, in order to assess the potential for risk diversification across stock market cycles, it seems natural to consider correlations over the duration of a typical stock market cycle and not on, say, a daily or monthly basis. The latter correlation measures might offer a misleading view on the potential for risk diversification if investors base their rebalancing decisions on stock market cycles.

Also, persistent swings in stock market prices and the potentially destabilizing effects on the real economy raise the issue of how monetary authorities should respond. Indeed, bullish stock markets can induce large amounts of loan collateral – especially in less developed banking systems with poor regulatory frameworks – which then increase demand and goods price inflation. Moreover, when the stock market bulls turn into bears, this can result in widespread liquidity problems and a "credit crunch" in the financial system. Thus, monitoring the impact of stock market swings is also of potential interest to regulatory bodies caring about systemic risk and overall financial stability. Finally, if stock cycles have become more synchronized over time, the potential for financial system instability to spill over to other countries has also increased which suggests that a coordinated effort of policymakers and regulatory bodies is necessary.

This paper makes several contributions to the stock market bulls and bears cum synchronization literature.[3] More specifically, we extend the generalized method of moments (GMM) approach to measuring business cycle synchronization due to Harding and Pagan (2006) toward estimating and testing for (bivariate, multivariate) cyclical stock market synchronization. First, we allow for a value of the "common" synchronization index between −1 and 1, whereas Harding and Pagan only consider tests for the benchmark cases of perfect synchronization or nonsynchronization. Second, the estimation and testing procedure for multivariate synchronization is complemented with an endogenous stability test for detecting time variation in cyclical stock market synchronization. Third, our stability testing procedure can be seen as extending a scant preceding literature on structural change in cyclical stock market synchronization, see e.g. Edwards et al. (2003). The latter papers tried to investigate the stability of bivariate concordance indices by means of rolling regressions.

Emerging markets are the more obvious candidates for detecting changes in cyclical stock market synchronization due to the rapid transformation of their financial systems and the recurrent financial crises, see e.g. Bekaert and Harvey (2000). We therefore use Asian stock market data in our empirical application. Furthermore, Monte Carlo simulation reveals that the stability test is able to detect contagion-like processes but not gradual changes. In that sense, our paper complements a recent literature on Asian contagion identification, see e.g. Forbes and Rigobon (2002) or Dungey et al. (2006).

The remaining sections are organized as follows. Section 2 discusses the statistical estimation and testing methodology that will be implemented. Section 3 evaluates the small sample properties of the stability test (size and power) and proposes a bootstrap method for determining the size-corrected small sample critical values. Empirical estimation and testing results are reported in Section 4. Concluding remarks are contained in Section 5.

2. Methodology

The concept of imperfect multivariate equity market synchronization is introduced in Section 2.1. Next we

[2] Few empirical studies identified and investigated univariate features of stock market cycles, see e.g. Edwards et al. (2003), Gomez Biscarri and Perez de Gracia (2003), Pagan and Sossounov (2003) or Lunde and Timmerman (2004). An even smaller set of papers looked into whether stock market cycles comove, see e.g. Gomez Biscarri and Perez de Gracia (2003), Edwards et al. (2003) and Harding and Pagan (2006).

[3] Preceding literature on stock market synchronization is vast and difficult to summarize. Early research on stock market linkages mainly documented cross border return correlations (see e.g. Roll, 1988). This correlation analysis was refined later on, either by implementing multivariate stochastic volatility (SV) models or cointegrated vector auto regressions (VAR). Representative articles of the former "school" include King and Wadhwani (1990); Malliaris and Urrutia (1992); Lin et al. (1994); Susmel and Engle (1994). These ARCH-type models were used, inter alia, to investigate the direction of international spillovers as well as to identify differences in market comovements in periods of market turbulence and market quiescence. Baillie and Bollerslev (1989), however, argued that the modelling of returns can result in a loss of information on possible common trends when prices are cointegrated. Representative articles of the cointegrated VAR literature are Kasa (1992) and Click and Plummer (2005).