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Dissecting the cycles: An intermarket investigation and its implications to portfolio reallocation

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ABSTRACT

By applying spectral analysis, this paper discovered that: (1) bond, equity, and commodity markets followed regular cyclical patterns of the business cycle that lasted 3.5 to 7.5 years; (2) four significant lead or lag relationships existed between the business cycle and the three markets, where the business cycle led the commodity market, but first lagged the stock market and then the bond market, while the bond market led the commodity market. We also show that if investors can perfectly gage their positioning in the business cycle, they can enhance their returns by reallocating assets between bonds, stocks, and commodities in the portfolio accordingly.

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1. Introduction

Intermarket analysis is the study of multiple asset classes in a variety of markets. Such an analytic framework has been widely used by finance practitioners and is recognized as being feasible.[1] The main reason why intermarket analysis can help investors enhance their profit is that peaks and troughs of a particular asset price cycle possess a time lead or lag relationship with the business cycle. In addition, the lead or lag relationships can be arranged orderly in a time sequence. Typically, in expansions, bond prices are the first to peak, then stock prices, followed by the business cycle and finally commodity prices. When bottoming the same order is followed during contractions as well (Murphy, 2004; Pring, 1992, 2002; Pring, Turner, & Kopas, 2012).[2] This stylized sequence is shown in Fig. 1. By understanding this chronological rotation via intermarket analysis, an investor can own a more comprehensive picture and be able to see significant market and economic changes earlier than other investors only with a single market focus.

The main purpose of the paper is to apply the spectral analysis to detect cyclical behaviors of bond, stock and commodity markets plus the business cycle, and find the lead or lag relationships among them. We will also demonstrate the applicability of the intermarket analysis. Through the empirical study of this paper, readers can better understand the cyclical sequence among multiple markets. Furthermore, the result is helpful for investors to know how to enhance their gains by incorporating such an "intermarket framework".

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[1] *Charlton and Earl in Journal of Technical Analysis* (Summer–Autumn 2002) had asked the membership of the Market Technicians to rate the relative importance of technical disciplines for an academic course on technical analysis. Of the fourteen disciplines included in the poll, intermarket analysis ranked fifth, while the cycle analysis ranked sixth.

[2] For example, the 10 years government bond prices and S&P 500 reached its peak in March and September, 2007, which respectively was nine and three months before the business cycle peak recognized by NBER. Meanwhile, the RJ/CRB commodity price index reached its peak in June, 2008, which was six months after the business cycle peak.

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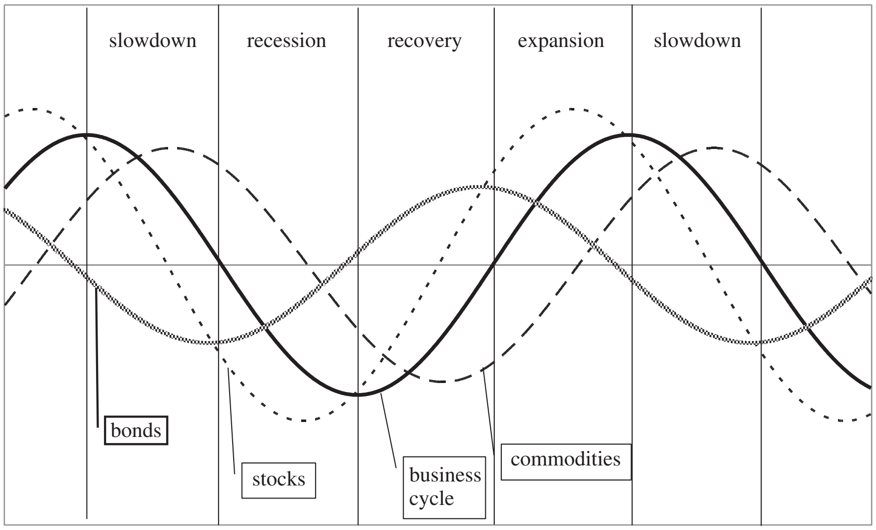

Fig. 1. A stylized diagram of how bond, stock and commodity interact during a typical business cycle.

Notwithstanding the contributions many earlier research have been made on this significant issue, they have only discussed it in a restricted manner. For example, Ayres (1939), Pring (1992, 2002) and Murphy (2004) showed the intermarket relationships between the bond, stock and commodity markets with the business cycle through graphic analysis, but they failed to present a statistical analysis. Moore (1975, 1990) and Oppenländer (1997) verified the lead or lag relationships between stock prices and the business cycle and also between bond prices and the business cycle by investigating simple accumulated returns on stocks and bonds, with the reference business cycle turning points recognized by the National Bureau of Economic Research (NBER). Yet, they failed to link all of this with the commodity assets. There are also many research on the applicability of the intermarket concept, such as Brocato and Steed (1998),[3] Hsu et al. (2011), Hsu and Liao (2012), Seigel (1991),[4] Gorton and Rouwenhorst (2006),[5] Gonzalez, Powell, Shi, and Wilson (2005), Kanas and Kouretas (2005), Hsu, Yen, Chang, and Chou (2011), and Fernandez-Perez, Fernández-Rodríguez, and Sosvilla-Rivero (2014).

Among those papers cited in the preceding paragraph, the most thorough treatment of the subject is attributed to Gorton and Rouwenhorst (2006). Based on simple statistical analysis, they illustrated that the negative correlation of commodity returns with both equity and bond returns likely stemmed from the different price behavior of bond, equity and commodity assets throughout the business cycle. Therefore, inclusion of commodity assets as an option can enhance the efficiency of investment portfolios. Although Gorton and Rouwenhorst (2006) pointed out that diversification benefits of commodity futures may come from inflation and business cycles, they did not provide the rationale of different price behavior of bond, equity and commodity assets throughout the business cycle. They also did not verify whether there is a common cyclical behavior among the bond, stock and commodity markets. Hence, it inspired us to use a more rigorous analytic tool to address this shortcoming.

Specifically, a more rigorous way to address this significant issue would require verifying such rotational sequence of business cycle and different markets as an integrated manner and also validating its applicability on asset allocation. Accordingly, to resolve the aforementioned incompleteness in literature, a scrupulous analysis of the issue is necessary and shall include: (1) detecting cyclical behavior in each of the asset prices; (2) finding the time lead or lag relationships among cyclical behaviors in different asset price and business cycles; and (3) demonstrating the applicability of the intermarket framework.

Moreover, one should use more sophisticated and up to date time-series econometric techniques regarding this issue, especially in the verification of cyclical relationships with formal statistical testing. Among the numerous instruments developed by econometricians, spectral analysis is one of the most proper analytical tools to identify cyclical patterns and verify whether lead or lag relationships exist between different series. Following its promotion by Granger (1966, 1969) and Granger and Hatanaka (1964), the method has gradually been widely applied to the research of cyclical patterns in financial and macroeconomic variables, in which univariate spectral analysis can formally picture the cycles in the variable of interest (Baxter & King, 1999, the BK filter in abbreviation; Christiano & Fitzgerald, 2003, the CF filter in abbreviation),[6] and cross-spectral analysis

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[3] Brocato and Steed (1998) indicated that cyclically reallocating the portfolio consisted of equity and bond. By considering the business cycle, it can improve the return to risk ratio and make the portfolio more efficient.

[4] As demonstrated by Siegel (1991), common stock returns can be significantly enhanced by a strategy that relies on correctly forecasting the turning points of the business cycle and reacting to it before the formal announcement of business cycle peaks and troughs by NBER.

[5] They use NBER business cycle dates to divide the business cycle into four phases-early expansion, late expansion, early recession and late recession. Phases are identified by dividing the number of months from peak to trough (trough to peak) into equal halves to indicate early recession and late recession (early expansion and late expansion). Hence, they compare average returns of different assets over these four business cycle phases.

[6] For example, if different economic time series followed a common cyclical pattern, say 4–6 years, one can separate out the 4–6 years cyclical patterns via spectral filters such as the BK filter and the CF filter. Furthermore, by analyzing the filtered series, one can detect relationships between the different economic time series.

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