

# Follow the Leader: Are Overnight Returns on the U.S. Market Informative?

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**Abstract.** Based on the international market linkages and the behavioral study of asset pricing, this study shows that a profitable trading strategy in equity markets can be made. The international stock market relationship has been found and tested by numerous scholars and a majority of the studies have only focused on the diversification benefits of the international portfolio. However, the linkages can be exploited to construct a profitable stock trading strategy if a constant pattern is observed. Overnight news such as the U.S. market returns is public information. If we capture the trading behavior of investors who have strong informative and predictive power, successful trading performance can be generated. The results show that the proposed strategy outperforms the benchmark and is more profitable and stable in market declining periods in the Japanese, Australian, Hong Kong and European stock markets.

**Keywords:** international market linkages, noise/informed traders, trading strategy

## 1. Introduction

Global financial markets have become increasingly more integrated with the lifting of barriers to allow the flow of capital across countries. Advances in technology, which have increased both the accessibility to world news and the speed of information transmission, have also helped to accelerate financial market integration. The stock markets are no exception, with stock composite indices across countries becoming increasingly correlated with each other over time. Such being the case, the focus of most academic studies has been in documenting evidence of increased international market comovement while others have tried to identify the source rather than the existence or structure of the comovement. Several studies attribute the comovement in financial returns to economic fundamentals and world information [1], [2] while others attribute it to contagion effect that cannot be explained by fundamental factors [3], [4].

If arguments for international market comovement are acceptable, then global equity traders should focus on international market linkages from a risk management point of view due to the erosion of diversification benefits. However, traders may be able to use the relationship among international stock markets to profit if a certain lead-lag relationship or a causal linkage from differences in trading time can be detected. Relatively few studies have been devoted to developing profitable trading strategies using international market linkages.

Investors may judge differently by how much and in what direction (i.e., positively or negatively) the overnight news influences their domestic markets. In addition, investors may respond differently to price movements if they believe their judgments are correct or when they admit their decisions are wrong. These various interpretations of overnight information and the diverse response by investors to market movements may render the stock market inefficient.

If we assume that the main determinant of overnight returns is based on news that arrives overnight, and that daytime returns are influenced by information released during the day, then overnight returns will mostly be decided by international factors, while daytime returns will be affected mainly by local news. If the market is inefficient so that overnight information is not fully reflected in the opening price due perhaps to the various interpretations, or the diverse opinions on the effect of the information, the closing price will also be influenced by international factors. From another perspective, if the market is efficient enough to reflect overnight information in the opening price, but at the same time if the opening price is affected by unreleased information that only a few informed traders can have, we can capture the short-term market

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directions. This study adheres to the latter case and if this pattern persists, a profitable trading strategy can be developed.

## **2. Literature Review**

### **2.1. International Stock Market Linkages**

Research on international market dependencies started with an interest of whether there were any diversification benefits from holding a global portfolio. Lessard [5] argues that the greater commonality among returns within countries than across countries is a major determinant of international diversification benefits. Solnik [1], by contrast, emphasises the strong relationship between local returns and international systemic risk, and focuses on the degree to which different national markets are integrated into a single multinational capital market.

Early studies found evidence of spillovers in both return innovations and volatility across stock markets [6]. The literature finds that the US is the dominant world market. Although innovations in the U.S. are rapidly transmitted to other markets in a clearly recognizable fashion, no single foreign market can significantly explain the U.S. market movements or volatility. Eun and Shim [6] find substantial multilateral interaction among the nine largest stock markets in the world. In particular, news originating in the U.S. market brings the most influential responses from other national markets.

Forbes and Rigobon [7] find virtually no increase in unconditional correlation coefficients (i.e., no contagion) during the 1997 Asian financial crisis, the 1994 Peso devaluation, and the 1987 U.S. stock market crash. There is a high level of market comovement in all periods, however, which they call interdependence. Corsetti et al. [8] applies bivariate correlation analysis to the international effects of the Hong Kong stock market crisis of October 1997. For country-specific shocks in Hong Kong, they find evidence of contagion for five countries out of a sample of 17. This is in contrast with previous findings of “no contagion, only interdependence” [7].

Previous research reports a significant correlation between open-to-close Japanese stock market returns and lagged close-to-close U.S. stock market returns. For example, Becker et al. [9] find a high positive correlation between the open-to-close returns for the U.S. stocks in the previous trading day and the open-to-close Japanese equity market performance in the current period. Using daily open-to-close and close-to-open stock index prices, Chong et al. [10] examine whether there are any lead-lag relationships between the Tokyo Stock Exchange and the other G7 stock markets. In particular, they analyse whether the movements of foreign markets in the preceding trading session can be used to formulate profitable trading strategies for the Japanese stock market. They find that the lead-lag relationships are slightly stronger in the short-term global up-trend than in the down-trend. The simulated trading strategies reveal that the next day market performance in Japan can be predicted by trading strategies using the signals from the G7 markets.

### **2.2. Noise Traders VS. Informed Traders**

There are several possible explanations for the intraday price movements by informed traders and noise traders. Black [11] introduces noise traders as they trade on noise as if it were information. They are essential to the existence of liquid markets. However, we classify traders in three categories, which include noise traders which Black [11] explains, traders who have public information, and privately informed traders who can make abnormal return. “Privately informed” does not only mean “unreleased” or “illegally obtained” but can include correct interpretation of the information.

Kyle [12] explains that informed traders incorporate their information into their pricing gradually. Hong and Stein [13] add the private information diffuses gradually across the investing public. Thus, only a small portion of private information is reflected in the opening price while public information such as the U.S. market return is fully reflected and the closing price implies full information. This leads to the intraday market direction. In contrast, Holden and Subrahmanyam [14] show there are multiple privately informed traders who compete and expose their private information early. If we catch the direction of informed traders, a profitable trading strategy could be generated.

## **3. Data and Methodology**

This study shows the validity of using larger market returns as a proxy for overnight information to develop profitable trading models. The criteria of overnight information are representative of the largest financial market and different time zone from domestic market operating hours. To examine the trading model in local markets, local stock index should be representative of the domestic markets and there should be tradable financial instruments such as index futures to draw pragmatic outcomes. In order to capture the trading signals, stock market indices are employed. Index futures are considered to investigate the return of the strategy due to high liquidity and the low transaction costs involved. Opening and closing price data is required to test the trading model as the strategy is the entry at market opening and the exit at market closing. In this study, three Asia-pacific markets (Japan, Australia, Hong Kong) and one European market (EUREX) are tested. The minute-by-minute index and index futures prices are obtained from Thomson Reuters Tick History through SIRCA.

### 3.1. Data

This study looks at the profitability of information transfer from the U.S. to other local markets over the period 2 July 2001 to 30 June 2011. The U.S. market is the largest financial market in the world and is by far the most important source of overnight information as the trading hours of the U.S. market does not overlap with most Asian stock markets and with the European markets only a few hours behind. The S&P 500 index is regarded as the stock index representative of the U.S stock market. As representatives of the local market we chose the following indices: Nikkei 225 (Japan), Hang Seng Index (Hong Kong), S&P/ASX200 (Australia) and EURO STOXX 50 (Europe).

For the S&P/ASX200, the opening prices are non-synchronous data and therefore should be replaced by the price identified 10 minutes after the market is open. This is due to opening prices of Australian shares are announced in the first 10 minutes alphabetically and use closing prices of the previous day to announce new opening prices. For the EURO STOXX 50, trading profits are investigated in open-to-early exit (15:30pm, CMT) returns because the trading hours are overlapping with the U.S. market.

### 3.2. Trading Strategy

Opening prices are determined by overnight information as follows.

$$P_t^{open} = f(P_{t-1}^{close}, \text{overnight information}) \quad \text{eq1}$$

In this research, we use the U.S. daily returns as a proxy of overnight information and that the local close-to-open returns reflect the overnight U.S. information.

$$P_t^{open} = f(P_{t-1}^{close}, r_{t-1}^{US}) = P_{t-1}^{close} + \beta \cdot r_{t-1}^{US} \quad \text{eq2}$$

In the eq2,  $\beta$  would vary in countries because they have different economic situations. Nonetheless, we assume  $\beta = 1$  and it is constant in time. In the real world, opening prices in local markets do not start exactly at the same level as the overnight U.S. market returns. It is possible that local traders do not react or overreact in a random fashion. The reason that the local markets start higher or lower than the price calculated by the U.S. market returns is due to the existence of informed traders.

Most traders would think it reasonable that local markets open at the level reflecting the U.S. market return if they do not have any advanced information. However, if some investors have useful information that can be indicative of the stock prices, they will gladly bid up or sell lower. Thus, the existence of informed traders leads to the volatility of the opening prices. If we assume that the judgement of the informed traders is correct, then the trading rule can be generated as follows.

- Trading rule 1. When the local market opens higher (lower) than the expected price based on the overnight returns on the U.S. market, a buy (sell) signal is generated. Irrespective whether the U.S. market went up or down.
- Trading rule 2. Reverse the position at the market closing.

Based on these rules, the following trading model is generated.

$$\begin{cases} \text{Buy: } Local\ return_t^{o-c} > US\ return_{t-1}^{c-c} \\ \text{Sell: } Local\ return_t^{o-c} < US\ return_{t-1}^{c-c} \end{cases}$$

where  $Local\ return_t^{o-c} = \ln(\text{opening price of Local at day } t) - \ln(\text{closing price of Local at day } t-1)$ ,

$$US\ return_{t-1}^{c-c} = \ln(\text{closing price of US at day } t-1) - \ln(\text{closing price of US at day } t-2).$$

In the calculation of total returns, trading commissions are considered by rates from the Interactive Brokers (JPY 800 in Japan; AUD 10 in Australia; HKD 60 in Hong Kong; EURO 4 in Germany for one round turn). Trading costs are significant as this strategy is based on day trading. Even though we use index futures to test the performance of the trading model, we do not consider leverage effects nor include the profits from surplus cash.

#### 4. Empirical Results

For the test period, international stock markets have fluctuated significantly, but the proposed trading model generates relatively stable performances. Figure 1 shows the accumulated returns of four stock markets. In the Nikkei 225 trading, the strategy had worked well before the end of 2008, and the profits have vanished with trading costs. In the Australian market, 10 year-return is less than that in the Japanese market, but the profits increase constantly. In the Global Financial Crisis, the model produces even higher returns than other periods. Although there was a large drawdown during the beginning of 2009, the returns of the strategy in the Hong Kong market are much higher than in other countries. The results of STOXX 50 index trading show that the proposed strategy was not quite attractive before the GFC, but has shown a notable performance from 2009.

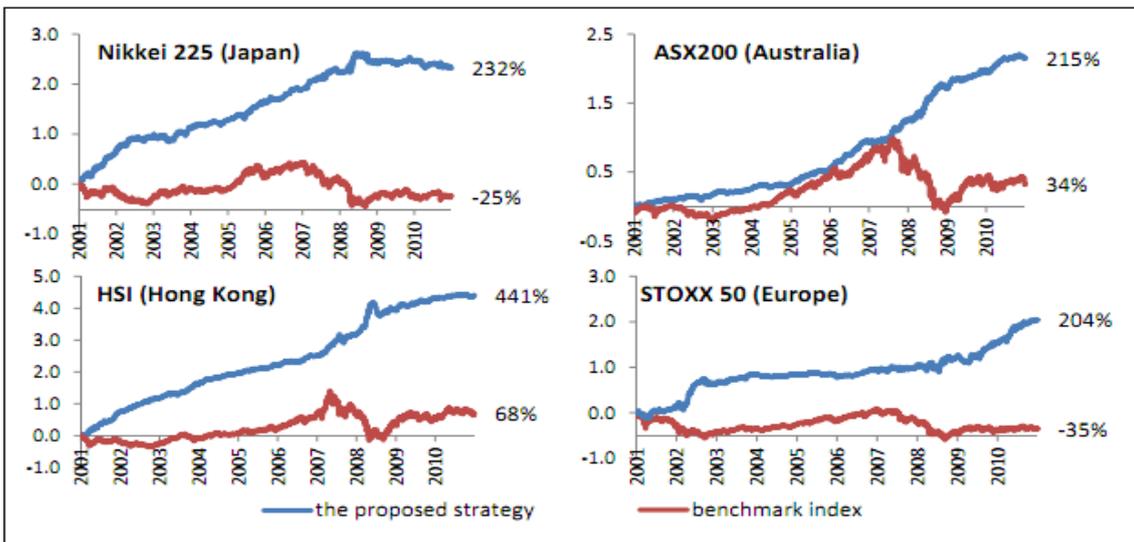


Fig. 1: Trading returns of the proposed trading strategy in four countries (July 2001 to June 2011)

Table 1 shows basic statistics of the trading results. The winning rates are slightly above 50% in four countries in spite of the successful performances. This means the average size of profits is larger than the size of the loss. The strategy shows the highest return but is the most volatile in Hong Kong, and achieves the lowest risk in the Australian market. All the returns in four countries are positively skewed.

Table 1: basic statistics of the performances in four countries

	Japan	Australia	Hong Kong	Europe
10 year-return	232%	215%	441%	204%
Total trading days	2,330	2,452	2,389	2,459
Winning days/Total days	51.4%	56.6%	56.6%	53.5%
Mean	0.096%	0.085%	0.178%	0.081%
Standard deviation	1.073%	0.653%	1.208%	1.140%
Skewness	0.32	0.50	0.38	0.15
Kurtosis	6.99	6.05	10.24	3.16
Max/Min	8.7% / -7.3%	5.4% / -4.3%	11.1% / -11.5%	5.8% / -5.8%
Maximum drawdown	-30.6%	-8.4%	-43.3%	-22.2%

## 5. Conclusion and Future Research

While most scholars are concerned with the decline of global market comovement, this study shows that international stock market linkages can be exploited to generate consistent profits. The abnormal returns of the proposed trading strategy imply that opening prices are not only determined by overnight information but also through private information or smart predictions. These patterns are becoming weak in the Japanese market, but continue to exist in the other markets such as Australia, Hong Kong, and Western Europe. For further research, we assumed a constant influence of the U.S. market returns (i.e. beta in the eq2 is 1), but if country-specific and time-varying beta is estimated, better performances can be achieved.

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