On Overnight Return Premiums of International Stock Markets

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Abstract

We study the daily close-to-opening overnight returns of stock indices of thirty-two developed and emerging markets. Overnight returns are generally less volatile than the trading-period returns and overnight return premiums are reported for twenty markets. Excess overnight returns over the trading-period returns are higher following a period of trading when differences of opinion were low but lower when divergence of opinion is going to be high on the next trading day. Higher overnight return premiums are observed for the markets that have short sale constrains. Our findings suggest that investors are generally better off buying at close but selling at opening, especially so on those markets that have high level of information asymmetry and short selling is not commonly practiced.

Keywords: Opinion divergence, short sale constrain, overnight stock return

I. Introduction

Superior return earned over a non-trading period is one of the many different types of financial market anomalies. French and Roll (1986) find it "puzzling" that stock returns are more volatile during the trading-hours than market closures over the weekends. They argue this phenomenon is caused by the differences of information flow and mispricing of stocks during the trading and the non-trading hours. Amihus & Mendelson (1991) and Masulis & Ng (1995) report that volatility of intraday returns are larger than that of overnight returns in stock markets of Japan and U.K. Branch and Ma (2006) find overnight returns of U.S. stocks are negatively correlated with returns generated during the trading hours after trading activity resumes the following morning. Cooper, Cliff and Gulen (2008) report individual stocks, stock indices and stock index futures offer better returns over the night non-trading period than over the trading-hours during the day in the U.S. More interestingly, they find volatilities of overnight returns are lower than those of trading-period returns. Tompkins and Wiener (2008) report similar findings for their study on stock index futures of four major economies including Germany, France, Japan and the U.K.

A number of factors are claimed by finance literature to be related to the level of market efficiency. For example, Chiou, lee and Lee (2010) find that stock returns are related to the state of market development based on the evidence that stock returns are lower, but riskier, in emerging markets than in developed markets. Bris et al. (2008) relate market anomalies to short sale restrictions. They study both cross-sectional and time series analysis based on data from 46 equity markets and find that stock prices incorporate information faster in countries where short selling is permitted by law and commonly

practiced. Furthermore, Shamsuddin and Kim (2010) show that market returns are less predictable, thus more efficient, in countries which have no short-selling restrictions.

Miller (1977) proposes that short-selling constrains lead to the overpricing of stocks when investors have disagreements about their prices. Miller argues that, as pessimistic investors are unable to sell short while optimistic investors can continue to buy long with short-sale constrains, the demand and the supply for a stock will become unbalanced when investors disagree about its value. As a result, market force will push up the stock price and lead to the overpricing of stock.

In light of Miller's argument, Diether, Malloy and Scherbina (2002) observe lower future returns to stocks having higher dispersion of investor opinions. They argue that stock prices tend to reflect optimistic views rather than pessimistic views when investors have different opinions about the stocks and pessimistic investors try to avoid trading. Therefore, stocks subject to higher dispersion of investor opinions tend to be overpriced and corrections to the overpricing in the future would result in lower returns to affected stocks.

On the other hand, Ofek and Richardson (2003), Jones and Lamont (2002) and Chen et al. (2002) find overpricing is more serious for stocks having greater short sale constraints as these stocks provide lower future returns. Asquith et al. (2005) argue that there are two necessary conditions of binding short sale constraints; the supply of the stock must be low, and the demand of shorting such stock must be high. They use institutional ownership to account for the supply side of the shares, and relative short interest to account for the demand for shorting. They find that stocks with both low

institutional ownership and high short interest experience greater overpricing. Nagel (2005) also reports that stocks having low institutional ownerships tend to provide superior risk-adjusted returns.

Berkman et al. (2008) observe significantly higher overnight returns and price reversals during the day from large stocks in the U.S. They show that the differences between overnight returns and trading-hour returns are so large that a close-to-open trading could generate significant gain which would be high enough to cover transaction costs. They argue that this phenomenon is caused by the overpricing of stocks at market openings due to the increasing dispersion of investors' opinions accumulated over the non-trading hours at night and the inability to trade by pessimistic investors under short selling constraints. In the spirit of Miller (1977), Boehme, Danielsen and Sorescu (2009) clarify that both high dispersion of opinion and short-sale constrains are necessary condition for overpricing of stocks as they find no systematic overpricing when only one of the two conditions is not met.

Although several studies have been done to show that the overnight return anomaly exists in the US and a few other developed financial market, little is known about whether this anomaly exists in other markets. If this anomaly exists in other international stock markets, effective trading strategies could be developed to help international stock investors to capture the differences between the higher opening prices and the lower preceding closing prices. If the magnitudes of abnormal overnight returns are large enough, such strategies may work better than a simple close-to-close buy-and-hold strategy. Such profitable opportunities, however, do not seem to be exploited by investors since the anomaly should otherwise go away. Is the overnight

return anomaly unique to the US, or is it a feature applicable to other international stock markets? This research intends to answer this question by examining the index data of a wide range of international stock markets.

Previous studies on this topic focus on well-developed financial markets in the U.S. and a few other major economies which have rather relaxed rules on short-selling practice. The purpose of this research is to examine whether overnight return anomaly exists in some other countries. In particular, we look at stock markets of thirty-two countries including both developed and emerging markets. As short-selling legislations and practices are different in different countries, our dataset provide us an opportunity to examine the effect that short-selling constrains have on overnight return anomaly. We have two main findings. First, overnight returns are generally higher, but less volatile, than opening-to-lose returns in twenty countries; and even more so in emerging markets. Second, overnight return premiums, which are differences between overnight returns and trading-period returns realized on the same day, are higher in countries that have short-selling restrictions. Our results indicate that short selling practice may abate overnight return anomaly and improve market efficiency. The practical implication of our findings is that investors are generally better off buying at close and selling at opening, provided they have decided to trade. The rest of the paper proceeds as follows. We provide details about data and research methodology in the next section. We then present our research findings in Section III and conclude in Section IV.

II. Data and Research Method

We obtain information for any country that are included in either the MSCI Developed Markets Index or the MSCI Emerging Market Index and have at least five years data

available for study. The sample includes 18 developed markets and 14 emerging markets. A list of all sample countries is provided in Table A1 in the Appendix.

For stock market of each country, we obtain several types of information from various sources. We download from Datastream, or Yahoo Finance, daily data for opening price (PO), intraday high (PH), intraday low (PL) and closing price (PI) of stock market index for the period from January 1st 2000 to December 31st 2009. This time period is chosen to obtain sufficient data for all countries that we study. The period also includes a complete cycle of ups and downs of international stock markets. We collect information about short sale regulation and practice of each country from two papers by Bris, Geotzmann and Zhu (2008) and Charoenrook and Daouk (2005) and also the websites of national stock exchanges.

For each individual national stock market index, we calculate the close-to-close daily return (DR), the opening-to-close overnight return (ONR) and the close-to-opening trading-period return (TPR) using formulae (1), (2) and (3), respectively.

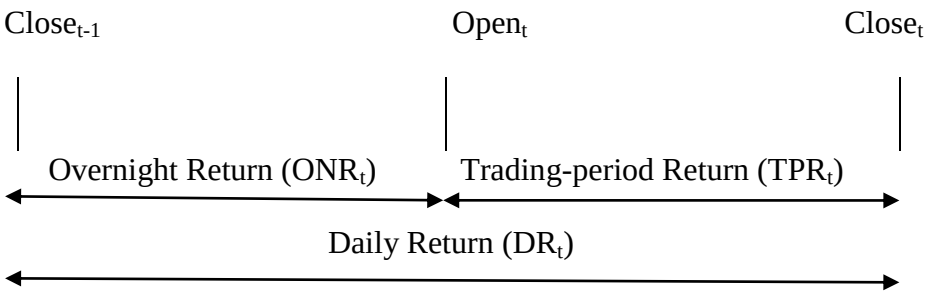
$$DR_t = (Close_t / Close_{t-1}) - 1 \quad (1)$$

$$ONR_t = (Open_t / Close_{t-1}) - 1 \quad (2)$$

$$TPR_t = (Close_t / Open_t) - 1 \quad (3)$$

Note that the sum of overnight return and trading-period return is the daily return on any given day. The diagram depicted in Figure 1 shows the relation of the above three returns.

Figure 1 Composition of daily returns



We define overnight return premium ($ONRP_t$) as the excess of overnight return over the trading-period return, calculated using Equation (4):

$$ONRP_t = ONR_t - TPR_t \quad (4)$$

where PI and PO are closing price and opening price, respectively; PH and PL are intraday high and intraday low, respectively; of a stock index. Subscripts t and (t-1) denotes for observations made on day t and (t-1), respectively.

In order to investigate the relationship between overnight return premium and investors divergence of opinion and short-selling constrains, we conduct a panel regression test in the form of Equation (5). The dependent variable is a matrix of daily overnight return premiums (ONRP) of a cross section of national stock market indices. There are three independent variables. The first two independent variables are matrices of divergence of opinions, one for the trading day before the market closure at night and one for the trading day after the market reopens the next morning. The third independent variable is a matrix of short-selling constrain dummy. Since investor behaviour may vary across different markets while short selling constrain is likely to exert the same influence on the efficiency of different markets, we allow cross section differences for coefficient

estimates for the two divergence of opinion variables but estimate a common coefficient for the short selling constrain dummy variable.

$$ONRP_{it} = C_i + \alpha_i \times DO_{i(t-1)} + \beta_i \times DO_{it} + \lambda \times SS_{it} \quad (5)$$

where DO_{it} and $DO_{i(t-1)}$ measure the levels of for country i's investors' divergence of opinion on the day an overnight return premium is measured and the day before that day; SS is a dummy variable for short-selling constrains which takes the value of zero if short sale is allowed and commonly practiced, or a value of one if short sale is either prohibited by law or is rarely practiced due to restrictions on security lending or other reasons.

As we use country-level stock index data, some proxies for measuring divergence of opinion on individual stocks commonly used in finance literature are either not available, or not suitable, for the purpose of this study. From the data we have, we measure divergence of opinion by relative range of index level calculated as the spread between the highest price and the lowest price in any given day adjusted by the level of closing price. Equation (6) specifies how we estimate the level of divergence of opinion.

$$DO_t = (PH_t - PL_t) / PI_t \quad (6)$$

We allow cross-section variations of coefficients for the two divergences of opinion variables and obtain a common coefficient for the short-selling constrain dummy variable. We also run Granger Causality tests, country by country, to check if overnight return premium is caused by divergence of opinion. We report the results in Table A2 in the Appendix. We report and discuss our results in the next section.

III. Results and Discussions

Summary statistics for the average daily overnight and trading-period returns for all thirty-two stock markets are presented in Table 1. The results show that the overnight returns are higher than the trading period returns and the close-to-close returns in 13 developed markets and 8 emerging market. The average overnight returns, averaged across the sample countries, are 0.0457% and 0.0394% higher than the average daytime returns, in developed and emerging markets, respectively. The above result indicates that although overnight return anomaly is more widespread in developed countries, the magnitude of overnight return premium has no difference across the developed and emerging markets. Our finding of the absence of the anomaly in the US market, however, is inconsistent with the findings of Cooper et al. (2007) and Berkman et al. (2008), both of which report significant overnight return anomaly in the US.

Is the superior overnight return associated with higher risk? We report the standard deviations of the close-to-close, the overnight and the daytime returns in Table 2. Our results show that overnight returns are less volatile than daytime returns in all countries except for Israel. This result suggests that higher overnight return is not associated with higher risk during the market closure at night, evidence that contradicts the theory of risk-return trade-off.

Table 1 Overnight return versus trading-period return in different markets

We report the averages of daily return (DR), overnight return (ONR), trading-period return (TPR) and overnight return premium (ONRP) for stock market index of each country. Panel A reports results for developed markets and panel B reports results for emerging markets.

Country	No of obs.	DR	ONR	TPR	ONRP
			Panel A: Developed markets		
Austria	2,364	0.0216%	-0.0013%	0.0414%	-0.0242%
Australia	1,561	0.0309%	0.0159%	0.0165%	**0.0023%**
Belgium	2,511	-0.0219%	0.0590%	-0.0639%	**0.1306%**
Canada	2,515	0.0210%	0.0479%	-0.0256%	**0.0735%**
Finland	2,508	-0.0111%	0.0015%	-0.0119%	**0.0134%**
France	2,514	-0.0145%	0.0346%	-0.0416%	**0.0833%**
Germany	2,502	0.0034%	0.0073%	0.0028%	**0.0119%**
Hong Kong	2,399	0.0177%	0.0363%	-0.0211%	**0.0556%**
Ireland	2,418	-0.0093%	-0.0093%	-0.0004%	-0.0089%
Italy	2,294	-0.0264%	0.0387%	-0.0579%	**0.1047%**
Japan	2,335	-0.0468%	0.0185%	-0.0445%	**0.0863%**
Netherlands	2,514	-0.0198%	0.0333%	-0.0451%	**0.0865%**
Portugal	2,472	-0.0018%	0.0469%	-0.0498%	**0.0967%**
Singapore	2,425	0.0094%	0.0484%	-0.0323%	**0.0872%**
Spain	2,034	0.0272%	0.0072%	0.0195%	-0.0129%
Switzerland	2,464	-0.0022%	0.0251%	-0.0210%	**0.0524%**
UK	2,464	-0.0052%	-0.0013%	0.0045%	-0.0026%
US	2,515	0.0121%	-0.0006%	0.0131%	-0.0137%
Average		*-0.0009%*	*0.0227%*	*-0.0176%*	*0.0457%*
			Panel B: Emerging markets		
Brazil	2,476	0.0752%	0.0133%	0.0674%	-0.0541%
China	2,411	0.0449%	-0.0135%	0.0625%	-0.0760%
Colombia	1,471	0.1181%	0.0190%	0.1024%	-0.0833%
Hungary	2,200	0.0625%	0.0669%	-0.0022%	**0.0689%**
India	2,347	0.0494%	0.1476%	-0.0850%	**0.2443%**
Indonesia	2,295	0.0671%	-0.0197%	0.0835%	-0.1064%
Israel	1,108	0.0705%	0.0953%	-0.0287%	**0.1185%**
Korea (South)	2,352	0.0295%	0.0591%	-0.0246%	**0.0881%**
Malaysia	2,356	0.0225%	0.0177%	0.0082%	**0.0129%**
Mexico	2,415	0.0754%	0.0025%	0.0690%	-0.0701%
Philippines	2,209	0.0450%	0.0374%	0.0087%	**0.0287%**
Poland	2,284	0.0485%	0.0106%	0.0393%	-0.0287%
Taiwan	2,382	0.0063%	0.1265%	-0.1197%	**0.2448%**
Thailand	2,438	0.0320%	0.1421%	-0.1102%	**0.2523%**
Average		*0.0534%*	*0.0503%*	*0.0050%*	*0.0457%*

Table 2 Standard deviation of daily return, overnight return and trading-period return in different markets

We report the average standard deviation of daily return (σ_{DR}), overnight return (σ_{ONR}) and trading-period return (σ_{TPR}) for stock market index of each country. Panel A reports results for developed markets and panel B reports results for emerging markets.

Country	σ_{DR}	σ_{ONR}	σ_{TPR}
	Panel A: Developed markets		
Austria	1.4894%	**0.0946%**	1.4981%
Australia	1.1263%	**0.0159%**	0.9592%
Belgium	1.3610%	**0.7173%**	1.1804%
Canada	1.2785%	**0.8269%**	1.0575%
Finland	2.0988%	**0.5427%**	2.0446%
France	1.5773%	**0.9046%**	1.3169%
Germany	1.6634%	**0.4386%**	1.5656%
Hong Kong	1.7036%	**1.1100%**	1.2315%
Ireland	1.4977%	**0.2434%**	1.5303%
Italy	1.3214%	**0.6837%**	1.1445%
Japan	1.5758%	**0.6436%**	1.3037%
Netherlands	1.6344%	**0.9053%**	1.3466%
Portugal	1.1015%	**0.5666%**	0.9701%
Singapore	1.3210%	**0.6407%**	1.1778%
Spain	1.3752%	**0.7371%**	1.1163%
Switzerland	1.3097%	**0.7322%**	1.0866%
UK	1.3396%	**0.0595%**	1.3383%
US	1.3451%	**0.0267%**	1.3695%
Average	*1.4511%*	*0.5494%*	*1.2910%*
	Panel B: Emerging markets		
Brazil	1.9789%	**0.1296%**	2.0178%
China	1.6691%	**0.7417%**	1.6025%
Colombia	1.5992%	**0.4651%**	1.6419%
Hungary	1.6797%	**0.9168%**	1.4465%
India	1.7631%	**0.9080%**	1.6075%
Indonesia	1.5078%	**0.7196%**	1.3429%
Israel	1.4008%	1.2002%	0.9121%
Korea (South)	1.8269%	**1.1661%**	1.4623%
Malaysia	0.9815%	**0.4969%**	0.8534%
Mexico	1.5189%	**0.0899%**	1.5147%
Philippines	1.1895%	**0.6196%**	1.1276%
Poland	1.3906%	**0.7923%**	1.1757%
Taiwan	1.6250%	**1.1120%**	1.3457%
Thailand	1.5320%	**0.8244%**	1.3715%
Average	*1.5474%*	*0.7273%*	*1.3873%*

Next, we report in Table 3 the key results of the panel regression in the form of Equation (5), which examines the relationships between the magnitude of overnight return premium and the level of investors' divergence of opinion and the variation of short selling constrains across all countries in our sample. Since we allow for cross-country variations of the coefficients for the two divergences of opinion variables, we obtain thirty-two sets of coefficient estimates; each is different from one another, for all countries we study. To be succinct, only the averaged values of estimated coefficients[1] are reported in Table 3. The dummy variable for short selling constrain is set as a common variable, which means it has a common coefficient for all countries.

Table 3 Summary results of panel regression

We run panel regressions in the form of Equation (5): $ONRP_{it} = C_i + \beta_1 \times DO_{it} + \beta_2 \times DO_{i(t-1)} + \lambda \times SS_{it}$.

Dependent variable ONRP is a matrix of overnight return premiums calculated as the difference between overnight return and the return realized during the trading period. Independent variables DO and DO_{-1} are matrices of expected values of divergences of opinion on the day market reopens after closure and the day before the closure at night. Dummy variable SS is a matrix of short sale constrains which takes the value of zero if short sale is allowed and commonly practiced and the value of one otherwise. We estimate a common coefficient for the short-selling constrain dummy but allow cross section variations of the two divergences of opinion coefficients. For each independent variable, we report estimated coefficient followed by t-statistics (in parentheses) and p-value. The symbol *** denotes for statistical significance at the one percent level.

Variable	Lagged divergence of opinion (β_1)	Divergence of opinion (β_2)	Short selling constrain dummy (λ)
Coefficient (cross-country average)	-10.94	17.84	0.06
t-stats (cross-country average)	-3.68***	5.77***	4.44***
Adj-R^2		2.14%	

The results of Table 3 suggest that overnight return premiums are lower following a period of trading when differences of opinions among investors were high before the markets close for the night. On the other hand, higher overnight return premiums are observed when the divergence of opinion is going to be high on the next trading day. Consistent with Miller (1977)'s conjecture that divergence of opinion tend to result in

[1] Detailed results for individual countries are available from the authors upon request.

the overvaluation of an asset in a short selling constrained environment, we find that overnight return premiums are indeed higher in countries where short sellings are prohibited or rarely practiced.

The negative coefficient of divergence of opinion before market closure seems to suggest that investors are more cautious when divergence of opinion was high during the day before markets are closed for the night. Therefore, investors tend to be more conservative bidding up prices when market resumes the next morning. On the other hand, greater disagreements among investors during the night and the trading hours after market resume the next morning lead to higher overnight return premiums. Between the divergences of opinion measured over the two periods, one before the night and the other including and after the night, the second factor dominates as indicated by its larger coefficient in absolute term. Our results are generally consistent with Berkman et. al. (2008) and support Miller (1977)'s arguments.

The results of Granger Causality tests reported in Table A2 of the Appendix suggest that the divergence of investors' opinions does Granger cause the overnight return premium in most of the countries we study.

IV. Conclusions

This research examines the anomaly of superior overnight non-trading period returns of international stock markets. Using stock index data of thirty-two countries, we find that the anomaly exists in twenty countries including both developed and emerging markets. We find that the superior overnight returns are not justified by the risk-return trade off as overnight returns are less volatile than trading-period returns. The results of a panel

suggest that greater divergences of opinion lead to higher overnight return premiums and that short sale constrains exacerbate the anomaly.

The findings of this study have both policy and practical implications. First, improving the quality of information flow will help to reduce the divergence of opinion among investors, which will in turn alleviate overnight return anomaly. Second, market participants may be better off buying at close and selling at opening if they have decided to trade. Our research also contributes to the literature as it is, to our knowledge, the first overnight anomaly study using country-level data of stock markets of a broad range of emerging and developed countries. The large dataset of time series data of a broad list of countries allows us to test the roles that divergence of opinion and the market-wide constrains on short sales using panel regression. A possible extension to this study is to examine the pattern of price change during the trading hours, especially at the opening and closing, to identify whether it is the overpricing at the opening, or the underpricing at the closing of the markets that leads to higher overnight return. This will apparently involve the study of tick data at the country level.

The findings of the above results have both policy and practical implications. Since improving the continuous flow of information may reduce divergence of opinion among investors, our findings suggest that improving information flow and relaxing constrains on short sales may help to abate the magnitude of overnight return anomaly. One practical implication of our findings is that investors are generally better off buying at close and selling at opening if they have decided to trade.

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Appendix

Table A1 List of sample countries

Country	Short sale restriction**
Panel A: Developed Markets	
Australia	Allowed and practiced
Austria	Allowed and practiced
Belgium	Allowed and practiced
Canada	Allowed and practiced
Finland	Allowed but rarely practiced
France	Allowed and practiced
Germany	Allowed and practiced
Hong Kong	Allowed and practiced since March 1994
Ireland	Allowed and practiced
Italy	Allowed and practiced
Japan	Allowed and practiced
Netherlands	Allowed and practiced
Portugal	Allowed and practiced
Singapore	Not allowed
Spain	Allowed but rarely practiced
Switzerland	Allowed and practiced
United Kingdom	Allowed and practiced
USA	Allowed and practiced
Panel B: Emerging Markets	
Brazil	Allowed but rarely practiced
China	Not allowed
Colombia	Not allowed
Hungary	Allowed but rarely practiced
India	Not allowed for institutional investors
Indonesia	Allowed in 1996 but rarely practiced
Israel	Allowed but rarely practiced
Malaysia	Allowed in 1995 but prohibited in 1997
Mexico	Allowed
Philippines	Allowed in 1996 but rarely practiced
Poland	Allowed but rarely practiced
South Korea	Not Allowed
Taiwan	Allowed but rarely practiced
Thailand	Allowed and practiced since 1999

Note: Information about short sale restrictions come from Bris, Geotzmann and Zhu (2008), Charoenrook and Daouk (2005) and the websites of national stock exchanges.

Table A2 Granger causality test results

For each country we run Granger causality test which has a null hypothesis that divergence of opinion granger causes overnight return premium. Symbols *, ** and *** denote for statistical significances at the ten percent, five percent and one percent levels.

Country	DO Granger causes ONRP	p-value
Australia	Accept	0.006***
Austria	Reject	0.256
Belgium	Accept	0.000***
Canada	Accept	0.000***
Finland	Accept	0.009***
France	Accept	0.068*
Germany	Accept	0.003***
Hong Kong	Accept	0.000***
Ireland	Reject	0.2327
Italy	Accept	0.040**
Japan	Accept	0.021**
Netherlands	Reject	0.132
Portugal	Accept	0.000***
Singapore	Reject	0.156
Spain	Reject	0.355
Switzerland	Accept	0.094*
United Kingdom	Accept	0.072*
USA	Reject	0.307
Brazil	Accept	0.000***
China	Accept	0.000***
Colombia	Reject	0.217
Hungary	Accept	0.000***
India	Accept	0.000***
Indonesia	Reject	0.823
Israel	Accept	0.026**
Korea (South)	Reject	0.225
Malaysia	Accept	0.019**
Mexico	Accept	0.033**
Philippines	Reject	0.839
Poland	Accept	0.010*
Taiwan	Accept	0.000***
Thailand	Accept	0.021**