

# Monetary Policy, Private Information, and International Stock Markets

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*Financial economists are uncertain as to the cause of common movements in international stock markets. Previous studies have found that only a small fraction of the movements can be attributed to public news about macroeconomic variables. This has led some to suggest that investor irrationality is responsible. In this article, we assess whether investors possessing superior (private) information about future U.S. interest rates and stock market movements affect international stock market comovements.*

**W**hat drives the common variations in international stock market movements? This is an important question for a number of reasons. First, researchers have identified a large degree of risk reduction in equity portfolios from diversifying funds into international stocks. The more that stock markets around the world move together, the smaller are the gains from diversification. Second, it is important to know whether the comovements are driven by rational responses to new information or by the over-reaction of one market to movements in another. Third, it is important for the Bank of Canada to understand how asset prices in a small, open economy are affected by foreign information. In particular, an assessment of the behaviour of financial markets requires an understanding of how and what information is incorporated into prices. Finally, it is important for central bankers to know how much of the movement is caused by changes in monetary policy. This will, in turn, help explain how the cost of capital for domestic corporations is determined in global markets.

## Background

Financial research provides a compelling answer to this question. Asset-pricing models show that expected stock returns vary in response to changes in risk-free interest rates, changes in expected future cash flows, and/or changes in the equity risk premium.<sup>1</sup> In a rational asset-pricing framework,

1. The equity risk premium is the extra return required on (risky) stocks above the return required on (less risky) bonds.

\* This article summarizes a recently published Bank of Canada working paper (Bauer and Vega 2004).

with integrated international stock markets, comovements in international stock returns would be driven by news about macroeconomic variables that affect cash flows, risk-free rates, or risk premiums in many countries.<sup>2</sup>

But existing studies, using daily or monthly data, show that public news about macroeconomic variables has a limited impact on international equity returns. For example, King, Sentana, and Wadhvani (1994) construct a factor model of monthly returns in 16 national stock markets and examine the influence of 10 key macroeconomic variables.<sup>3</sup> They conclude that the public news components of these observable variables contribute little to variations in world stock markets. Rather, there is a dominant unobservable (i.e., non-public) factor driving international returns. They interpret the common factor as an index of “investor sentiment,” suggesting a degree of market irrationality. Other studies also find that public news about macroeconomic variables has little cross-market impact; e.g., Karolyi and Stulz (1996), Connolly and Wang (2003).

If public news about macroeconomic variables is not responsible for the comovements, could some “market friction” be responsible? One potential friction is asymmetric information. Information is asymmetric when some investors have superior (private) information about the

2. In a “rational” market, prices fully and accurately reflect all available information. Markets are “integrated” when there are no barriers to trade in financial assets between countries.
3. In a factor model, the expected returns on a large number of stocks are explained by a much smaller number of variables.

returns on assets in their own country. The standard view is that these “sophisticated” agents are either insiders in a company or obtain the private information about the firm by analyzing public information in a superior manner. When sophisticated agents trade, their private information is (partially) revealed to the market, causing revisions in asset prices. Trading based on private information could thus be a potential cause of the comovements in international stock returns if the agents had superior knowledge about the common macroeconomic factors that price equities in many countries. But the economic origins of such private information remain unexplored. Indeed, Goodhart and O’Hara (1997) wonder, “in the international context, how could private information be expected to have a global impact?”

One possible answer to this question is that sophisticated investors could have superior information about future macroeconomic factors that will affect both U.S. equity prices and interest rates. This private information about U.S. macroeconomic factors would likely be useful in making trades in stocks around the world. The large size of the U.S. economy and the links between U.S. and foreign firms suggest that U.S. macroeconomic conditions are likely to have a global impact. Indeed, if international equity markets are integrated, then private information about U.S. factors will give informed agents superior knowledge about the global factors that price stocks in many countries (Albuquerque, Bauer, and Schneider 2003). Thus, it is likely that the private information of sophisticated investors trading in (liquid) U.S. markets will help explain the cross-section of international equity returns.<sup>4</sup> This article therefore addresses the question of whether both public and private news about U.S. macroeconomic factors could help explain comovements in international stock markets.

## Methodology

In our paper, we test the potential cross-market effect of trading on private information by looking at information revealed in two U.S. markets.

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4. Another source of such global private information is the trading floors of large banks. Traders see customer order flows in many markets around the world. This superior knowledge of global demand conditions would be useful for the firm’s proprietary traders.

The first is the Eurodollar futures market that trades on the Chicago Mercantile Exchange. The Eurodollar futures contract is considered to be the most liquid exchange-traded money-market instrument in the world. Traders use the market to hedge against, and speculate on, future movements in the Eurodollar interest rate (the rate on U.S.-dollar deposits in banks outside the United States). We look at holding-period returns on and trades in the six-month Eurodollar futures contract.

The second market is the S&P 500 Exchange Traded Fund (ETF), known by its acronym as the SPDR (Spider), which began trading on the AMEX in 1993.<sup>5</sup> This fund is designed to track the performance of the S&P 500 Index, a broad index of U.S. stocks. The SPDR is a very liquid security; in mid-2003, the fund had over US\$37 billion in assets under management, with an average daily trading volume totalling US\$4 billion.

We examine the impact on foreign stock markets of public and private news originating in these two U.S. markets. We wish to observe the prices of foreign stocks at the same time that we observe prices in the two U.S. markets. To do this, we use foreign ETFs. Barclays Global Fund Advisors manage “iShares” that trade on the AMEX. They are baskets of foreign stocks put together to track the performance of foreign market indexes compiled by Morgan Stanley Capital International. We also use the ETFs of 12 other countries (Germany, Japan, the United Kingdom, Switzerland, Canada, France, Netherlands, Hong Kong, Spain, Sweden, Australia, and Italy). These countries were selected because they have developed equity markets and ETF data that are available over the sample period.

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5. ETFs are shares of a portfolio of stocks that trade continuously on an exchange and are designed to closely track the performance of a specific index. Managers of ETFs may buy either all the stocks in the index or a sample of stocks to track the index. Market participants are able to create and redeem shares in an ETF when its market price differs from the value of its underlying index. This ability to “open” the funds at any time ensures that ETFs trade near their net asset value. Elton et al. (2002) conclude that the SPDR closely tracks the S&P 500 Index, since the difference between the two is less than 1.8 basis points per annum.

Our analysis proceeds in two steps. In the first, we obtain public and private information shocks in the two U.S. markets by adapting techniques from the microstructure literature (primarily Hasbrouck 1991). Our analysis relies on the use of high-frequency data to obtain better estimates of the impact of news on prices. We use regression analysis to remove the impact of short-run microstructure effects from the high-frequency price and trade data. The residuals from these regressions represent (noisy measures of) public and private information shocks occurring in U.S. markets.

In the second step, we use a factor model of international equity returns to evaluate the effects of the U.S. public and private information shocks on foreign equity markets.<sup>6</sup> We examine how well these factors are able to explain comovements in international stock markets over holding periods ranging from one-half hour out to one week.<sup>7</sup> The effects of private information will be revealed if unanticipated trades in U.S. markets are significant for longer holding periods (one day to one week). This is because unanticipated trades are a combination of random liquidity shocks plus private information. Liquidity shocks have only a short-run effect on prices, while the effect of private information is permanent.

## Results

The analysis yields a number of interesting findings. The first stage of the analysis reveals that some agents have superior knowledge about future U.S. interest rates and aggregate equity market returns. This suggests that the old way of viewing private information as a “firm-specific” phenomenon is not correct; sophisticated investors can have private information about entire markets. This comes from their superior interpretation of public news.

In the second stage of the analysis, there is strong evidence of information spillover across markets. Both private and public information

shocks revealed in U.S. markets are components of the factors that model the cross-section of international equity returns. Contrary to the earlier literature, public information shocks do have an effect, because they are more precisely measured in the microstructure data than they were in the daily or monthly data. Private information shocks are also a statistically significant part of the factor. Sophisticated investors have an impact on global markets when their superior information is incorporated into international equity returns. This trading based on private information is partly responsible for the common variation in the movements of international stock markets.

An interesting finding concerning monetary policy is that unanticipated interest rate changes made by the U.S. Federal Reserve Board influence foreign stock markets. A policy-driven increase in U.S. interest rates lowers foreign stock returns. Changes in U.S. interest rates that are not associated with monetary policy are not statistically significant. Thus, changes in U.S. interest rates affect the international cost of equity capital only when they are associated with changes in monetary policy.

These shocks are quantitatively important. For example, a shock of one standard deviation to private information about future U.S. interest rates is equivalent to almost 25 per cent of the standard deviation of the total factor driving weekly returns. A similar shock to private information about U.S. equity markets is equivalent to 17 per cent of the standard deviation of the factor.

Private information can originate in two ways. Sophisticated agents, such as hedge fund managers, can conduct “top-down” analyses, where they generate private information about macroeconomic fundamentals from a superior interpretation of public information.<sup>8</sup> The fundamentals could be related to either the U.S. economy or foreign economies. In either case, with integrated international markets, such information would be useful for capturing return variations in many countries.

Alternatively, order flow in U.S. markets could be acting as a “bottom-up” aggregator of diffuse

6. The factors are linear combinations of the public and private information shocks from U.S. money and equity markets.

7. Foreign stocks will also respond to news released in their home markets. Thus, the approach does not measure the effects on asset prices of all trades based on private information, but only a subset of these trades.

8. A “top-down” fund manager is an individual who has a well-developed view of the macroeconomy and uses this view to invest in many different sectors.

private information. Evans and Lyons (2004) present a model of the foreign exchange market where order flow aggregates the dispersed private information about productivity shocks in two countries. They note that while productivity shocks would occur at the level of the firm, aggregate trades by agents in the country would give a more precise estimate of the country's productivity shock for that period. They also note that agents' trades could be aggregating information about other variables at the micro level, such as money demand. Our U.S. shocks can be interpreted as money-demand shocks and real shocks arising from firm-level information. Financial firms in the United States that observe a large cross-section of customer order flows could extract such information and use it for proprietary trading. Again, with integrated markets, such U.S. information shocks would have an international effect.

## Conclusion

The goal of this research is to deepen our understanding of the links between movements in the prices of foreign assets and news (public and private) originating in U.S. money and equity markets. Our first contribution is to show that some agents have private information about future U.S. interest rates and about aggregate returns in equity markets. Our second contribution is to show that this superior knowledge affects equity markets abroad. This finding gets to the core of Goodhart and O'Hara's (1997) question of how private information can have a global impact. Not only do we show that public and private information about U.S. interest rates and aggregate equity markets predicts future movements in foreign equity markets, but we also show that these are components of factors that are priced in the cross-section of international equities.

The analysis raises a number of additional questions. Are other sources of private information available to sophisticated investors? While monetary shocks are important, there may be "real" shocks related to technology or productivity that sophisticated investors observe. In addition, who are the investors who obtain this information? Is it solely American investors who have superior knowledge about American markets? It is likely that sophisticated foreign investors—such as offshore hedge funds—could also obtain this information. Finally,

does this private information affect other assets, such as foreign exchange and fixed-income markets? Answering all these questions requires further analysis.

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