Reports

Introduction

Reports address specific issues of relevance to the financial system (whether institutions, markets, or clearing and settlement systems) in greater depth.

The ability of households and firms to confidently hold and transfer financial assets is one of the fundamental building blocks of the Canadian economy, as is the manner in which savings are directed to investments. Frictions in financial markets can affect the matching of savers and borrowers, impeding the effective allocation of financial resources. To understand these frictions, the "efficiency" of financial markets must also be understood. The report, *A Taxonomy of Market Efficiency*, describes the three main definitions of market efficiency: informational, operational, and allocative. The author points out that these three definitions are linked, with the degrees of informational and operational efficiency helping to determine the degree of allocative efficiency.

Over the last few years, both institutional and retail investors in Canada have started to place assets in hedge funds. Previously, these were available only to wealthy investors. The increased demand has led to the establishment of a number of hedge funds and "funds of funds" in Canada. To better understand the implications of these developments for the Canadian financial system, the Bank of Canada organized a workshop in June 2004. *Portrait of the Canadian Hedge Fund Industry* describes the nature of these investment vehicles, their weight in the Canadian financial system, and discusses questions raised by the development of this industry in Canada, particularly the factors affecting its growth, regulation, and potential impact on the Canadian financial system.

A Taxonomy of Market Efficiency

Gregory H. Bauer

The Bank of Canada has a long-standing interest in the stability and efficiency of Canadian financial markets. In terms of efficiency, the Bank is concerned with how well the financial system allocates capital between savers and investors.

This article describes the three main definitions of market efficiency: informational, operational, and allocative. These concepts are described as they are used in finance theory.[1] One important point raised is that these three components of efficiency are linked via a hierarchy: the degrees of informational and operational efficiency help to determine the degree of allocative efficiency.[2] Some important policy implications arising from existing research are also examined.[3]

Informational Efficiency

An asset market is informationally efficient when the price of the asset incorporates all the information about its "fundamental value."[4] The definition is further refined depending on the information available to market participants. A market is "weak form" efficient if only the information in past prices is contained in the current price. This rules out using technical trading rules to make excess (i.e., risk-adjusted) returns.[5] A market is "semi-strong form" efficient if all public information is reflected in the asset price. This rules out trading on public information, such as dividend yields or interest rates, to make excess returns. A market is "strong form" efficient if prices contain all private and public information.[6] This rules out making excess returns via insider trading, because the prices already reflect that information.[7]

It is important to note that there is no such thing as a perfectly informationally efficient market (the Grossman-Stiglitz paradox). This can be demonstrated by examining what a perfectly efficient market would entail. In a market where the asset's price contained all private and public information, no one would have an incentive to do any research on the asset because no gains could be made from obtaining superior information. The lack of research implies that there would be no way for information to be incorporated into the asset price in the first place. Thus, the price of an asset could not contain all private and public information.

The best way to describe the informational efficiency of a market is by its degree of relative

1. The definitions provided here were used by Deputy Governor Sheryl Kennedy (2004).
2. For a summary of the evidence regarding Canadian capital market efficiency, see Hendry and King (2004).
3. Although the Bank of Canada does not have legislative authority to design and implement policy in most areas directly affecting informational and operational efficiency, the linkages between these and allocative efficiency motivate the Bank's involvement.
4. The fundamental value of an asset is the discounted sum of expected future cash flows from the asset, where the discount rate is the risk-free rate plus the expected risk premium on the asset.
5. Trading rules are "technical" when they are based only on movements in past prices and volumes.
6. Private (asymmetric) information is information known by sophisticated investors in the market but not known by ordinary investors. This could be (i) insider information about a particular firm; (ii) better forecasts of public information that has not yet been released; or (iii) a clearer understanding of information that is in the public domain. Information in the last two categories can affect either individual firms or groups of firms. In the finance literature, the role of private information on asset prices is examined by studying investors' order flow.
7. Note that trading by insiders may be either legal or illegal, depending on the context. See King and Padalko (2004) for further details.

efficiency. The amount of information in the asset's price is such that the marginal cost of producing the information is equal to the marginal benefit from trading on the information. At any given time, an asset's price does not reflect all available information, however defined. The interesting questions are: (i) how long does it take for information to be incorporated into prices, and (ii) how does the information get into the price? The first question is important because savers will want to know that the price of the asset they are investing in is "fair;" i.e., that they will not be negatively affected by previously known bad news after they invest. The second question relates to market integrity. If insiders have superior information that the asset is overvalued, how do ordinary investors get that information? Do the ordinary investors receive the information after the insiders have (illegally) traded the stock or in a public news release?

Informational efficiency is often confused with the idea of "random walks" in stock prices.[8,9] It is important to note that the two concepts are separate. If the risk premium on stocks is moving over time, then stock prices will change in response to current market conditions. Thus, stock prices will not be a random walk. However, if the market is semi-strong form efficient, no one will be able to make excess returns by trading on public information.

Policy implications

- Most research shows that markets react very quickly to public news announcements (e.g., interest rate shocks). However, such news appears to play a very small role in the dynamics of asset prices. Rather, the bulk of returns and volatility in stock, bond, and foreign exchange markets comes from the revelation of private information. It is therefore important for policy-makers in general to understand why some agents appear to have information superior to that of others and how this private information is released to the market. The Bank's research on market transparency is related to these issues.
- Lessons from previous work on small, open economies carries over to this line of research. Private and public information generated in the U.S. equity and money markets has an impact on Canadian equity prices. (See Albuquerque, Bauer, and Schneider 2004.) Importantly, a portion of this private information is related to the beliefs of sophisticated U.S. investors about the path of future U.S. interest rates (Bauer and Vega 2004).
- In general, smaller firms or markets will likely be less informationally efficient because fewer resources will be devoted to producing market research. This could be worrying for small firms in Canada or for the Canadian corporate bond market in aggregate. In addition, markets in the early stages of development (e.g., the Canadian credit-risk transfer market) are likely to be less informationally efficient and to contain more profit incentives for investors who do research.
- Small amounts of informational inefficiency can significantly affect the price of an asset. Suppose that the price of the asset equals its fundamental value, as described above. Under this definition, future cash flows are discounted by a rate composed of a risk-free rate plus an expected risk premium. Empirical work has shown that the expected risk premium is very "persistent" (i.e., the level of the risk premium next month is closely related to its value this month). If the current expected risk premium is "wrong" because of some inefficiency, the error will carry through to many future periods. Thus, the future cash flows from the asset will be discounted for some time by an expected return that is incorrect. This would significantly affect the current price. Thus, small changes in policies related to improving

8. Stock prices follow a "random walk" if the change in a stock's price cannot be forecast based on any available information.
9. Loosely speaking, an asset's price will follow a mathematical process called a "random walk" if all market participants are risk neutral, something not observed in everyday life. The "random walk" is a statistical model of prices that does not fit many real-world prices.

informational efficiency could have a major impact.[10]

- Tests of informational efficiency are complicated since they must be performed jointly with a test of the predictions of an asset-pricing model. For example, researchers cannot say, that the Government of Canada bond market is (relatively) informationally "efficient" without stating which asset-pricing model is used to evaluate the prices in the market. The problem for policy-makers is that there is no consensus as to the "right" asset-pricing model, suggesting that researchers have to temper their conclusions about informational efficiency. To understand the efficiency of a market, policy-makers must understand how prices are set in that market.

Operational Efficiency

Operational (or transactional) efficiency is a measure of the cost of transferring funds from savers to borrowers. It is thus concerned with transactions costs. In a perfect world, the transactions costs present in a market should (with competition) reflect the marginal costs of providing the services to the market participants.[11]

Work on operational efficiency is often concerned with the "liquidity" of a particular market: can investors trade in "reasonable" size without paying large transactions costs? (See for example, D'Souza 2002.) Finance theory shows that sophisticated investors (those with private information) trade in markets where there are many liquidity-based (i.e., non-informed) investors so that they can hide their trades. Thus, the degree of informational efficiency (larger amount of information in prices) is linked to the degree of operational efficiency (larger amount of liquidity in the market).

Policy implications

- The link between the first two types of efficiency raises concern about attempts to impose transparency on markets (Zorn 2004). Sophisticated investors produce private information on an asset in order to trade on it and make a profit. This information is revealed to the market through the trades and quotes of the investors. This helps make the market more informationally efficient as defined above. Suppose policy-makers cause an operational change by forcing investors to reveal price quotes or trades that they wish to keep private. The investors will then have less incentive to produce that private information. This means that the informational efficiency of the market will decline. This, in turn, means a decline in the market's liquidity, which would hurt non-informed (small) liquidity-based traders.
- There are global implications to this research as well. Barriers to transferring capital across borders can exist because of either formal capital controls or microstructure issues, such as lack of available liquidity, concerns about asymmetric information, etc. Differences in operational and informational efficiency may also cause traders to choose alternative markets in different countries in which to conduct the same trade.

Allocative Efficiency

A market is allocatively efficient when the marginal rate of return (adjusted for risk) is equal for all borrowers and savers. This implies that investors provide funds for projects that have the highest net present value and that no "good" investment projects go unfunded.[12] The concept of allocative efficiency is related to the large body of literature on the investment choices of firms. It is also related to the consumption/saving decisions of consumers. In general, to evaluate whether a market is allocatively

10. An example using the standard Gordon growth model of stock prices illustrates this point. Suppose a stock has a dividend of $1 per year that is expected to grow by 3 per cent per year. Also suppose that the required rate of return on the stock is 5 per cent per year. Under these assumptions, the price of the stock would be $50. Now suppose that a market friction is eliminated, causing the required rate of return of the stock to decline by 25 basis points (to 4.75 per cent per year). In this case, the price of the stock would increase to $57.14.
11. For a good overview of the operational efficiency of the clearing and settlements system, see McPhail (2003).
12. This definition is known to most economists as "Pareto optimality."

efficient requires a very sophisticated model of the economy.

The finance literature is, in general, concerned with a different set of questions. However, an important and very recent strand in the literature looks at the role played by informational and operational efficiency in allocative efficiency. For example, some papers look at how the amount of private information in a market affects the equilibrium required rate of return in the market (Easley, Hvidkjaer, and O'Hara 2002). If investors fear that certain more sophisticated investors possess information or superior knowledge about the asset (and that this information is not currently priced in), then they will demand a higher rate of return on the asset. Another part of the literature looks at the role of liquidity in equilibrium rates of return (Pástor and Stambaugh 2003). It is safe to say that the literature has not sorted out the separate roles played by information and liquidity in asset prices. It is clear, however, that these microstructure phenomena have an effect on equilibrium rates of return. Hence, it is safe to say that microstructure finance no longer provides only "small answers to small questions," which was a common perception of the early literature.

Thus, the amount of allocative efficiency in the market can be viewed as depending on the degree of informational and operational efficiency.[13] Prices will allocate resources in an optimal manner to the degree that they correctly incorporate information about an asset's fundamental value.

Conclusions

Research at the Bank has so far focused on the informational and operational aspects of efficiency in various Canadian capital markets. As noted above, improving informational and operational efficiency can significantly affect asset prices. Thus, changing these aspects via an exogenous policy shock could lead to significant effects on the required rates of return for Canadian corporations and, in turn, change the way funds are allocated in the market. Small policy changes imposed on financial market structure could thus potentially have large effects on real activity. Such policy directives therefore require a great deal of analysis before implementation.

13. Indeed, there are different definitions of allocative efficiency, depending on the information set used to measure the equilibrium outcomes.

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Portrait of the Canadian Hedge Fund Industry

Miville Tremblay

In the early 1980s, a few wealthy Canadian families were investing in large U.S. hedge funds. Ten years later, a handful of institutional investors had joined them. The practice has spread, and today even small investors have access to this method of managing securities through guaranteed-principal notes and closed-end mutual funds. This growing demand stimulated the emergence of Canadian hedge funds and funds of funds. To better understand the rise of this new industry, the Bank of Canada hosted a workshop last June, and this article presents the highlights of those discussions.[1]

The development of hedge funds in Canada is characteristic of an activity that is integrated internationally. Some elements can be identified, but not isolated, as specifically Canadian. This level of integration complicates measurement efforts all the more because data on the global industry are themselves imprecise. There are, in fact, no reliable and complete data on the Canadian component of this industry, and we must, at this point, rely on the judgment of participants to obtain even estimates of its size. The information presented here is from several formal and informal sources that use different methods of compilation. (See the box on page 43 for a description of hedge funds.)

By the end of 2003, there were about 7,000 hedge funds around the world, with total assets of approximately US$800 billion (Hedge Fund Research, Inc. 2004).[2] According to various informal sources, Canadian capital invested in these financial instruments may total up to Can$23 billion.[3] However, a large share of these savings were managed by funds established abroad, mainly in the United States. Funds established in Canada administer over $5 billion in assets, but much of this is from foreign investors. Funds of funds—specialized organizations that manage portfolios invested in several hedge funds—handled $3.7 billion of Canadian capital in 2003, according to Investor Economics (2003).[4] This amount does not include Canadian capital entrusted to funds of funds that are not registered in Canada. Finally, retail sales of products linked to hedge funds have reached $7 billion. This simple statistical overview underscores the breadth of the hedge fund phenomenon in Canada.

Strong Demand

Canadian demand was at first exclusively, and remains largely, satisfied by foreign hedge funds. These funds initially targeted large private fortunes, but it is the growing interest of institutional investors that explains their high growth rate in recent years. In keeping with worldwide trends, Canadian pension funds also seek to diversify their portfolios with new assets, the prices of which are weakly correlated with the prices of stocks and bonds and that generate an absolute return, such as real estate, venture capital, and hedge funds.

While there is a high level of interest in hedge funds, relatively few pension funds have, as yet, made the move into them. Institutions with considerable resources, such as the Ontario Teachers'

1. Most of the speakers at the workshop were representatives of various segments of the Canadian hedge fund industry. We wish to thank them for their valuable contributions.
2. Others have put the number of funds at over 8,000 and have assessed their total assets at nearly US$1 trillion.
3. From here on, all amounts are in Canadian dollars. For purposes of comparison, the market for mutual funds is $475 billion.
4. This includes only funds of funds registered with provincial regulators.

Pension Plan, the Caisse de dépôt et placement du Québec, and OMERS, have established their own portfolios of hedge funds. Some have also set up internal teams that use hedge fund strategies to generate an absolute return. Note that Canadian banks have been using these same strategies for some time in their proprietary trading operations.

Smaller pension funds have tended to play this market using foreign funds of funds, although some pioneers began with direct investments, yielding mixed results. Although they extract higher management fees, funds of funds offer instantaneous diversification, as well as expertise in the selection and monitoring of investments. Pension funds involved in these investments generally allocate 3 per cent of their portfolio, although their ultimate target is 5 to 10 per cent. Overall, Canadian pension funds have placed approximately $10 billion with hedge funds.

The retail market is developing rapidly, especially in Quebec, where the Desjardins Group and the National Bank are selling term deposits and structured notes[5] in which the capital is generally guaranteed and the yield is that of a fund of funds. Such structures have also been set up by independent funds of funds, which use notes issued by Crown corporations for that purpose.[6] The minimum investment may be as little as $500. Northwater, the largest Canadian fund of funds, opted to enter the retail market with closed-end mutual funds listed on the Toronto Stock Exchange.[7] This small-investor market also exists in Europe but not in the United States, where only wealthy individuals and institutions have access to hedge funds.

A Limited Canadian Supply

On the supply side, approximately 150 hedge funds established in Canada can be identified,[8] but most of them have less than $25 million under management. The bulk of the capital managed in Canada—an increasing proportion of which is from foreign funds of funds—is in the hands of only six firms: Sprott Asset Management, Salida Capital, Polar Capital, Leeward Capital, Mapleridge Capital, and J.C. Clark (Cohen 2004).[9] To date, few Canadian institutional investors, including funds of funds, have made direct investments in Canadian hedge funds. Medium-sized money managers, for their part, attract private Canadian investors who are guided by financial advisers. By far the most popular strategy is long/short equities.

To penetrate this lucrative and rapidly growing market, traditional fund managers, such as TD Asset Management, Natcan, and Fiera Capital, recently created portfolios that are handled in the same fashion as hedge funds. These remain small operations, however, when compared with the volume of capital under traditional management.

In Canada, the funds of funds sector is relatively more developed and growing more rapidly than the hedge fund sector. Aside from Northwater, the largest independent firms include Norshield, Maple Partners, Tricicle, HR Strategies, and Arrow Hedge. The products of several foreign funds of funds are also sold in Canada, either directly or through a domestic partner. Except for the National Bank and Desjardins, the major Canadian deposit-taking institutions are still largely absent from this market. In total, about 60 funds of funds are active in Canada.

On the other hand, all the major banks have established prime brokerage services that, in addition to offering execution of trades, provide specialized services to hedge funds, such as financing, custody of securities, transactions settlement, securities lending for short sales, risk-management systems, and even promotional support among investors. Globally, this activity is dominated by three large investment banks.[10] In Canada, the main players to date are the Royal Bank and the Bank of Montreal.

5. A structured note is a negotiable debt security with special features. In this case, interest is replaced by the return on a fund of funds.
6. The advantage for the Crown corporation is a lower borrowing cost.
7. A Canadian insurance company also sells on the retail market a segregated fund linked to a fund of funds.
8. There are fewer managers, since some firms have several funds.
9. Most Canadian hedge funds are based in Toronto, although several Canadian funds of funds are managed from Montréal. Quebec's pension funds are generally more inclined to invest in this type of asset than those of the other provinces.
10. These are: Morgan Stanley, Bear Stearns, and Goldman Sachs.

Box 1

The ABCs of Hedge Funds

The term "hedge fund" covers a very diverse field of organizations and behaviour that defies any simple definition. The analysis in this article is presented from two complementary angles, which are useful to distinguish, since the typical organization called a "hedge fund" is no longer the only one to exhibit these traits. A small, but growing, number of traditional financial institutions, seeking to generate an absolute return, are managing their capital in the manner of hedge funds.

Organization

The typical hedge fund is a private investment pool, limited to a few wealthy or institutional clients,[1] each of whom commits a large amount of money. The organization is usually small and is centred around the expertise of its portfolio managers. These, in turn, are often veterans of traditional money-management firms or former proprietary traders at large banks. Various secondary functions are usually subcontracted to specialized administrators and to prime brokers.

Hedge funds cherish a culture of discretion, even secrecy. Regulation bars them from soliciting business from the general public through advertising. But they seek mainly to protect their market positions, distinctive strategies, and the intellectual property of their quantitative models. The flip side of the coin is that the investor must usually accept a low degree of transparency in the managers' activities and positions.

Legally, these funds are constituted as limited partnerships, are frequently registered offshore, and are subject to light regulation. The general partners invest their own capital alongside that of the limited partners, ensuring the alignment of their financial interests. The general partners receive high management fees, on the order of 1 to 2 per cent of the assets plus 15 to 25 per cent of returns.

Since hedge funds often invest in illiquid markets or positions, the limited partners can withdraw their money only after giving advance notice, once per quarter or per year.

Finally, hedge fund managers have realized that their returns decline when the assets under management exceed a certain threshold relative to the opportunities identified. Possibilities for arbitrage tend to dissipate when too much capital seeks to take advantage of them. Thus, the best-performing funds refuse to accept new investors when approaching what they deem to be the optimal size.

Behaviour

The conduct that includes, but goes beyond, that of hedge funds is described as absolute-return management. The central motivation of hedge funds and related management methods is, indeed, the search for an absolute return. The goal is expressed as a fixed percentage (e.g., 15 per cent) or as a markup on a short-term interest rate.

Traditional management of institutional investments focuses on a relative return—outperforming some market index. This distinction is blurring, since an increasing number of institutional investors now pursue an absolute return.

Hedge funds are sometimes called speculative funds, and some of them clearly are. But in general, seeking an absolute return requires a rigorous and selective management of risk in which it is more important to minimize losses than to maximize returns. In fact, the target return is paired with an acceptable level of volatility. Traditional management, on the other hand, seeks to minimize the negative difference with the index, whether the index is rising or falling.

Absolute-return managers seek out a specific risk, about which they have a strong opinion, and neutralize all other risks arising in the investment. Most of the time, they seek to eliminate market risks (and returns), the beta, and maximize the value added by their talent, the alpha. They usually accomplish this by pairing short positions with long positions. For example, we can imagine two equal positions taken on two pulp and paper companies. This combination will generate neither profit nor loss in response to broad fluctuations in the stock market or in the paper and forest products sub-index. It will, however, generate a profit if there is a change in the relative value of the two companies, provided the one sold short declines relative to the other.

Thus, while traditional managers can make profits only on rising stock prices, absolute-return managers can also earn money on falling prices. Their scope for profitable investments is therefore much broader.

Short positions provide liquidities that can be partially reinvested in long positions. This hedging naturally generates leverage, which may be enhanced by borrowing or using derivatives. The extent of the leverage varies widely according to management strategies and styles. It is estimated at between two and five times, although it can be completely absent.

Note that some funds of funds also use leverage, which increases their returns but also their losses. Given the various sources of leverage, it is difficult for the investor to measure its total magnitude.

It should also be pointed out that the word "hedge" in "hedge funds" can be misleading in some cases, since some of the management styles employed by these funds do not seek to hedge against market risks, but rather to speculate on market direction.

Firms that compile return indexes for the various types of hedge funds have established very elaborate classifications. They categorize funds according to decision processes, instruments used, and geographical markets. Global Macro funds, which opportunistically bet on significant movements in currencies or interest rates, are only one type among many.

In practice, freedom of choice in terms of markets and strategies is constrained by the particular style and specific expertise of the manager, although it is still greater than that of the traditional portfolio manager. Finally, absolute-return management is characterized by returns that are weakly correlated with traditional asset classes, such as stocks and bonds, theoretically allowing the creation of portfolios that are less volatile for a given return. There is also a weak correlation among the returns from various management styles.

1. This includes funds of funds; i.e., organizations that actively manage a portfolio of hedge funds.

The Issues

Some workshop participants expressed disappointment over the fact that relatively few hedge funds have as yet set up shop in Canada. The size of the industry in various countries can be measured in relation to that country's stock exchange. On this scale, despite an annual growth rate of 20 per cent, the industry is only half as developed in Canada as it is in Europe, and only one-sixth of that in the United States. In contrast, the activities of funds of funds and sales of retail products appear to be more developed here.

According to Greenwich Associates (2003), the percentage of Canadian institutional investors in the Canadian hedge fund market is lower than that observed in the other major industrial countries, except the United Kingdom. Thus, the main challenge facing Canadian managers is to raise the necessary capital, especially during the start-up phase. Some attribute this to the fact that there are fewer large foundations and family estates here and that pension funds are smaller and more conservative. Others maintain that reduced access to the required technical expertise and the relative smallness of Canadian financial markets impede the implementation of certain strategies; for example, merger and acquisition arbitrage.

Workshop participants agreed that current regulation is not an obstacle to the development of the industry. After a heated debate, the Securities Exchange Commission recently decided to register hedge fund managers, as is already the case in several countries, including Canada. Here, as elsewhere, the small investor cannot invest directly in hedge funds. However, provincial regulatory bodies allow retail sales visas for a restricted class of closed-end mutual funds and for guaranteed capital products, which, in turn, invest in hedge funds. Moreover, one seminar participant, who lost a large amount of money in a fraudulent U.S. fund, suggested that regulation can deter scam artists. Another, however, maintained that registration generates a false sense of security among investors.

Several international bodies—notably the Financial Stability Forum, the International Monetary Fund, and the Bank for International Settlements—have examined the impact of hedge funds on the stability of the global financial system. Among the issues that are still on their agenda is the management of counterparty risk by the prime brokers of high-leverage hedge funds. The opacity of these high-leverage funds is a further issue, as is the protection of small investors who purchase the industry's retail products. Finally, some emerging-market countries remain concerned about the deleterious effect that the rapid capital inflows and outflows associated with hedge funds may have on the stability of their nascent financial systems.

Nevertheless, some participants emphasized that hedge funds typically buy when traditional investors sell, and vice versa, thus bolstering the liquidity of markets and, consequently, their stability and efficiency. This observation applies particularly to arbitrage strategies, which are based on an expected return to fundamental value, but not to directional strategies, which bet on existing trends.

Conclusion

The Canadian hedge fund industry is growing rapidly in several market niches. However, the marketing side appears somewhat more developed than the production side. This industry does not currently appear to be raising any concerns in matters of financial stability, especially since it is still small. Nonetheless, its activities are largely integrated into the global hedge fund industry. Several international bodies continue to examine the potential benefits and risks associated with that industry.

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