

GLUCKSMAN FELLOWSHIP PROGRAM STUDENT RESEARCH REPORTS:

Judson Coplan, "Diagnosing the DVD
Disappointment: A Life Cycle View"

Ben Macdonald, "Rating Change Timeliness Across
Rating Agencies"

Shivanker Saxena, "Premia in the Indian ADR
Market—An Analysis of Trends and Causes"

Joe Ryan, "Examining Market Reaction to Activist
Investor Campaigns by Hedge Funds"

William L. Silber, Editor

PREFACE

The Glucksman Institute for Research in Securities Markets awards fellowships each year to outstanding second year Stern MBA students to work on independent research projects under a faculty member's supervision. Four research projects completed by the Glucksman Fellows of 2005-2006 are included in this special issue of the Finance Department Working Paper Series. These papers focus on important topics in empirical financial economics.

Judson Coplan, under the supervision of William Greene, examines the recent slowdown in U.S. sales of DVDs and the resulting effects on movie studio and media conglomerate profits. Ben Macdonald, under the direction of Richard Levich, compares the timeliness of rating changes across the major rating agencies in three major capital markets: the United States, Canada and Australia. Shivanker Saxena, under the supervision of Rangarajan K. Sundaram, explores the phenomenon of high premiums at which ADRs from India trade in the US compared to the prices of the underlying equities in India. Joe Ryan, under the direction of Yakov Amihud, examines activist investor campaigns and attempts to measure whether their efforts increase shareholder value for other shareholders. These papers, reflecting the research effort of four outstanding Stern MBA students, are summarized in more detail in the Table of Contents on the next two pages.

William L. Silber, Director
Glucksman Institute

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This paper examines the recent slowdown in U.S. sales of DVDs (Digital Versatile Disc, formerly known as the Digital Video Disc), and the resulting effects on movie studio and media conglomerate profits. The falloff in growth is explained by a product life cycle hypothesis that links DVD sales to DVD player penetration and rapid consumer adoption. Industry data, historical statistics, and academic models demonstrate how the DVD has become the fastest-selling consumer electronics product in American history. These findings are then used to recommend future industry practices, as the entertainment business prepares its rollout of the next-generation, high-definition DVD format.

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This paper examines the timeliness of rating changes across the major rating agencies. Rating agencies occupy a powerful position in the capital markets across the world. This study was conducted in 3 different credit markets – Australia, Canada and the USA. Similar rating changes by different credit agencies were compared by date. The results reveal that particular agencies tend to be faster to upgrade in some markets and faster to downgrade in other markets. Standard & Poor's seems to be the most conservative agency, with faster downgrades and slower upgrades. Fitch is fast to upgrade, and Moody's tends to migrate ratings after the other agencies. This difference appears to be broad-based across many industries, but has some variation across markets.

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This paper explores the phenomenon of high premiums at which ADRs from India trade in the US compared to the prices of the underlying equities in India. These ADR premiums have persisted too long (over 5 years) to be dismissed as an aberration. The average ADR premium over the last 5 years (2001-2005), has been 17% for a sample of 11 Indian ADRs. The paper focuses on the inter-temporal trends and the likely causes of these ADR premiums. Specifically, the paper analyzes the institutional framework (including capital flow restrictions), liquidity, and currency risk as possible reasons for the existence of ADR premiums and the absence of arbitrage.

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This paper analyzes excess returns surrounding activist investor campaigns by hedge funds. The market appears to anticipate the start of activist investor campaigns because target stocks show positive excess returns surrounding announcement. Target stocks do not appear to earn significant excess returns at the conclusion, when the activist investor fails, and they earn negative excess returns when the activist succeeds. Activist investor campaigns at companies with low relative stock prices but growing operating earnings and cash flow appear to yield the highest excess returns at announcement.

**Diagnosing the DVD Disappointment:
A Life Cycle View**

Judson Coplan

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Glucksman Institute for Research in Securities Markets
Faculty Advisor: William Greene
April 3, 2006

I. Introduction

Development of the DVD (Digital Versatile Disc, formerly known as the Digital Video Disc) was perhaps the most significant innovation in entertainment since color television. DVD players and pre-recorded films penetrated U.S. homes at a rate faster than any consumer electronics device on record.¹ Movie studios realized unprecedented revenue growth, with DVD sales of movies rivaling and even exceeding corresponding box office receipts. Furthermore, the new digital format neatly replaced the quickly aging medium of VHS, while offering studios a far higher profit margin than its analog predecessor (66% vs. 45%)². In 2003, a mere eight years after the invention of the DVD, it appeared that Hollywood had found a high growth machine for the next decade.

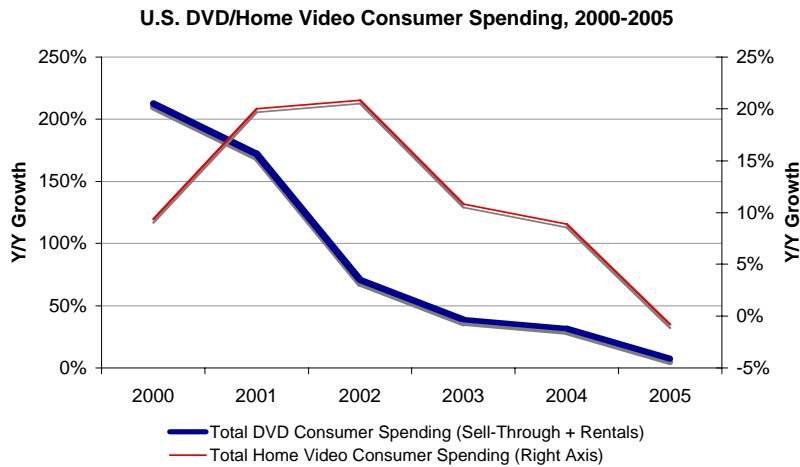
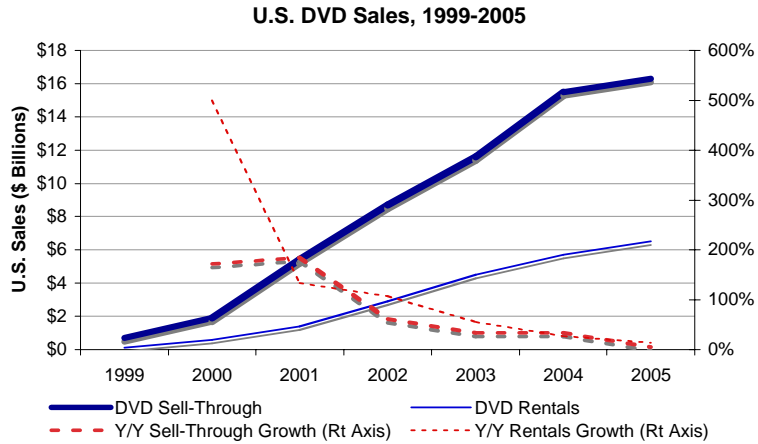
Then, suddenly, the trends shifted. In 2005, unit growth in U.S. shipments of DVD films and TV shows fell to just 9% year-over-year, compared to 50% growth in both 2003 and 2004.³ As prices fell, DVD sell-through (i.e. sales to end consumers on a buy-to-own basis) in dollar figures grew just 5%. When including the shrinking VHS market, overall consumer spending on home video actually shrank by 1% from 2004-2005.⁴

¹ Data from Consumer Electronics Association eBrain Market Research statistics, dating back to 1954.

² According to a 2004 study by Jessica Reif-Cohen, media and entertainment Research Analyst at Merrill Lynch.

³ Data and chart from the Digital Entertainment Group, a nonprofit trade consortium.

⁴ Data from Bernstein Equity Research team.



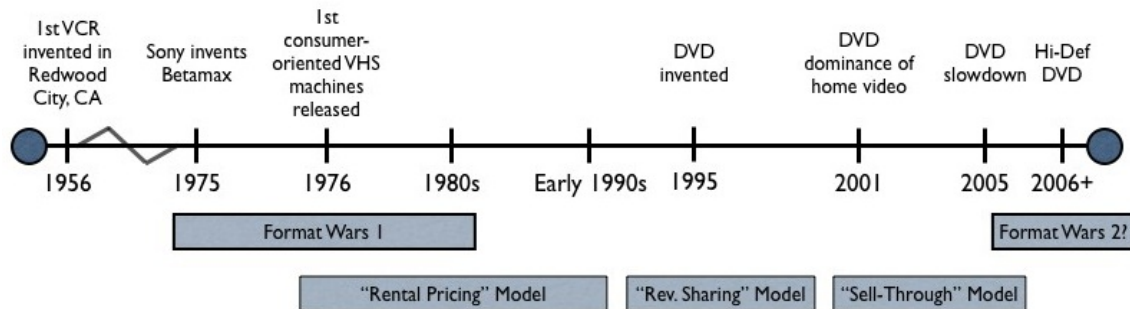
Sales trends for DVD hardware took a similar turn in 2005. The NPD group analyzed retail sales on Black Friday⁵ 2005 vs. 2004, showing that DVD players experienced double-digit declines on par with CRT televisions and portable CD players.

Retail Sales Growth in Consumer Electronics: Black Friday 2005 vs. 2004		
	Unit Growth	Rev. Growth
LCDs over 26"	1008.3%	556.4%
Plasma TVs	210.0%	154.2%
LCDs under 26"	393.9%	133.1%
MP3 Players	194.1%	126.4%
Satellite Radios	203.1%	101.0%
DVD Recorders	163.9%	56.1%
Portable DVD Players	48.3%	5.8%
Camcorders	0.9%	-0.7%
Direct View TVs (Regular CRT)	-26.9%	-29.0%
DVD Players	-44.0%	-45.2%
CRT Rear Projection	-42.5%	-51.5%
Personal CD Players	-49.7%	-52.7%

⁵ Black Friday, one of the major U.S. holiday shopping days, falls on the day after Thanksgiving every year.

A number of theories explain this rapid and abrupt deceleration in DVD sales growth, including illegal piracy, new technology substitution such as video-on-demand and pay-per-view (Exhibits 1 & 2), and the growing popularity of rent-by-mail services like Netflix (Exhibit 3). While these are all legitimate and likely contributing factors, this paper seeks to explain the changing growth trends through a market penetration hypothesis. By examining home video sales data, academic research, and historical trends in consumer electronics, the data presents a life cycle driven theory for the rapidly slowing DVD business. The popularity and understanding of this view is growing in the entertainment industry, and this paper seeks to quantify and clearly illustrate a concern that was recently articulated by Steve Beeks, President of Lionsgate Entertainment: “We all anticipated the maturing of the DVD business, and the corresponding slow-growth business that it would become, but it happened more quickly than we had anticipated.”

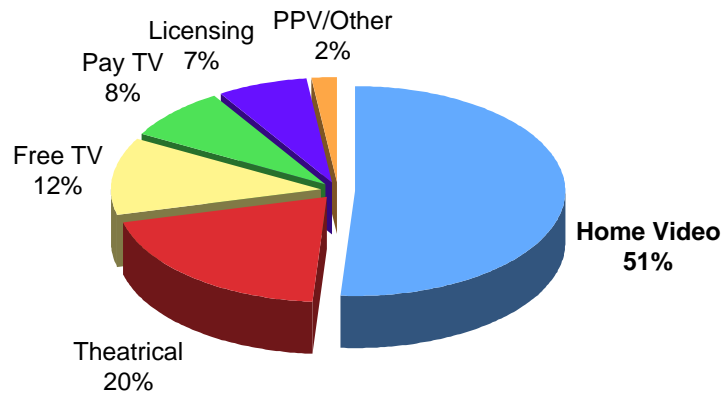
II. A Brief History of Home Video



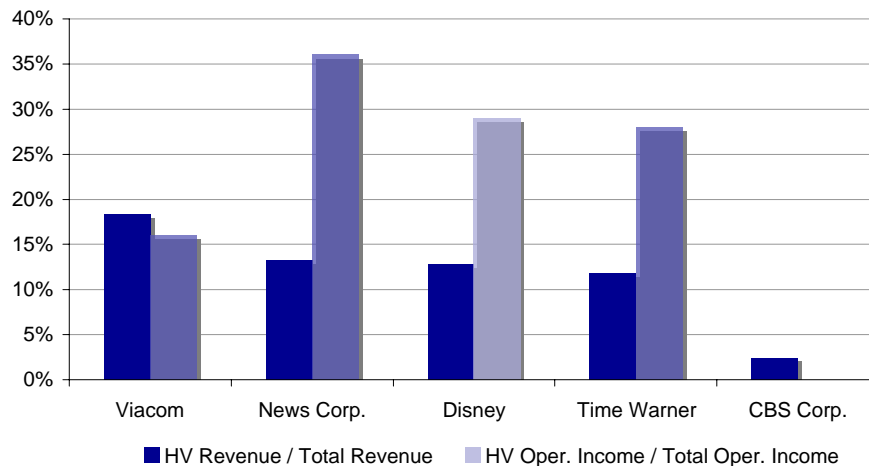
Sony introduced the first commercially successful videocassette recorder (VCR) in 1975. It was a bulky and expensive Betamax machine for which there was little prerecorded software at the time. Just 11 years later, movie studios “generated more in domestic wholesale gross revenues from [sales and rentals of] home video (about \$2

billion) than from theatrical (\$1.6 billion) sources.”⁶ The home video market continued to grow through the 1990s, becoming the largest single component of studio revenues alongside theatrical receipts, sales to TV networks (i.e. Free TV), pay TV revenues, and licensing fees. By 2004, home video sales accounted for 51% of studio top lines.⁷ By 2005, home video profits at the major U.S. media conglomerates made up as much as 35% of total firm operating income.⁸

Studio Revenue Breakdown, 2004



Media Firm's Exposure to Home Video, 2005



⁶ Vogel, pg. 103.

⁷ Kagan Research estimates, based on \$45.6 billion in 2004 worldwide studio revenue.

⁸ Home Video estimates from Bernstein Research (revenue data) and Goldman Sachs Research (operating income data).

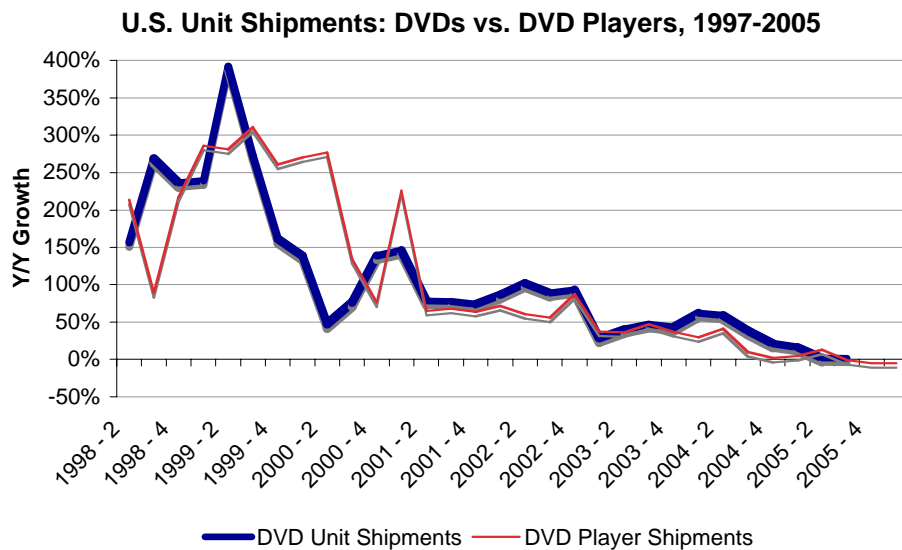
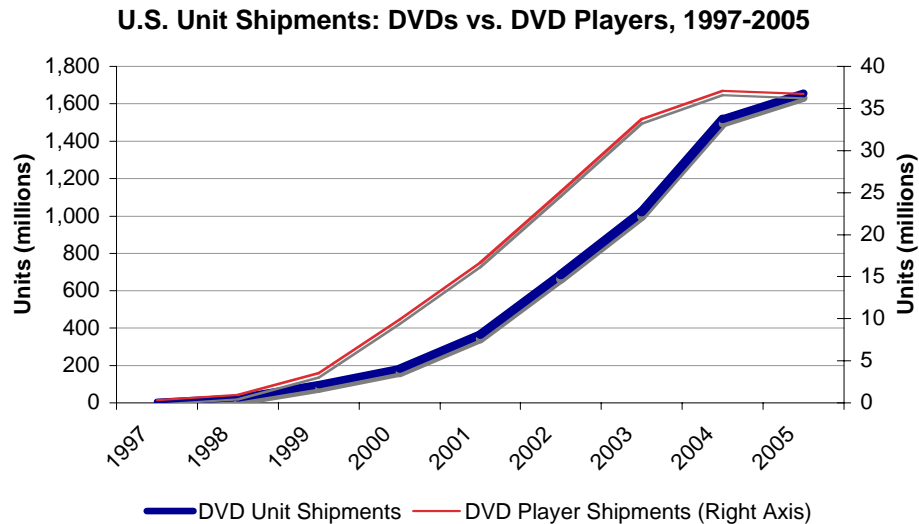
During this period, Hollywood also began to shift its pricing model for home video products. In the late 1970s and through the 1980s, “rental pricing” meant that studios charged exorbitant prices (up to \$100 per VHS tape) to rental shops such as Blockbuster Video. These retailers would then loan the movie out as many times as possible in order to recoup their initial outlay and eventually turn a profit. The early 1990s ushered in the “revenue sharing” model, in which studios sold VHS tapes to the same retailers for far less (as low as \$5 per unit), but shared in the resulting rental revenues.

The DVD era of the late 1990s and early 2000s led to today’s “sell-through” model. This system focuses on the consumer buy-to-own market rather than the video rental market. Studios charge retailers like Wal-Mart anywhere from \$10-\$30 per disc, and Wal-Mart then sells the products directly to consumers. These changes in pricing models have drastically affected consumer behavior. In fact, sell-through purchases now dominate rental purchases, making up over 70% of home video sales in 2005 (Exhibit 4). The emergence of the sell-through model also coincided with the decline in sales of pre-recorded VHS tapes. Exhibit 5 illustrates the breakdown of all home video sales (sell-through *and* rental) between DVD and VHS tapes, with the latter representing just 6% of 2005 home video revenues in the U.S.

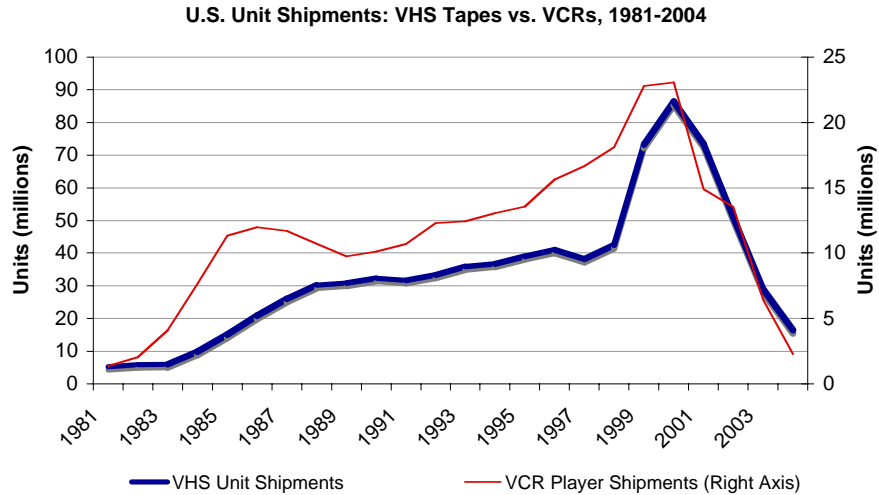
III. Rise of the DVD – The Hardware-Software Connection

Sales of DVDs, like sales of VHS tapes, depend upon customers possessing the hardware equipment to view the content at home. Therefore, growth trends for discs should reflect growth patterns for DVD hardware (i.e. players), while trends for VHS

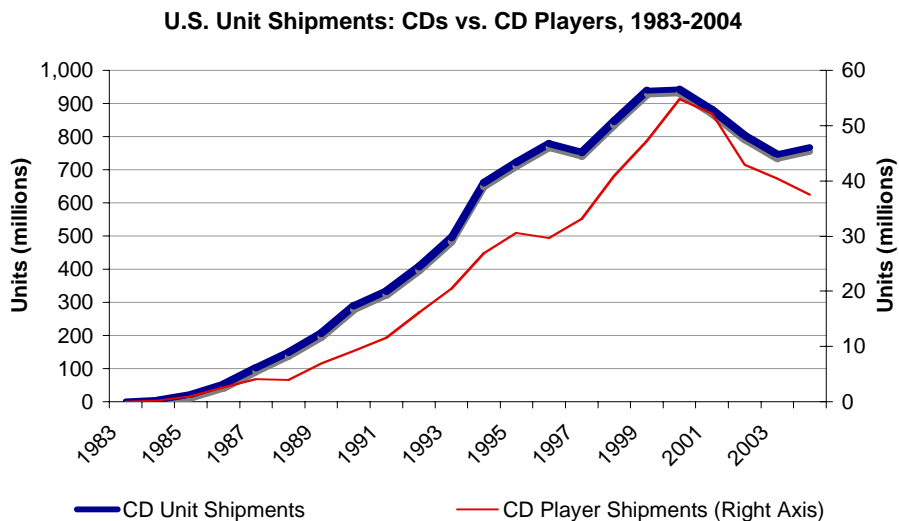
tapes should mirror those for VCRs. Data from the Digital Entertainment Group⁹ and Adams Media Research confirm this hypothesis, as the unit shipment and growth charts below indicate similar sell-through trends for DVDs/DVD players and VHS tapes/VCRs.



⁹ Note: The charts above include sales data for DVDs from the Digital Entertainment Group (DEG). Figures include set-top and portable DVD players, Home-Theater-in-a-Box systems, TV/DVD and DVD/VCR combination players.



This link between software and hardware sales is prevalent for audio products as well. The chart below indicates that shipments of music CDs closely mirror shipments of CD players.¹⁰ This makes intuitive sense, as both video and audio markets share similar characteristics of upfront hardware purchases followed by multiple software purchases. Furthermore, both products exhibit the hump-shaped growth curve common to consumer durables. This will be discussed further in section five.

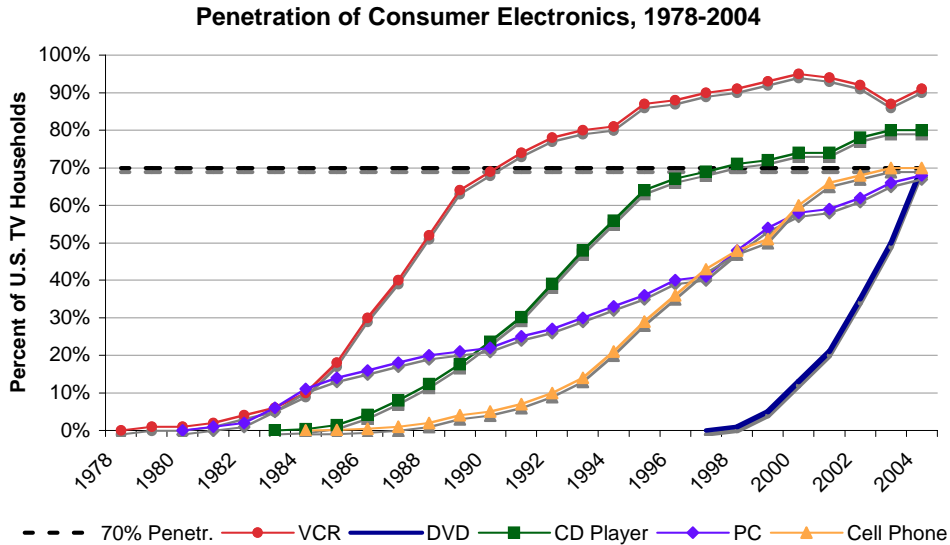


¹⁰ Data from the Recording Industry Association of America (CD units) and Consumer Electronics Association eBrain Market Research statistics (CD players).

IV. Rise of the DVD – Historical Comparisons of Hardware Penetration

Section 3 illustrated the close relationship between video players and discs, whereby hardware growth seemingly dictates the direction and magnitude of software growth. Therefore, Hollywood executives should be able to simply forecast sales of DVD players in order to gauge growth trends in DVD software.¹¹ Why, then, were so many of these same executives shocked when sales of DVD movies slowed dramatically in 2005?

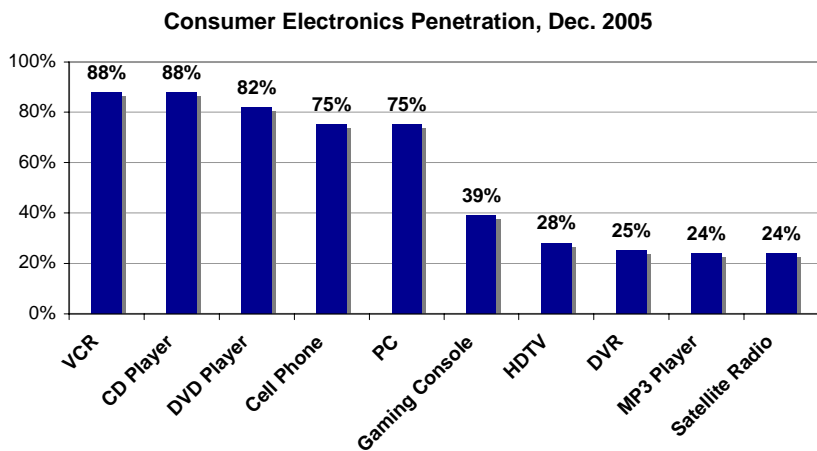
The answer lies in the remarkably rapid penetration of DVD players across the U.S. Few people could have predicted that DVD players would reach over 70% of American TV households a mere six years after commercial introduction. VCRs achieved this same penetration rate in twelve years, CD players required 14 years, cell phones 18 years, and PCs nearly a quarter century (below).¹²



¹¹ There is research that shows the reverse effect of complementarity between DVD software availability and subsequent DVD player purchases, most notably by Pinar Karaca-Mandic at University of California at Berkeley. Nevertheless, the relationship still stands between discs and players, whereby hardware sales and software sales move in tandem.

¹² Data from Consumer Electronics Association eBrain Market Research statistics.

The FCC compiled a similar chart of consumer product penetration, dating back to 1876 (Exhibit 6). It is important to note that since the mid-20th century, rates of penetration have increased steadily for new or replacement technologies, a topic that will be addressed in section five. Although DVD players are not included in the FCC chart, there is no other consumer product that matches DVD's 70% penetration in seven years. Furthermore, no other product has moved up the lower segment of the penetration curve as quickly as DVD players. Exhibit 7 shows that DVD hardware was in 25% of U.S. homes just 5 years after the technology was *invented*, displaying an outstanding rate of growth early in the product life cycle. A consumer survey conducted in December 2005 by IPSOS Public Affairs showed that DVD Players are now in over 80% of U.S. homes, eclipsing cell phone and PC penetration (below).



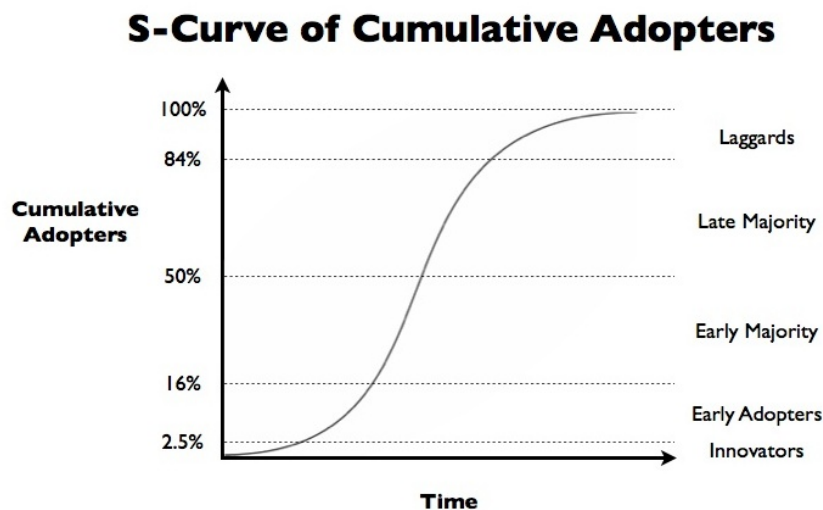
There are numerous reasons for the rapid penetration of DVD hardware, such as inclusion of DVD players in PCs and gaming consoles, an easy-to-grasp technology transition from VCRs, and rapidly falling prices for the players themselves. Various research models address these issues and shed light on the factors behind general

consumer product growth. The next section presents academic insights to explain the meteoric rise of the DVD, while also offering a glimpse into the future of the format.

V. Rise of the DVD – Academic Models

Everett Rogers and Innovation Diffusion

The most well known research on technological adoption comes from Everett Rogers, who published his first edition of *Diffusion of Innovations* in 1962. In this book, Rogers formalized the theory that technological innovations spread through society in an S-Curve of cumulative adoption. Various consumer groups along this curve are categorized as innovators, early adopters, early majority, late majority, or laggards, based on their time of adoption and personal characteristics (below).



The S-Curve model not only identifies adopter groups, it also provides insights into product growth over the course of the life cycle. For example, the S-shaped curve of adoption “takes off” in the range of 10-20 percent adoption. Rogers identifies this segment as the “heart of the diffusion process,” after which point it is often impossible to stop further spread. Conversely, diffusion growth slows in the 70-80 percent range, as

fewer remaining individuals adopt the innovation. These theories are consistent across numerous consumer products, and modern research confirms that, “U.S. consumer adoption rates begin to flatten dramatically at penetration levels between 65% and 80%.”¹³

Rogers also conducted research that examined rates of adoption, defined as “the relative speed with which an innovation is adopted by members of a social system.”¹⁴ This rate is typically measured by the number of people who adopt a product each year, and it serves as an indicator of the steepness of the adoption curve for a particular innovation. Rogers’ writings indicate five variables that explain “from 49-87 percent of the variance in adoption rates”: relative advantage, compatibility, complexity, trialability, and observability. These variables are classified under the title Perceived Attributes of Innovations, and DVD player technology scores highly across all these categories. Rogers also offers four additional variables, including type of innovation-decision, communication channels, nature of social system, and extent of change agents’ promotion efforts. Again, DVDs score well in all these areas that display a linear relationship to rate of adoption (Exhibit 8).

The Bass Model

Professor Frank M. Bass from Purdue University used Rogers’ insights to develop a quantitative product growth model for consumer durables. First proposed in 1969, the model identified two adopter categories; imitators, who are influenced by word-of-mouth communication (internal influence), and innovators, who are influenced by mass media

¹³ Nathanson, pg. 4.

¹⁴ Rogers, pg. 206.

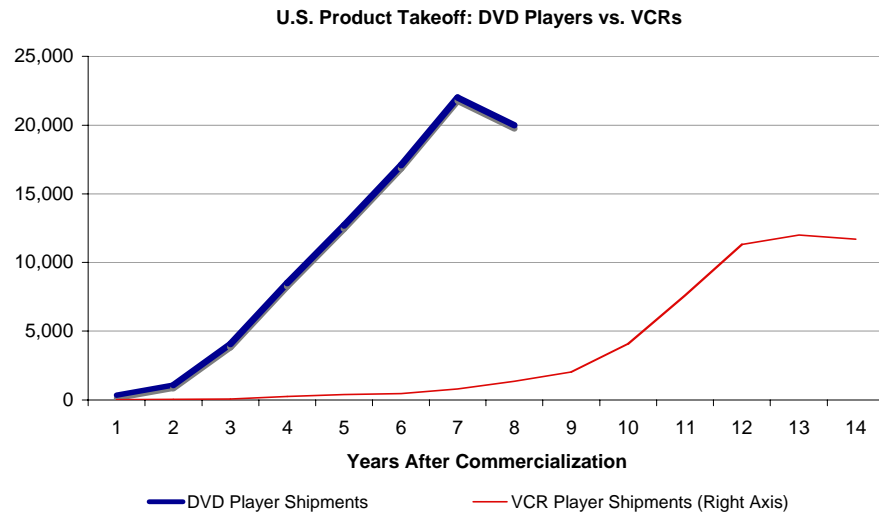
communication (external influence). The Bass Model converts this concept to a quantitative form, in which each influence is represented by a variable. The former variable is referred to as the “coefficient of imitation” while the latter is referred to as the “coefficient of innovation.”

This model has been used to accurately predict and explain product growth trends over the past 40 years. Critics claim that Bass’ work is overly simplistic, as it considers only two adopter categories and uses past data for comparable products as the basis for future predictions. Nevertheless, the Bass Model illustrates a growth pattern (Exhibit 9) very similar to that proposed by Rogers and entirely consistent with the eight years of data available from the DVD hardware industry.

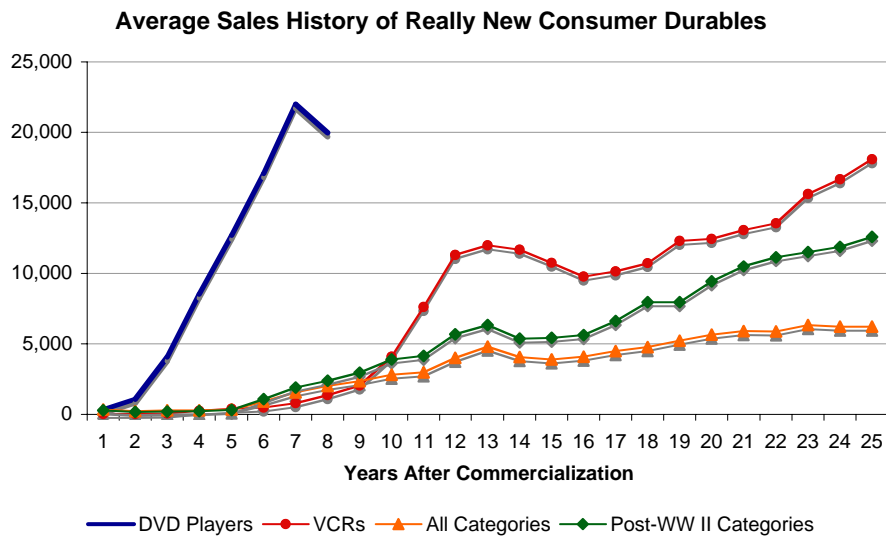
The Takeoff Model

Research by Professor Peter Golder (NYU Stern School of Business) and Gerard Tellis (USC Marshall School of Business) provides additional insight into rates of product adoption. Their “takeoff model” predicts the distinct point in the product life cycle at which the transition occurs from introductory stage to growth stage. This is represented as an elbow-shaped discontinuity in the sales curve, typically with an “average sales increase of over 400%.” This feature is often ignored in diffusion models, which tend to depict adoption of new consumer durables with smooth curves. As mentioned earlier, Everett Rogers made brief reference to this phenomenon, broadly characterizing product takeoff as the time between 10-20 percent penetration.

By following Golder and Tellis' model, we can show that DVD player takeoff occurred in early 1999, just two years after commercialization and at a rate far greater than takeoff for VCRs (below).¹⁵



In fact, DVD player sales have far outpaced historical sales averages for new consumer durables, as calculated by Golder and Tellis (below).¹⁶



¹⁵ Data from Consumer Electronics Association eBrain Market Research statistics.

¹⁶ Golder P. and G. Tellis. (2004, Vol. 23, No. 2), pg. 213.

Two years following commercial introduction, DVD hardware shipments eclipsed 500,000 units per quarter at a growth rate of 300% on a year-over-year basis. By comparison, Golder and Tellis found that the average time to takeoff for 16 post-World War II categories is six years. To understand DVD's rapid movement into the growth stage, it is important to examine the primary drivers of takeoff. The research identifies three primary independent variables (price, year of introduction, market penetration) and two control variables (product-specific characteristics and economic conditions). As in the Rogers model, we find that DVD technology exceeds the averages for each of these variables, leading to a remarkably early and strong takeoff for the product (Exhibit 10).

Evolving Process Model for new Product Sales

The three previous academic models explained rates of hardware adoption in the U.S., however it is worth examining a relatively unrelated theory that applies to DVD software purchasing. Rather than confront the early growth segment of the life cycle, Professor Peter Fader at Wharton considers repeat purchases that occur after consumers gain more experience with a product. This evolving process model assumes that consumers become more regular in their buying behavior over time, moving from an initial stage of exponential purchasing to a steady state. While Fader's model deals primarily with the regularity of timing between purchases, there is significant evidence that also shows a decrease in buying frequency for DVDs.

A USA Today article from early 2005 claimed, "if you look at the average number of DVDs bought by the DVD homes, the peak of 25 was in 1998; the past few

years it has been about 15.”¹⁷ According to Dan Ernst, a media analyst with Soleil Securities, in 1999 the average owner of a DVD player was buying 20 DVDs each year. By mid-2005, he wrote that the number had dropped to about 14 DVDs sold per household per year.¹⁸ Holly Wagner, senior editor with Home Media Retailing, offered anecdotal evidence, “Now that everyone has a DVD player, they aren’t rushing out to buy the first of everything.”¹⁹

It appears that as the market matures for DVD players, household purchasing of DVDs has cooled as the novelty and excitement of technological adoption wears off.

VI. The Next S-Curve?

Movie studios and home video executives are beginning to realize that the golden goose of DVD is near its end. Scott Hettrick, editor-in-chief of trade publications Video Business and DVD Exclusive said it best, “The DVD market matured much more quickly than anyone expected...there is little growth left.”²⁰ DVD hardware sped up the diffusion S-Curve more quickly than any other consumer product in American history. As a result, sales of DVD players and discs came to a screeching halt well before the industry predicted. Perhaps the largest factor, as described in Golder and Tellis’ takeoff model, was falling prices for hardware (below) that spurred rapid adoption in the U.S. In their follow-up research,²¹ the two professors found significant evidence that product

¹⁷ Snider, M. (2005, January 5). DVD Continues Spinning Success. *USA Today*.

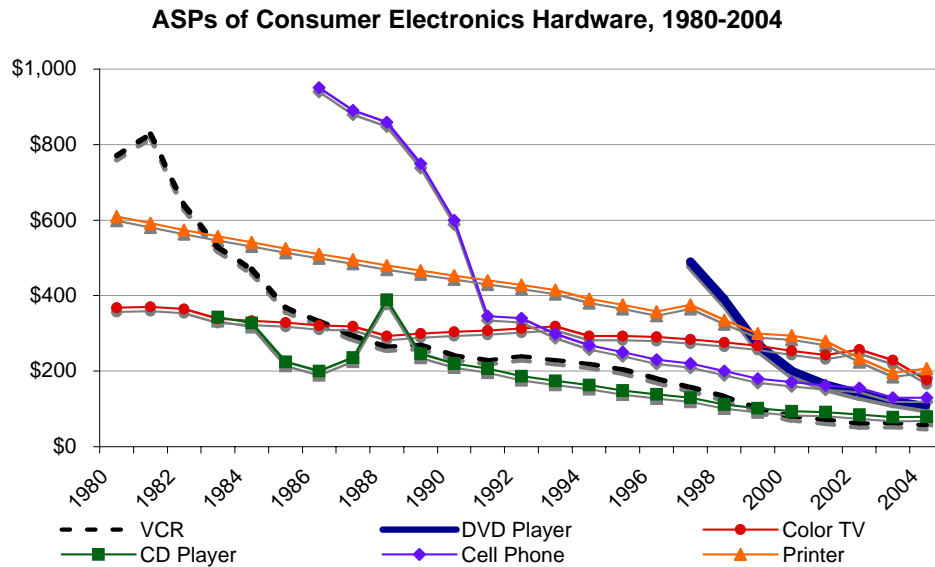
¹⁸ Fost, D. (2005, September 5). Consumers Changing DVD Buying Habits. *San Francisco Chronicle*.

¹⁹ Same as above.

²⁰ Snider, M. (2006, January 4). Video Slips as DVD Market Matures; Hopes Pinned on ‘High-Def.’ *USA Today*.

²¹ Golder P. and G. Tellis. (2004, Vol. 23, No. 2), pg. 213.

slowdown is positively correlated with adoption, specifically that “every 1% increase in penetration is associated with a 3.9% increase in the probability of a slowdown.”²² As Mr. Hettrick stated in early 2006, “The industry shot itself in the foot by lowering DVD prices too much and too quickly.”



Golder and Tellis’ work on product slowdown has other important implications for the fading future of the DVD business. The researchers discovered that products with large sales increases at takeoff tend to have larger sales declines at slowdown, an ominous portent for DVDs. Additionally, the two found that leisure-enhancing products (e.g. DVD players, color TVs, VCRs) have a negative effect on the duration of the growth stage.

The multi-billion dollar question in Hollywood is, of course, what’s next? Online downloads and pay-per-view purchasing offer a glimpse into a disc-less future, but the industry is placing its high-growth bets on High Definition DVD. This upgrade to

²² Golder and Tellis define slowdown as the first year, of two consecutive years after takeoff, in which sales are lower than the highest previous sales. Although this point has not yet arrived for the DVD industry, it could very well occur in 2007 or 2008.

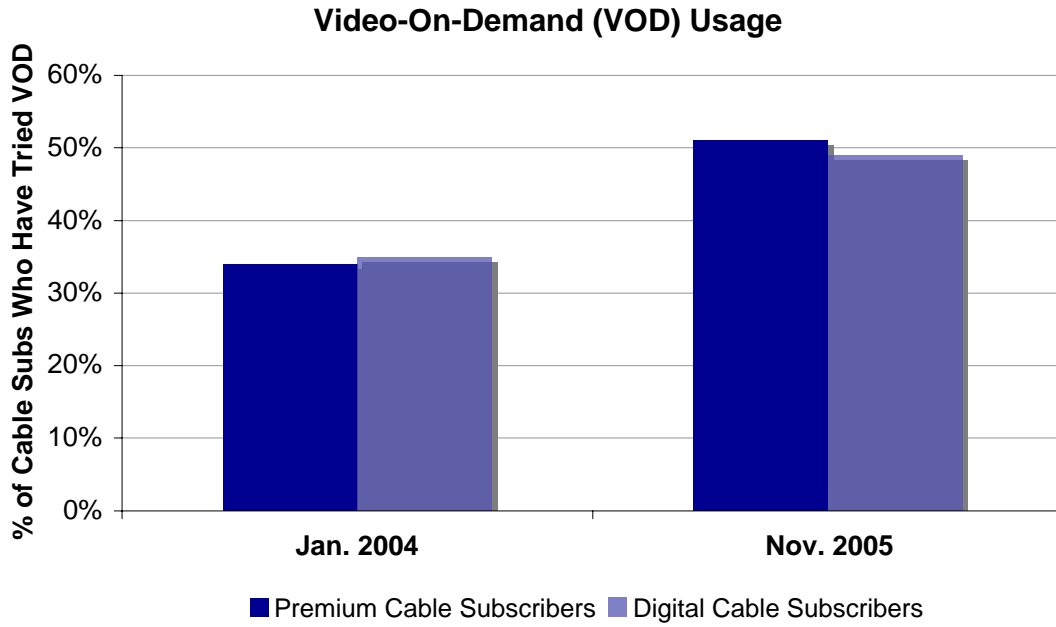
existing DVD technology offers increased storage space that allows for even higher-resolution video and a wealth of additional content, in addition to superior profit margins.

However, as this paper illustrates, there are numerous variables that affect the success of a new consumer product. Companies must work together to introduce a technology that possesses Rogers' key ingredients and has strong takeoff potential. At the same time, content producers and hardware manufacturers should avoid excessive supply-side increases that lead to rapid price reductions and shorter product life cycles. On a positive note, recent research into new product development identified demand growth as a second leading factor in successful launches.²³ Agarwal and Bayus found that, "outward shifting supply *and* demand curves lead to market takeoff." Thus, firm entry and activity geared towards increasing product quality may be just as important as price declines in determining success. This is certainly good news for product managers, and it suggests that, "sales growth does not have to necessarily come at the expense of compressed profit margins."

If the home video industry can strike the right balance between innovation and supply-side management, perhaps there is another round of growth ahead. Just in time to replace the relatively young – yet faltering – DVD.

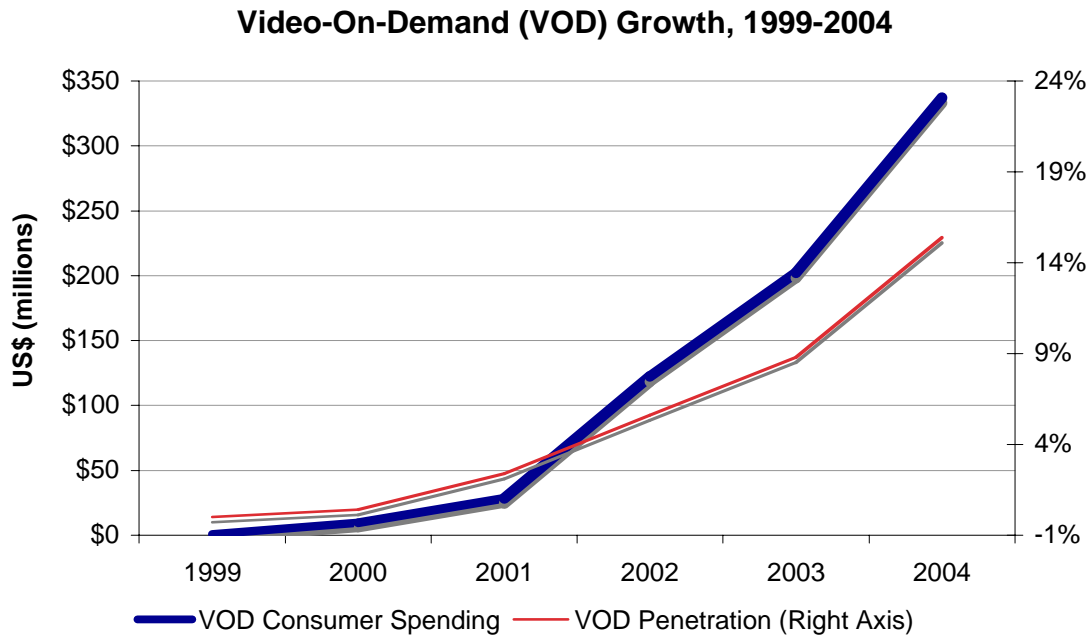
²³ Agarwal, R. and B. Bayus.

Exhibit 1



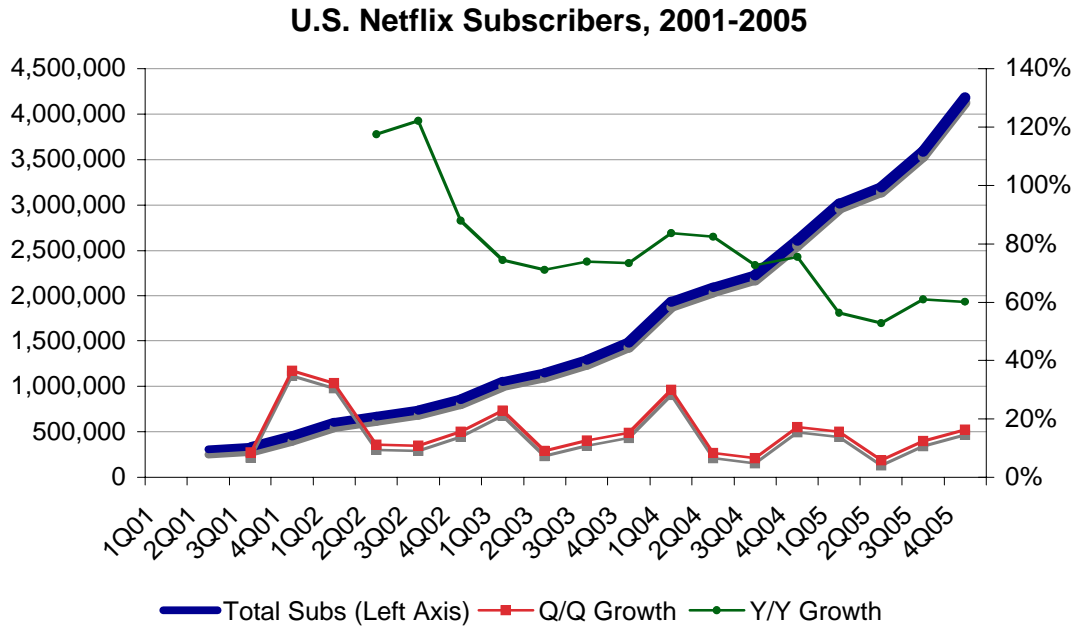
Source: ICR CENTRIS Omnibus Survey (conducted 11/11/05-11/16/05)
 Base used is total digital cable households where Video-On-Demand is available

Exhibit 2



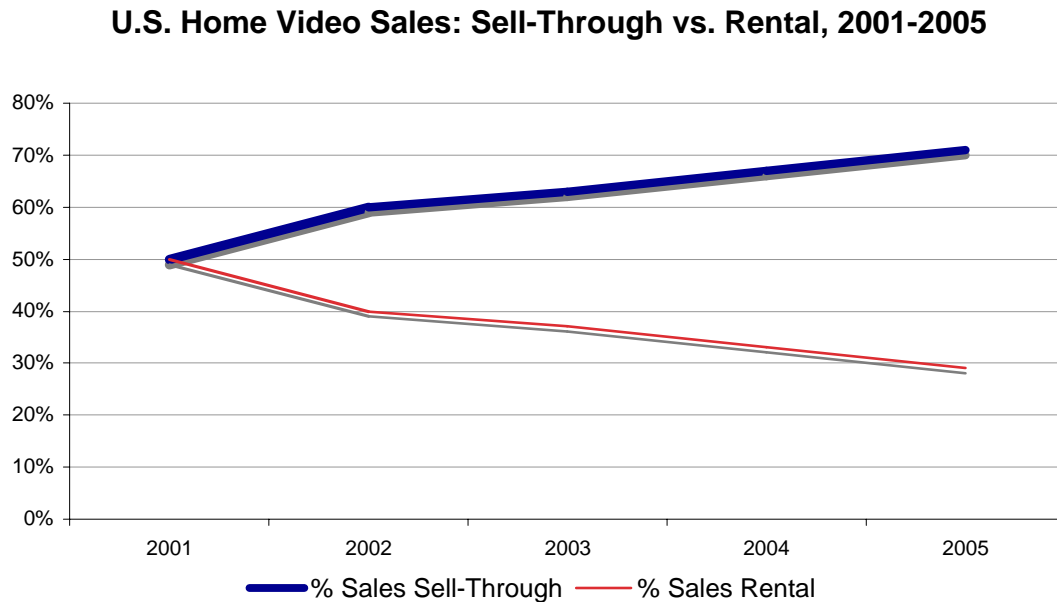
Source: Nielsen Media Research, Adams Media Research, Video Store Magazine

Exhibit 3



Source: Netflix company data

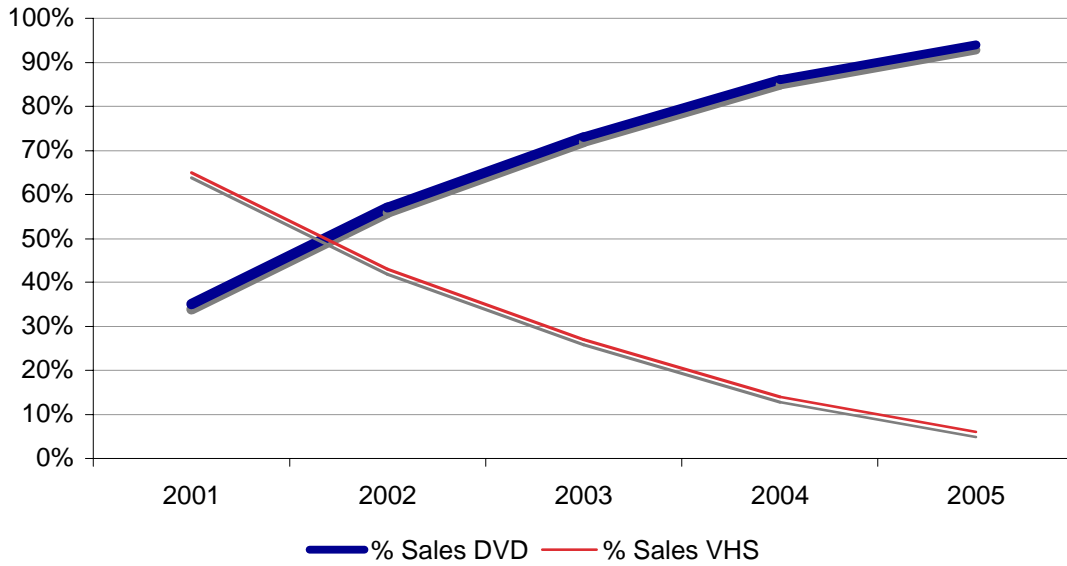
Exhibit 4



Source: The Digital Entertainment Group, 2006

Exhibit 5

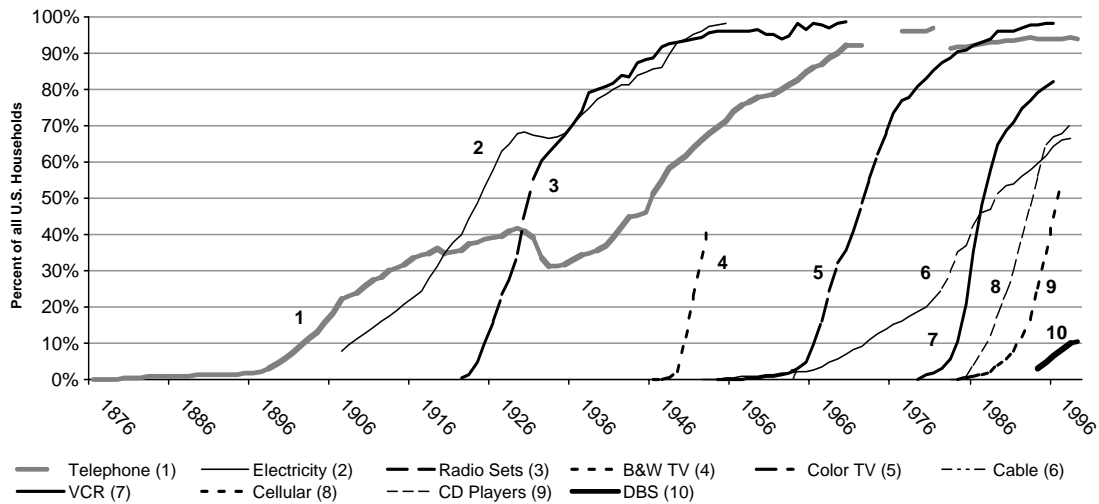
U.S. Home Video Sales: DVD vs. VHS, 2001-2005



Source: The Digital Entertainment Group, 2006

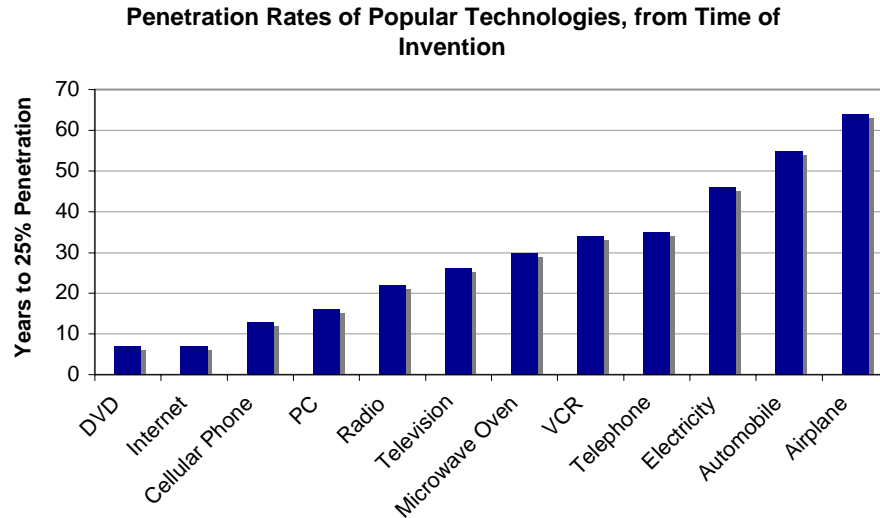
Exhibit 6

Penetration of Consumer Technologies, 1876-19



Source: For "households" (1876-1900) and "homes with electricity" (1908-11, 1913-16, 1918-20), FCC staff estimates based on Census Bureau information. For CD players, Consumer Electronics Manufacturers Association data (June 1999). For Direct Broadcast Satellite, THE SATELLITE REPORT 1999, by Global Satellite Research, C.E. Unterberg, Towbin (1999). For all other data, STATISTICAL ABSTRACTS OF THE UNITED STATES, by US Department of Commerce, Bureau of the Census (1972, 1974, 1976, 1978, 1979, 1982-83, 1987, 1989, 1990, 1992, 1995, 1997, 1998) and HISTORICAL ABSTRACT OF THE UNITED STATES: FROM COLONIAL TIMES TO 1970, by US Department of Commerce, Bureau of the Census (1975).

Exhibit 7



Source: Federal Reserve Bank of Dallas, Consumer Electronics Association

Exhibit 8

Variables Determining the Rate of Adoption of Innovations	
	<u>DVD Diffusion in the U.S.</u>
I. Perceived Attributes of Innovation	
1. Relative advantage	Substantial benefits over analog technology: improved sound and picture, more content, fast scene selection, smaller physical footprint. Economic benefit of falling prices for players and discs over time, becoming even cheaper than VCRs and VHS tapes.
2. Compatibility	Single format for DVD reduced consumer confusion and facilitated production of hardware and peripherals (i.e. avoided costly VHS-Beta war). DVD falls neatly within the home entertainment product landscape and is compatible with American beliefs regarding technological innovation and improved quality of life.
3. Complexity	Relatively easy to understand and use. DVDs are also very similar in function to preceding analog VCR technology (i.e. playback, FF, Rewind, etc).
4. Trialability	Wide range of trial options, including friends, neighbors, and electronics stores.
5. Observability	Benefits of DVD innovation are clearly observable, in the form of drastically improved video resolution, quick access to content, and superb sound.
II. Type of Innovation-Decision	Individual, optional purchase decision does not require groups or higher authority.
III. Communication Channels	Well organized mass media channels plus widespread interpersonal communication (i.e. word of mouth).
IV. Nature of the Social System	Technologically advanced, with highly interconnected communication network.
V. Extent of Change Agents' Promotion Efforts	Coordinated advertising and marketing from electronics and entertainment industries.

Source: Everett Rogers *Diffusion of Innovations*

Exhibit 9

Bass Model Formulation

$$\text{Cumulative number of adopters} = N_t = N_{t-1} + p(m - N_{t-1}) + q \frac{N_{t-1}}{m} (m - N_{t-1})$$

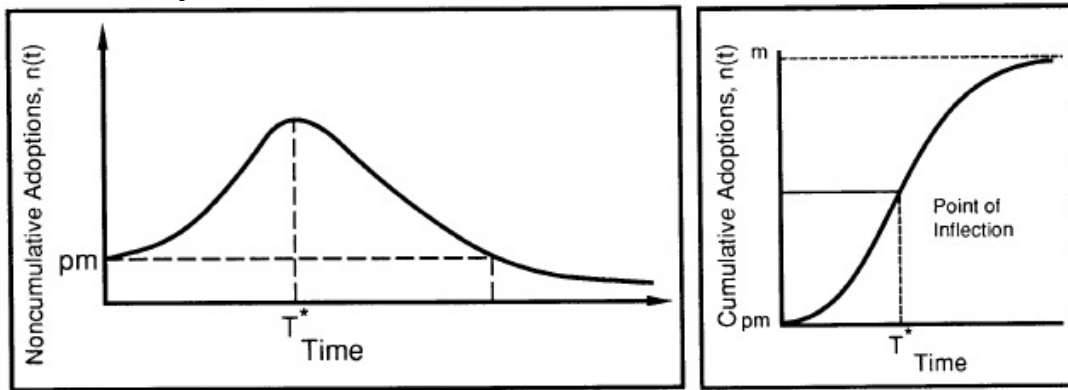
m = number of people who will adopt (i.e. total market size)

$N(t-1)$ = number who have already adopted at a point in time t

p = tendency to adopt (coefficient of innovation – external factors such as media coverage)

q = likelihood of adoption (coefficient of imitation – internal factors such as word of mouth/social contagion)

Analytical Structure of the Bass New Product Diffusion Model



Source: Mahajan, V., Muller, E., & Bass, F.M. (1990, Vol. 54, No. 1). New Product Diffusion Models in Marketing: A Review and Directions for Research. *Journal of Marketing*, pg. 4.

Exhibit 10

Variables Determining Takeoff

I. Independent Variables	Golder & Tellis Comments	Average Takeoff	DVD Takeoff
1. Price	"Probably the single most important factor." To standardize measurements of price, G&T divided the price of each product in each period by that product's initial price.	Price = 63% of introductory price.	Price = 58% of introductory price.
2. Year of Introduction	G&T posit that the introductory stage of the product life cycle is shortening over time, and takeoff occurs earlier than in the past. Thus, they expect year of introduction to be positively correlated with takeoff.	Time from introduction to takeoff = 6 years	Time from introduction to takeoff = 2 years
3. Market Penetration	Defined as the percentage of households that have purchased the new product. Everett Rogers' research on diffusion indicates a distinct threshold (2.5%) at which products move to mass market. Plus, availability of complementary products implies relationship between market penetration and takeoff.	Penetration at takeoff = 1.7%	Penetration at takeoff = 2.1%
II. Control Variables			
1. Product-Specific Characteristics	These include type of product (leisure, time-saving, electronic good) and whether sales depend on externalities such as software.	Not significant	DVD is an electronic good
2. Economic Conditions	These include GNP, total number of households, consumer sentiment.	Not significant	Strong GDP growth, budget surplus, and high consumer sentiment may be factors

Source: Golder and Tellis "Will It Ever Fly? Modeling the Takeoff of Really New Consumer Durables."

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Rating Change Timeliness across Rating Agencies

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I. Summary

Rating Agencies occupy a powerful position in capital markets across the world. Their credit ratings of Sovereigns, Corporates and Structured Finance deals can have a strong affect on the cost and ability to borrow for many organisations. Previous studies have quantified the effect of rating changes on the price of bonds in the secondary market. Event studies have shown a marked influence on price, particularly when a credit downgrade is announced. This effect is even more pronounced when the rating downgrade crosses the Investment/Speculative rating boundary.

However, the timeliness of ratings across agencies is still an unanswered question. Making the assumption that a rating change brings new information to the market, does one rating agency consistently make rating changes earlier?

This paper will compare the timeliness of rating changes across the major rating agencies in three major capital markets: the United States, Canada and Australia.

II. Introduction and Motivations

The concept of rating the creditworthiness of companies and individuals has been around for many years. In the 1860s, Henry Varnum Poor began publishing financial information about railroad and canal companies. By the late 1800's, R. G. Dun & Co had a network of representatives that reported on merchants and companies around the USA.

John Moody provided the first corporate rating for a railway bond in 1909, followed by Standard Statistics in 1916 and Poor's publishing in 1919. Standard Statistics and Poors merged in 1941 to form Standard & Poor's. Fitch rated its first deal in 1924.

Coverage of Municipal Bonds followed in the 1940s, Sovereign Ratings became common in the 1980s and 1990s, and rating of Structured Finance deals also began in the 1980s with residential mortgage backed securities.

The US Securities and Exchange Commission (SEC) created a regulatory category of “Nationally Recognized Statistical Rating Agency” or NRSRO in 1975, and accredited these three major bond rating agencies. In the following decade, 4 new agencies were accredited, but by 1992, mergers led to only three major names remaining: Standard & Poor’s, Moody’s and Fitch.

More recently, in 2003, the SEC accredited Dominion Bond Rating Service (DBRS) and A.M. Best with the NRSRO designation, so that the US market currently features 5 NRSROs.

The corporate rating industry also exists in a number of other countries, particularly Australia, Canada and the UK, and it is growing in many other locations throughout Europe and Asia. The large US based rating firms tend to dominate the markets (for example, S&P bought the largest rating agency in Australia, and recently took a majority interest in the largest in India).

Following the recent corporate collapses of companies like Enron and WorldCom, there has been renewed discussion as to the effectiveness of ratings agencies. There are a number of different ways that their effectiveness can be judged – with the most obvious metric being an examination of occurrence of default for companies that have been assessed at a particular rating level.

Rating agencies state that their analysis is based on all available public information, and they cannot be expected to accurately identify a corporate fraud. This somewhat mitigates the argument that they missed some of the recent corporate failures.

So the next reasonable question is how effective are the rating agencies in predicting corporate distress due to normal economic conditions and competition?

There are a number of different dimensions that can be tested. Rating agencies define a hierarchy of rating levels or “notches”, and although there is some variation between agencies in nomenclature, the philosophy is identical – the highest rated bonds (generally notated “AAA”) should have a very low chance of default, and this chance can be expected to increase as we move down the rating levels through B, C and eventually down to D (default) status. The better rating levels are known as Investment Grade, and the lower levels are known as Non-investment or Speculative grade.

There are two parts to risk of a bond. First, what is the risk that a bond will have a “credit event” such as default, and second, if such an event occurs, what percentage of the principal and accrued interest will be recovered? It is reasonable to assume that risk of default increases and recover rates fall as we move down through the rating level hierarchy. Highest level ratings indicate the best quality borrowers, with stable earnings, a strong capacity to repay loans, and often a history of similar successful repayments. A lower quality rating may indicate a company that has high debt with relatively minimal spare cash flow for contingencies, or a cyclic company or one with volatile earnings. A lower rating generally indicates greater risk.

Studies have been completed both in the academic world and within the agencies that looked at the effect of rating upgrades and downgrades on both the particular bond issues rated and the issuing corporation or sovereign entity.

Of particular interest is the effect of a rating downgrade. Such a downgrade is an indication that the bond may be at greater risk of loss or impairment than previously supposed.

From the Capital Asset Pricing Model (CAPM), if we assume that the pool of fixed income investors is rational, then they will demand greater reward for a higher risk bond.

A rating upgrade, by comparison, is a weaker leading indicator. The risk of the bond may be less than previously expected, but investors tend to react less to a potential gain than the equivalent potential loss. Furthermore, in the case of an upgrade to a bond, the potential payoff to an investor is capped at par, while downside losses can reach 100%.

The theory of efficient markets states that prices of securities should reflect all public knowledge (assuming the semi-strong theory). Rating agencies claim that their ratings are based only upon public knowledge. Thus if we have a secondary market for a bond, and it is downgraded, then we may or may not see a decrease in the market price of the bond (and a corresponding increase in yield). This depends on whether the rating downgrade is truly a new piece of news, or merely a summary of already public information.

In recent years, agencies like Standard & Poor's have become more transparent with their rating intentions, and they now publish warnings about bonds that are on "positive" or "negative" outlook ahead of most actual rating migrations. These warnings are known as putting a rating on "Credit Watch".

With ratings determined from public information and the distribution of credit watch warnings, we would thus expect that when a rating migration actually occurs, it should have already been priced into the bond by the market, and there should be little movement in bond price. Studies have actually found that the rating migration contains new information for the market, and there is a definite movement in bond prices after downgrades (although little if any changes due to an upgrade). Thus the effect of a rating change upon price has been comprehensively studied.

One question currently unanswered is regarding the timeliness of the different rating agencies. Is one agency generally quicker than others at upgrading or downgrading bonds? Does one agency have better insight into particular industries?

This paper investigates the timeliness of rating migrations across rating agencies. While it does not look at the accuracy of rating changes in terms of subsequent price changes, it does look at when rating migrations occurred for bonds that are rated by more than one rating agency.

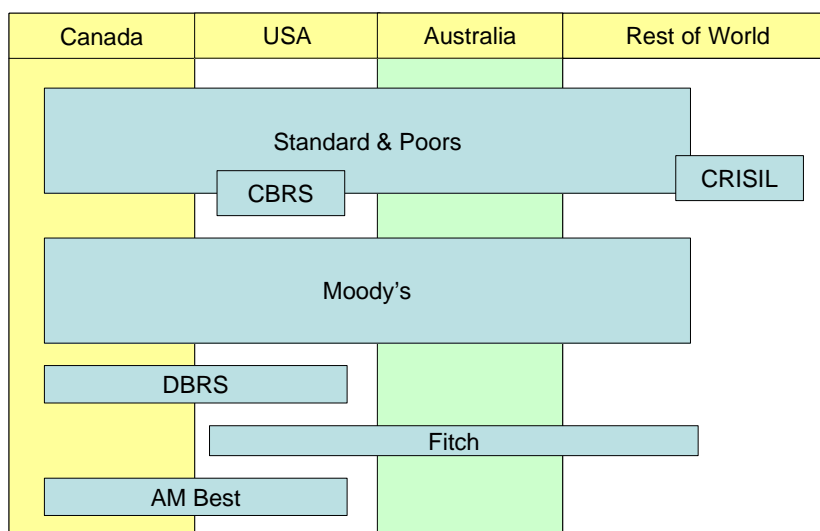
The universe for this study will be corporate bonds. Structured finance data was difficult to obtain, and similar studies to this have already been performed in the sovereign rating space. Bonds in three markets will be examined, as described in Table 1. The three markets were chosen as they are relatively liquid markets with more than one sizable rating agency in operation. Data was obtained from Bloomberg (more detail on this later in the paper).

Table 1: Dataset

Location	USA	USA	Canada	Australia
Dataset	S&P 500	All Corporates	All Corporates	All Corporates
Date Range	1980 – 2005	2004-2005	1980-2005	1980-2005
Rating Agencies	Fitch Moody's S&P	A.M.Best DBRS Fitch Moody's S&P	CBRS DBRS Moody's S&P	Fitch Moody's S&P

The selected agencies have a large number of published rating migrations within the particular location (large means within one order of magnitude of the largest agencies in that location).

Diagram 1: Geographic spread of rating agencies



III. The Rating Agencies

The big three US rating agencies have recently been joined by two other smaller NRSROs. Table 2 provides some information about each of the rating agencies.

Table 2: Rating Agency Information

Agency	Size / Locations	Owner	Other brands	Affiliations
Standard & Poor's	6,300 people, 20 countries	McGraw Hill (Public US Company) since 1966.	CBRS (Canadian Bond Rating Service) CRISIL (India) 2005	
Moody's	2,900 people, 22 countries	Public US Company since 2001, previously part of Dun & Bradstreet	Operates economy.com & Moody's KMV	
Fitch Ratings	Not known	Subsidiary of Fimalac (France) since 1997	IBCA (London) 1997 Duffs & Phelps 2000 Thomson BankWatch 2000	Clasificadora de Riesgo Humphreys Limitada (Chile) ICRA Ltd (India) Moody's Interfax (Russia) Korea Investor Service, Inc. Middle East Ratings & Investor Services (MERIS – Egypt) Midroog Limited (Israel).
Dominion Bond Rating Service (DBRS)	117 Analysts listed on Website.	Privately owned, founded 1976. based in Toronto, now expanding into the US.		
A. M. Best	Founded 1899, Offices in USA, UK and Hong Kong.	Private Company		

IV. Ratings Categories¹

Each of the rating agencies uses a set of different corporate credit “ratings”. While the wording of definitions varies across agency, they each follow a similar philosophy, with around 26 possible rating levels (or “notches”) for a long-term credit. Additionally, the rating agencies sometimes offer guidance about expected future rating migrations – for example, they may indicate that a rating is at risk, and may be soon downgraded.

The rating agencies offer a number of different types of ratings, including:

- Long term ratings
- Short term ratings
- Outlooks

This paper looks at long term ratings and migrations in these ratings. Short term ratings are labelled in a different manner and will be outside the scope of this paper. In order to discuss the ratings for individual rating agencies, we first need to define the ratings levels for each agency.

¹ From Wikipedia and Rating Agency websites. See References for details

V. S&P Long Term Credit Ratings:

S&P rates companies on a scale from AAA to D. Intermediate ratings are offered at each level between AA and B (i.e., BBB+, BBB and BBB-). For some companies, S&P may also offer guidance (termed a "credit watch") as to whether it is likely to be upgraded (positive), downgraded (negative) or uncertain (neutral)

Table 3: S&P Ratings

Investment Grade	
AAA	the best quality companies, reliable and stable
AA	quality companies, a bit higher risk than AAA
A	economic situation can affect finance
BBB	medium class companies, which are satisfactory at the moment
Non-Investment Grade	
BB	more prone to changes in the economy
B	financial situation varies noticeably
CCC	currently vulnerable and dependent on favorable economic conditions to meet its commitments
CC	highly vulnerable, very speculative bonds
C	highly vulnerable, perhaps in bankruptcy or in arrears but still continuing to pay out on obligations
CI	past due on interest
R	under regulatory supervision due to its financial situation
SD	has selectively defaulted on some obligations
D	has defaulted on obligations and S&P believes that it will generally default on most or all obligations
NR	not rated

Note that **CBRS** and **DBRS** use a very similar scale to S&P, although DBRS has 'H' and 'L' in place of '+' and '-'.

VI. Moody's Long Term Obligation Ratings

Moody's long-term obligation ratings are opinions of the relative credit risk of fixed-income obligations with an original maturity of one or more years. They address the possibility that a financial obligation will not be honored as promised. Such ratings reflect both the likelihood of default and any financial loss suffered in the event of default.

Table 4: Moody's Ratings

Investment Grade	
Aaa	Obligations rated Aaa are judged to be of the highest quality, with minimal credit risk.
Aa1, Aa2, Aa3	Obligations rated Aa are judged to be of high quality and are subject to very low credit risk.
A1, A2, A3	Obligations rated A are considered upper-medium grade and are subject to low credit risk.
Baa1, Baa2, Baa3	Obligations rated Baa are subject to moderate credit risk. They are considered medium-grade and as such may possess certain speculative characteristics.
Speculative Grade	
Ba1, Ba2, Ba3	Obligations rated Ba are judged to have speculative elements and are subject to substantial credit risk.
B1, B2, B3	Obligations rated B are considered speculative and are subject to high credit risk.
Caa1, Caa2, Caa3	Obligations rated Caa are judged to be of poor standing and are subject to very high credit risk.
Ca	Obligations rated Ca are highly speculative and are likely in, or very near, default, with some prospect of recovery of principal and interest.
C	Obligations rated C are the lowest rated class of bonds and are typically in default, with little prospect for recovery of principal or interest.
Special	
D	In Default
WR	Withdrawn Rating
NR	Not Rated
P	Provisional

VII. Fitch Long-Term Credit Ratings

Fitch's long-term credit ratings are set up along a scale almost identical to that used by S&P. Moody's also uses a similar scale, but names the categories differently. Like S&P, Fitch also uses intermediate ratings for each category between AA and B (i.e., BBB+, BBB and BBB-).

Table 5: Fitch Ratings

Investment Grade	
AAA	the best quality companies, reliable and stable
AA	quality companies, a bit higher risk than AAA
A	economic situation can affect finance
BBB	medium class companies, which are satisfactory at the moment
Non-Investment Grade (Also known at Junk)	
BB	more prone to changes in the economy
B	financial situation varies noticeably
CCC	currently vulnerable and dependent on favorable economic conditions to meet its commitments
CC	highly vulnerable, very speculative bonds
C	highly vulnerable, perhaps in bankruptcy or in arrears but still continuing to pay out on obligations
CI	past due on interest
R	under regulatory supervision due to its financial situation
SD	has selectively defaulted on some obligations
D	has defaulted on obligations and S&P believes that it will generally default on most or all obligations
NR	not rated

When comparing ratings across agencies, we will make the assumption that rating levels are readily comparable between the agencies. For long term credit ratings, each has the same number of rating levels, and when performing an analysis we will be assigning a code to each rating level as detailed in Appendix 4.

VIII. Obtaining a dataset

Data was obtained from a Bloomberg terminal, using the RATC rating changes command.

Bloomberg has the following rating-related commands available:

Table 6: Bloomberg commands

Command	Use	Notes
RATE	Credit Ratings	GOVT, CORP, MTGE, M-MKT, PFD, EQUITY
RATC	Rating Changes	Historical rating changes for a given market and date range.
RCHG	Rating History	CMO – Collateralized Mortgage Obligations only
RATD	Rating Definition	Rating categories for a particular rating agency.
CSDR	Sovereign Debt Ratings	

The RATC command provided useful data for corporate ratings. It lists rating migrations across a specified date range for a given country and agency. It can be further specified by a subset of all securities (such as SPX for members of the S&P 500 in the following result set):

Diagram 2: Screen Capture from Bloomberg RATC Command

COMPANY CREDIT RATING REVISIONS							RATC
Select Security List: Index: SPX Date: 1/ 1/2005 - 11/26/2005							
Search Criteria: Rating Type: ALL ; Agency: S&P ; Grade: ALL Direction: ALL							
Country: US;							
Industry Type: All							
Company Name	Date	Rating Type	Agency	Current Rating	Last Rating	Country	Industry Type
Progress Energy Inc	11/23/2005	Outlook	S&P	STABLE		US	Electric-Integrated
Progress Energy Inc	11/23/2005	ST Local Issuer Credit	S&P	A-2	A-3	US	Electric-Integrated
Progress Energy Inc	11/23/2005	ST Foreign Issuer Credit	S&P	A-2	A-3	US	Electric-Integrated
Calpine Corp	11/22/2005	LT Local Issuer Credit	S&P	B- *-	B-	US	Independ Power Producer
Calpine Corp	11/22/2005	LT Foreign Issuer Credit	S&P	B- *-	B-	US	Independ Power Producer

In this table, we can see that Progress Energy has an outlook, and upgrades for Short Term local issuer credit and foreign issuer credit. Calpine has changed from B- to B- with a negative credit watch for both Long Term local issuer credit and foreign issuer credit.

Four different datasets were analysed:

- All USA Corporations for the period 1 January 2004 to 26 November 2005
- USA Corporations belonging to the S&P 500 from 1980 to 26 November 2005,
- All Australian corporations from 1980 to 26 November 2005
- All Canadian corporations from 1980 to 26 November 2005.

Bloomberg data was very sparse before 1 January 1980, so this determined a natural start date for the datasets. The data collection date was 26 November 2005, and all datasets are current up until that date.

Getting data for all US corporate bonds would result in a huge dataset that would be hard to manipulate. For example, the year 2004 returned 16,243 records, so it was impractical to use an exhaustive list of ratings for the US market. Instead, the US data is analysed in two ways:

- first with a deep slice – all S&P members from 1980 to 26 November 2005
- second, with a wide slice – all USA corporate bonds for 2004/2005 up until 26 November 2005.

Table 7: Raw Data Available

Data Set	Date Range	Total Set Size	Set Size by Agency		Set Size by Rating Type
			(Large)	(Small)	
USA S&P 500	01/01/1980 to 26/11/2005	17,909	Fitch 2,686 Moodys 7,292 S&P 7,365	<i>AMBest 69</i> <i>CBRS 45</i> <i>CRISIL 2</i> <i>DBRS 441</i> <i>R&I 9</i>	Changes 12,861 <i>New Ratings 3,878</i> <i>Negative Outlook 153</i> <i>Positive Outlook 112</i> <i>Stable Outlook 905</i>
USA All Ratings	01/01/2004 to 26/11/2005	35,828	AMBest 3,757 DBRS 1,016 Fitch 5,098 Moody's 13,636 S&P 12,246	<i>Care 1</i> <i>CRISIL 1</i> <i>JCR 22</i> <i>KR 7</i> <i>Mikuni 3</i> <i>NICE 2</i> <i>R&I 37</i> <i>RAM 2</i>	Changes 21,508 <i>New Ratings 5,538</i> <i>Negative Outlook 1,270</i> <i>Positive Outlook 777</i> <i>Stable Outlook 6,673</i> <i>Developing Outlook 62</i>
Australia All Ratings	01/01/1980 to 26/11/2005	6,128	Fitch 364 Moody's 1,921 S&P 3,732	<i>AMBest 7</i> <i>CBRS 2</i> <i>DBRS 41</i> <i>JCR 23</i> <i>MARC 1</i> <i>PEFIN 1</i> <i>R&I 36</i>	Changes 4,032 <i>New Rating 1,721</i> <i>Developing Outlook 1</i> <i>Negative Outlook 26</i> <i>Positive Outlook 22</i> <i>Stable Outlook 325</i>
Canada All Ratings	01/01/1980 to 26/11/2005	14,005	CBRS 3,248 DBRS 2,844 Moody's 3,404 S&P 3,968	<i>AMBest 75</i> <i>CRISIL 1</i> <i>Fitch 433</i> <i>JCR 12</i> <i>R&I 20</i>	Changes 8,954 <i>New Rating 4.069</i> <i>Negative Outlook 124</i> <i>Positive Outlook 50</i> <i>Stable Outlook 808</i>

The total set size is the total number of ratings found for the particular dataset. This includes rating migrations (upgrades and downgrades), changes to credit watch, credit outlooks, rating initiations and termination of rating coverage. Furthermore, from table 7, it can be seen that the rating agencies that have substantial numbers of rating changes are a subset of all

agencies operating in each particular location. Table 8 lists the agencies that have sufficient data to allow comparisons of a large number of rating changes. The potential size of the dataset for each agency is also given.

Table 8: Chosen Data

Data Set	Date Range	Set Size (These Agencies only)	By Agency	By Rating Type
USA S&P 500	01/01/1980 to 26/11/2005	17,909	Fitch 2,686 Moody's 7,292 S&P 7,365	Changes 12,861
USA All Ratings	01/01/2004 to 26/11/2005	35,828	AMBest 3,757 DBRS 1,016 Fitch 5,098 Moody's 13,636 S&P 12,246	Changes 21,508
Australia All Ratings	01/01/1980 to 26/11/2005	6,128	Fitch 364 Moody's 1,921 S&P 3,732	Changes 4,032
Canada All Ratings	01/01/1980 to 26/11/2005	14,005	CBRS 3,248 DBRS 2,844 Moody's 3,404 S&P 3,968	Changes 8,954

IX. Analysis

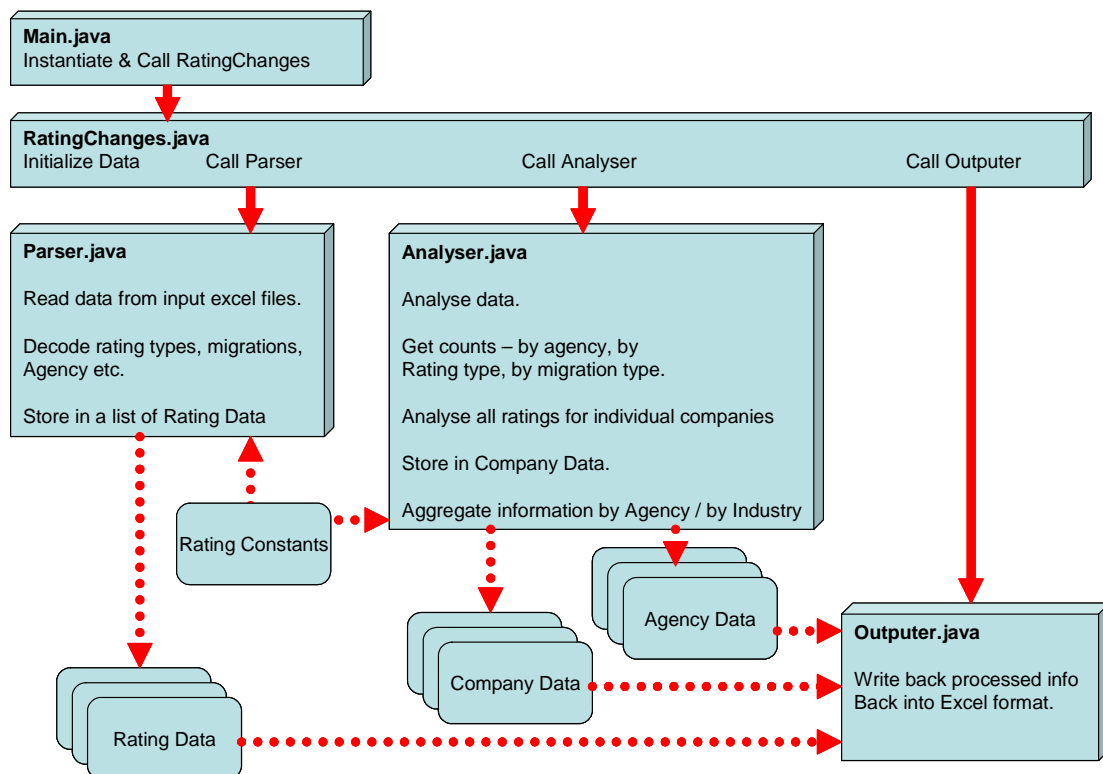
The data is naturally broken into the 4 different datasets. Each of these datasets was analysed in the same manner that will be described below. Data was initially obtained from a Bloomberg terminal.

The analysis was performed using a java application custom written for this paper. The structure of the application is shown in Diagram 3.

The following steps were followed during the analysis:

- Obtain rating data from Bloomberg.
- Obtain data about rating levels and other inputs.
- Read all data into application
- Convert dates to days after start of period so dates are now an easily compared number.
- Sort into groups of ratings by individual company
- Analyse each particular company's ratings – comparing rating changes. This is the crucial step, and will be described in greater detail below.
- Aggregate results by company
- Aggregate results by industry.
- Aggregate results by dataset.

Diagram 3: Software Structure



Before analysis can begin, rating data needs to have rating levels, rating types and industries translated into numerical codes in order to compare between markets and between Rating Agencies. The translation data that was used is provided in Table 6 (rating level equivalencies) and Appendices 1 & 2 (rating types & industry assignments).

Once data was loaded into the application and stored by company, the next step was to assess which rating changes can be meaningfully compared.

The sample selection process involves only looking at ratings that occur in a period of time with joint ratings coverage. Thus we need at least two rating agencies to be covering the stock at the time of the rating action.

Rating actions that are either upgrades or downgrades were considered. The simplest example is a change in rating level (for example, from AAA to AA), but for the purpose of this paper, the addition or removal of a credit watch was also included (so we might see a rating of “AAA” move to “AAA *-” which is an introduction of a negative credit watch). A change in credit watch provides real information to the market, and it was felt that discarding credit watch information would unnecessarily shrink the dataset.

This paper will not assess initiation of ratings by an agency since this is more likely to be a function of the size of the analyst pool in the rating agency rather than a function of the agency’s effectiveness in producing timely ratings. This paper will also not assess rating withdrawals by agencies.

The initial pass will look at all rating transitions. Later passes will further divide the dataset into investment grade (BBB/Baa and above) and speculative grade (BB/Ba and below) ratings, considering ratings migrations within these different data sets, and rating migrations that cause a company to transition from one of these subsets to the other. A rating downgrade that

cross the investment/speculative grade boundary are associated with larger reactions than downgrades in general, so this particular case will also be examined.

We also need to define a time window within which ratings can be said to be “concurrent”. If S&P did an upgrade on 1 January 2004, Moody’s upgraded on 1 March 2004, and Fitch upgraded on 1 November 2004, can it be stated that all 3 events are related?

Previous research in the sovereign area² used a 20 day time period. Thus they would only describe two rating actions as related if they occurred within 20 days of each other.

We feel this constraint is too restrictive. This paper is not an event study and does not look at price effects of ratings. Rather, it is only looking at the relative timeliness of ratings. We feel that ratings that are up to 92 days (approximately 3 months) may still be related to each other, and will use a window of this length. The decision to use a 3 month window is somewhat arbitrary, but we feel that rating changes that occur further apart than this are probably not responses to the same corporate news. A second pass using a 31 day window will be performed as well.

The next issue concerns a comparison between two rating events. Are we going to only compare upgrades with upgrades? What happens if S&P upgrades twice, and then Moody’s later does one upgrade? Furthermore, what should we do if the rating change is not the same (i.e. S&P moves from rating level 26 to 24, and Moody’s moves from 25 to 20)?

In order to resolve this issue, the rating changes will be assessed in a more simplistic manner by comparing rating changes in the same direction. Initially, we will not worry about the size of the transition or the start and end rating levels – but instead only the direction. If there are multiple rating events by one agency, we will consider the rating event closest to a rating event

² Emawtee Bissoondoyal-Bheenick (2004) Rating timing differences between the two leading agencies: Standard and Poor’s and Moody’s

by another agency – an example of this is if S&P downgraded twice, then Fitch downgrades, the second S&P rating event will be compared with the Fitch event, and if S&P downgraded once followed by two Fitch downgrades, then the S&P downgrade will be compared with the first Fitch downgrade.

Another issue is choosing which rating types should be used. There are 54 different types of rating within our 4 datasets (listed in Appendix 5). However, only long term ratings are being considered in this paper, and also require rating types with large amounts of information. Note that some rating types are only used by one rating agency, but are equivalent to other rating types for other agencies. For example, the following rating types are used by the different rating agencies for equivalent credit ratings:

Table 9: Rating Type equivalence examples

S&P	Moody's	Fitch
Financial Strength	Bank Financial Strength	Financial Strength
LT Foreign Issuer Credit LT Local Issuer Credit	Senior Unsecured Debt	Senior Unsecured Debt

We will compare rating transitions across the agencies and rating types. We will also consider credit watch changes in cases in which the rating itself did not change. Rating types that are utilized are listed in Appendix 5.

Rating migration types are defined based on the present and previous rating. There may or may not be a value for current rating and old rating. Both need to be defined for this rating entry to be a rating migration. If only one is present and the other is blank, then there is a rating initiation or withdrawal.

Table 10: Rating Migration Types – obtained from current rating versus previous rating

Previous Rating	Current Rating	Migration Type
Undefined	Defined	Rating Initiation
Defined	Undefined	Rating Withdrawal
In AAA to D	In AAA to D above Old Rating	Upgrade
In AAA to D	In AAA to D below Old Rating	Downgrade
In AAA to D	Same as Old Rating	No Change

The logical flow for comparison of ratings:

Sort all rating entries for a given company by date.

Loop through the ratings to look at each individually.

For a given rating, it is a rating change if it is one of the following:

- An upgrade
- A downgrade
- No rating change, but with a creditwatch change upwards or downwards (For example, a rating change from “AAA *+” to “AAA” is a “downgrade” from creditwatch positive to no credit watch).

Each rating migration is provided by one particular rating agency. For each rating migration, the most recent rating from each other rating agency needs to be compared, if it exists.

If the two ratings have changed in the same direction, and are close enough in time (which is defined in this study as being within 92 days for the first pass of analysis, and within 31 days for a second pass), then we will consider them related, and record this relationship. Such a pair of ratings indicates that one of the agencies has “lagged” the other agency in performing this rating change.

As we iterate across all ratings for a company, we will keep track of the most recent rating from each agency. When looking at a valid rating change, it will be compared with each of the most recent ratings from other agencies if they exist. This rating will then be stored as the most recent rating for its particular agency.

The lead/lag between agencies is aggregated for each company, and then aggregated for each industry and for each dataset.

This study will assess the mean and median of the lead and lags, the raw number of each, and present histograms to illustrate whether particular agencies seem to consistently lead or lag compared to other agencies with their rating changes in a particular industry or data set.

X. Results

From Table 8, we have 4 datasets, namely

- USA S&P500 Members from 1980 to 2005,
- USA All Corporates from Jan 2005 to November 2005
- Canada All Corporates from 1980 to 2005
- Australia All Corporates from 1980 to 2005.

We will perform the same analysis on each dataset.

XI. Australia: All Corporates from 1 January 1980 to 26 November 2005

The complete analysis for the Australian data is included in the body of this paper; similar analysis for the other 3 datasets is included in Appendices 1-3.

Table 11: Initial Data for Australia:

	Fitch	Moody's	S&P	Other Agencies	Total
# Companies Covered	75	276	308	-	-
Total Ratings Records	364	1921	3732	0	6017
Other/Not useful³	148	533	1409	-	2090
Useful	216	1388	2323	-	3927
Initiations	89	371	609	-	1069
Upgrades	29	230	316	-	575
Downgrades	49	358	535	-	942
Withdrawals	6	97	220	-	323
No Change	43	332	643	-	1018
Creditwatch upgrade⁴	14	156	220	-	390
Creditwatch unchanged	10	22	47	-	79
Creditwatch downgrade	19	154	376	-	549

The count of companies is all companies that have at least one rating entry by the Rating Agency. If only the potentially Useful Rating Data are considered from the table above, we have the following information.

Table 12: Comparable Data for Australia.

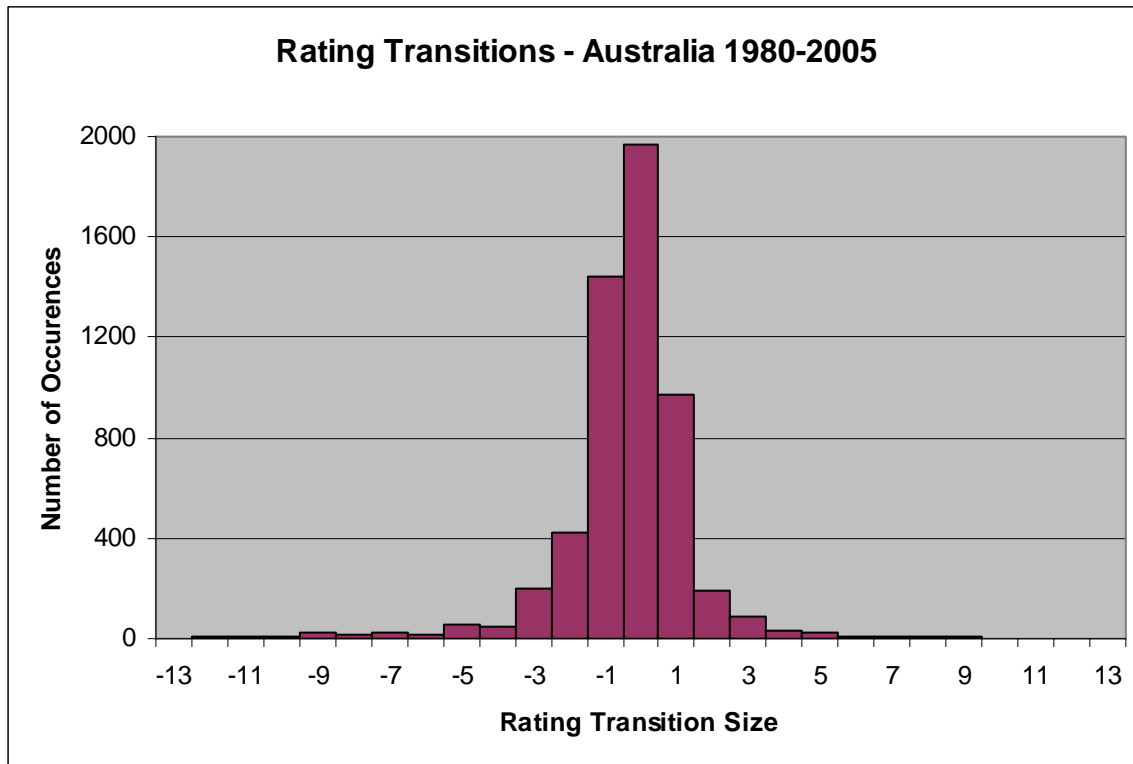
	Fitch	Moody's	S&P	Total
Upgrades	29	230	316	1344
Downgrades	49	358	535	2279
Creditwatch upgrade	14	156	220	705
Creditwatch downgrade	19	154	376	305

³ Other/Not useful includes “outlooks” or short term ratings. This study is only looking at long term ratings.

⁴ Creditwatch upgrades and creditwatch downgrades involve a change of creditwatch level without any rating notch change (for example, from AA to AA *). The “No Change” category is a sum of the creditwatch categories.

Upgrades and Creditwatch upgrades are both considered upward movements in a rating by an agency, and Downgrades and Creditwatch downgrades are both considered downward movements in a rating by an agency. When ratings are compared, upward movements will be compared with upward movements only, and downward movements with downward movements.

Figure 1: The size of rating transitions in Australia:



The largest grouping is a zero notch rating migration – which may still be useful data as we can have a credit watch change. The next most common events are a one notch downgrade and a one notch upgrade. Note that the range of possible rating upgrades and downgrades is from -26 (a rating change from AAA to D) to +26 (D to AAA). Extreme rating migrations like this are unlikely, and indeed our distribution shows that by far the most common events involve a 1 or two notch migration.

If we then look at only the ratings that involve an upgrade or downgrade, we get the following set of data:

Table 13: Number of Ratings Transitions in Australia by Type:

	Fitch	Moody's	S&P	TOTAL
<i>I / Upgrade</i>	29	211	286	526
<i>I / Downgrade</i>	43	295	430	768
<i>I / CW upgrade</i>	14	121	170	305
<i>I / CW downgrade</i>	19	125	332	476
<i>S / Upgrade</i>	0	12	13	25
<i>S / Downgrade</i>	4	44	65	113
<i>S / CW upgrade</i>	0	35	50	85
<i>S / CW downgrade</i>	0	29	44	73
<i>I → S Downgrade</i>	2	19	40	61
<i>S → I Upgrade</i>	0	7	17	24

I = Investment Grade (BBB or better) CW Upgrade = credit watch was increased

S = Speculative Grade CW Downgrade = credit watch was decreased.

Rating migrations by different agencies were compared using a 92 day window and a 31 day window. The window determines the maximum number of days that can separate two different rating migrations that are still considered related. Thus the 92 day window implies that a Fitch rating upgrade 3 months after an S&P rating upgrade are related and should be compared. The 31 day window implies that only rating migrations by different agencies that occurred within 1 month should be compared. The 92 day window may be more comprehensive, allowing

comparison of a greater number of rating changes, but it also has the potential risk that rating changes close to three months apart would heavily influence the mean lead or lag.

In table 14, we also note that a negative value for the Mean / Median means that the Rating Agency on the left is leading the Rating Agency at the top. A positive value means that the Agency at the left is lagging the Rating Agency at the top

Table 14: Number of Leading / Lagging rating migrations versus other rating Agencies in Australia:

		Moody's				S & P			
		Upgrade		Downgrade		Upgrade		Downgrade	
	Fitch	92 day	31 day	92 day	31 day	92 day	31 day	92 day	31 day
#Leading		6	4	5	3	11	5	7	5
#Same		0	0	5	5	0	0	2	2
#Lagging		3	1	11	5	5	4	13	5
Mean		-11	-22	8	0	-31	-5	18	-2
Median		-28	-14	1	0	-6	-14	5	0
	Moody's								
#Leading						24	6	58	32
#Same						7	7	15	15
#Lagging						21	12	69	26
Mean						-2	9	6	-1
Median						0	0	0	0

The rating agency at left are compared with the rating agency at the top. For the first intersection: Fitch vs Moody's, the values are leading=6, same=0, lagging=3, mean=-11, median=-28 for the 92 day window.

This means that Fitch leads Moody's in 6 ratings, and lags Moody's in 3 ratings. The mean time between related ratings from Fitch and Moody's is -11 days, and the median time between ratings for Fitch and Moody's is -28 days. It can be stated that Fitch leads Moody's for

timeliness of ratings in Australia, both from the number of leading versus lagging rating changes, and also from the mean and median difference between ratings from these agencies.

The table is a matrix, and it can be transposed. Thus, from this table it can also be seen that Moody’s lags Fitch by a median of -28 days using 92 day data.

This comparative timing information was aggregated into an indicator of how many other Agencies each particular Agency leads or lags. The number of leading ratings versus number of lagging ratings is one indicator. The mean is useful as well. The Median is related to number of leading and lagging ratings (for example, if there are more leading ratings, then the median should be a leading number). Then scoring 1 point for a clear lead, 0.5 points for a mixed message between count of rating changes and mean, and 0 for a clear lag, we get the following table:

Table 15: Summary of Leading versus Lagging in Australia

Agency	Upgrade Lead/Lag	Downgrade Lead / Lag
Fitch	2 / 0	0 / 2
Moody’s	0.5 / 1.5	1.5 / 0.5
S&P	0.5 / 1.5	1.5 / 0.5
Timeliness Order:	Fitch Moody's S&P	S&P Moody's Fitch

This suggests S&P and Moody’s appears the timeliest in Australia for downgrades, but the least timely for upgrades. This implies that S&P and Moody’s are more conservative or cautious in their ratings than is Fitch in Australia.

One other dimension was analysed – the timeliness of Rating Agencies on an industry by industry basis. Table 16 details an industry breakout of rating comparisons. The industry groups are defined in Appendix 6.

Table 16: Summary of Leading and Lagging Rating Agencies for Upgrades and Downgrades by Industry in Australia

Category	Upgrades				Gap Size (days)	Total # Ratings	Downgrades				Gap Size	Total # Ratings
	First	Second	Third	4th			First	Second	Third	4th		
#N/A												
Advertising												
Aerospace												
Agriculture												
Beverages							Moody's	S&P			81	1
Chemical												
Clothing												
Commercial	Moody's	S&P			29	3	Moody's	S&P			12	9
Commodity	Moody's	S&P			36	2	S&P	Moody's			16	13
Construction	Fitch	S&P			3	2	Fitch	Moody's	S&P		27	5
Education												
Entertainment & Rec												
Finance	Fitch	S&P	Moody's		13	39	S&P	Moody's	Fitch		12	78
Food	S&P	Moody's			77	2	S&P	Moody's			27	5
Government	Moody's	S&P			2	4	Fitch	S&P			52	14
Healthcare							S&P	Moody's			25	10
Insurance	Fitch	Moody's			28	1	S&P	Fitch			42	1
Manufacturing							S&P	Moody's			12	9
Media	Moody's	Fitch			31	1	S&P	Moody's			24	5
Real Estate							Moody's	S&P			21	3
Retail	S&P	Fitch			45	2	S&P	Moody's			51	2
Services												
Technology												
Telecom							S&P	Moody's	Fitch		2	10
Transport							Moody's	S&P			2	7
Utility	Fitch	S&P	Moody's		32	18	S&P	Fitch			53	3

The breakout by Industry confirms the results of the summary in table 15. Within the Australian market, S&P and Moody's appear faster in downgrades in most industries, and Fitch is faster to upgrade ratings in many industries. This table also allows an analysis of where most of the ratings changes have occurred. For Australia, most of the action has been in the Finance industry, with lower but substantial changes in the Utility, Commodity and Government areas.

XII. Conclusions

The following table is a summary of results across the different datasets:

Table 17: Summary of Agency Timeliness

	Australia	Canada	USA S&P500	USA Broad
Order of timeliness for upgrades <faster> to <slower>	Fitch Moody's S&P	S&P Fitch DBRS Moody's CBRS	Fitch S&P Moody's	Fitch S&P Moody's DBRS
Order of timeliness for downgrades <faster> to <slower>	S&P Moody's Fitch	DBRS Fitch CBRS Moody's S&P	S&P Fitch Moody's	S&P Fitch DBRS Moody's

Timeliness of ratings can be interpreted in both a positive and a negative way. A rating agency that is faster to change ratings may be doing so from an operational or a philosophical point of view. They may have extra resources and the ability to complete risk assessment before their competitors. They may also have a different assessment of risk, and decide that the correct rating level has changed prior to competitors.

Corporate credit ratings attempt to be an accurate forecast of future risk for a bond. If a rating agency repeatedly upgrades and downgrades a particular bond, then market participants will have less confidence in the performance of that bond and the ability of the Rating Agency to accurately forecast risk. Many corporations operate within a multi-year industry cycle, and rating

agencies also must take these larger cycles into account when providing a rating, and try to avoid rating changes simply to match the cycle of an industry.

This paper has found that Standard and Poor's tends to be the most cautious of the Rating Agencies, with the fastest downgrades of corporate bonds, and average timing for upgrades. The one notable exception to this rule is in the Canadian Market when Standard and Poor's appears to be more accepting of risk and slower to downgrade. Across the 4 datasets Moody's is the slowest to downgrade bonds, but is also slow to upgrade as well. Fitch is generally quite aggressive with both upgrades and downgrades.

This paper has found that rating agencies are not consistent in their relative timeliness in different markets. While each rating agency has guidelines and Ratings Criteria to help standardize rating quality and consistency, it is apparent that this infrastructure does not ensure the same relative performance in different markets. The differences can most likely be attributed to differing staff knowledge and expertise in the various locations, poor internal dialog between the regional offices of a Rating Agency, and also variation due to different legal environments.

While this paper's results can be explained by Rating Agency philosophy and operational ability, these results can also be used in a predictive way. Due to the expected relative timing of rating changes, an S&P downgrade is more likely than other rating changes to result in a subsequent downgrade by a second rating agency. Also, a rating upgrade by Fitch is most likely to be followed by an upgrade by another Rating Agency. Moody's rating changes have less of a predictive effect, as they more commonly occur after other agencies have already moved their rating. It is outside the scope of this paper to examine the correlation between rating migrations by different agencies, but quantifying the increase in the likelihood of a rating change by one agency when another agency has announced a rating change is a worthy extension to this paper.

Appendix 1: Analysis of Canadian Data:

All Corporates from 1 January 1980 to 26 November 2005

There are 5 Rating Agencies operating in Canada that have published a sufficient quantity of rating changes for analysis in this paper.

Table 18: Initial Data for Canada

	CBRS	DBRS	Fitch	Moody's	S&P	Other Agencies	Total
# Companies Covered	475	600	74	453	466	-	-
Total Ratings Records	3248	2844	324	3968	3184	437	14005
Other/Not useful	1382	1439	0	1085	0	-	4343
Useful	1866	1405	324	2883	3184	-	9662
Initiations	438	572	112	836	898	-	2856
Upgrades	410	109	37	429	359	-	1344
Downgrades	433	261	76	684	825	-	2279
Withdrawals	474	143	13	337	245	-	1212
No Change	111	320	86	597	857	-	1971
Creditwatch upgrade	21	75	38	243	328	-	705
Creditwatch unchanged	73	119	8	31	74	-	961
Creditwatch downgrade	17	126	40	323	455	-	305

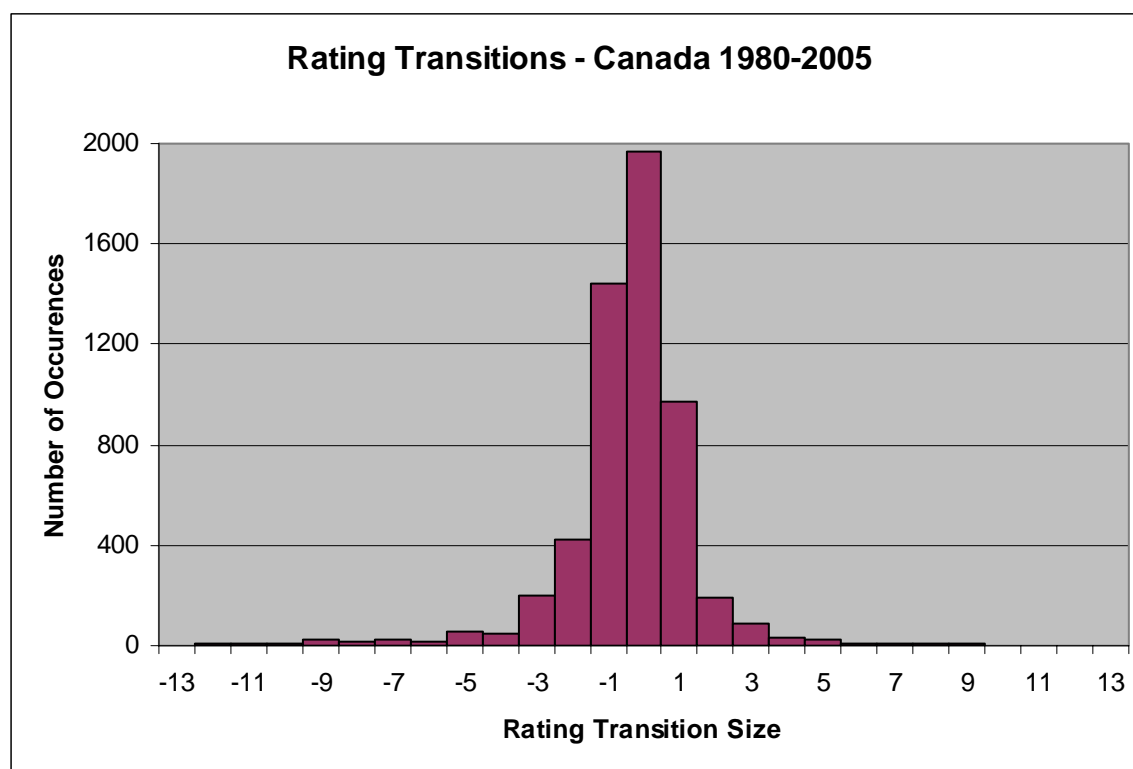
This rough data set provides the following set of rating changes that can be compared with those from other rating agencies:

Table 19: Comparable data for Canada

	CBRS	DBRS	Fitch	Moody's	S&P	Total
Upgrades	410	109	37	429	359	1344
Downgrades	433	261	76	684	825	2279
Creditwatch upgrade	21	75	38	243	328	705
Creditwatch downgrade	17	126	40	323	455	305

A summary of all rating transitions looks as follows:

Figure 2: The size of rating transitions in Canada:



The largest grouping is a zero rating notch migration. One notch downgrades and upgrades are the next most common events.

Table 20: Number of Ratings Transitions by Type in Canada:

	CBRS	DBRS	Fitch	Moody's	S&P	Total
<i>I / Upgrade</i>	313	90	34	222	182	841
<i>I / Downgrade</i>	330	159	64	295	393	1241
<i>I / CW upgrade</i>	13	61	34	132	182	421
<i>I / CW downgrade</i>	11	98	37	186	317	652
<i>S / Upgrade</i>	55	17	1	166	139	378
<i>S / Downgrade</i>	55	73	7	326	352	813
<i>S / CW upgrade</i>	9	14	4	111	146	284
<i>S / CW downgrade</i>	3	28	3	137	138	309
<i>I → S Downgrade</i>	48	29	5	63	80	225
<i>S → I Upgrade</i>	42	2	2	41	38	125

A summary of the number of ratings that lead or lag those from other companies is listed in table 21. Note that this was done for both a 92 day and a 31 day “window”.

Table 21: Lead or Lag versus other rating Agencies in Canada:

		DBRS				Fitch				Moody's				S & P			
		Upgrade		Down		Upgrade		Down		Upgrade		Down		Upgrade		Down	
	CBRS	92d	31d	92d	31d	92d	31d	92d	31d	92d	31d	92d	31d	92d	31d	92d	31d
#Leading		1	0	9	6	0	0	0	0	14	1	31	16	6	2	30	15
#Same		0	0	0	0	0	0	0	0	2	2	5	5	1	1	2	2
#Lagging		2	1	9	7	3	0	3	0	13	9	23	8	6	3	15	10
Mean		16	16	0	2	43	0	67	0	-11	10	2	-3	-11	0	-17	-5
Median		16	16	1	4	43	0	74	0	0	15	-7	-7	0	0	-19	-13
	DBRS																
#Leading						4	4	11	6	26	13	81	53	6	4	90	54
#Same						3	3	6	6	0	0	15	15	2	2	34	34
#Lagging						5	3	15	9	13	6	54	25	13	7	58	23
Mean						2	-5	4	3	-20	-6	-1	-4	16	1	-2	-2
Median						0	0	0	0	-26	-1	-1	-2	10	0	0	0
	Fitch																
#Leading										5	2	15	13	2	0	18	10
#Same										1	1	1	1	3	3	1	1
#Lagging										2	0	23	12	5	3	16	12
Mean										-4	-10	11	-1	8	9	-3	0
Median										-14	-3	3	0	0	0	-1	0
	Moody's																
#Leading														37	15	132	74
#Same														3	6	58	56
#Lagging														53	31	151	86
Mean														0	4	0	1
Median														2	1	0	0

Looking at aggregating timing for each agency's for upgrades (lead/lag versus other agencies for average of median and mean):

Table 22: Summary of leading versus lagging in Canada

Agency	Upgrade Lead/Lag	Downgrade Lead/Lag
CBRS	1/3	2/2
DBRS	2.5/1.5	3/1
Fitch	2.5/1.5	2.5/1.1
Moody's	1/3	1.5/2.5
S&P	3.5/0.5	0.5/3.5
Timeliness Order:	S&P Fitch DBRS Moody's CBRS	DBRS Fitch CBRS Moody's S&P

Table 23: Summary of Leading and Lagging Rating Agencies for Upgrades and Downgrades by industry in Canada:

Category	Upgrades				Gap Size (days)	Total # Ratings	Downgrades				Gap Size	Total # Ratings
	First	Second	Third	4th			First	Second	Third	4th		
#N/A												
Advertising												
Aerospace												
Agriculture							CBRS	DBRS	S&P		25	4
Beverages							S&P	Moody's	CBRS		27	4
Chemical	S&P	Fitch	Moody's		19	2	Fitch	Moody's	S&P	DBRS	22	11
Clothing												
Commercial							CBRS	Moody's	S&P	DBRS	12	50
Commodity	S&P	DBRS	Moody's	CBRS	17	41	S&P	Moody's	DBRS	CBRS	19	80
Construction	Moody's	CBRS	S&P		15	12	S&P	DBRS	Moody's	CBRS	19	18
Education												
Entertainment & Rec	S&P	Moody's			60	1	S&P	Moody's			1	4
Finance	Fitch	Moody's	S&P	Fitch	12	20	Moody's	S&P	Fitch	DBRS	11	44
Food							S&P	Moody's			11	3
Government	CBRS	DBRS	Moody's	S&P	35	19	Moody's	CBRS	S&P		18	14
Healthcare	S&P	Moody's			2	2						
Insurance	Fitch	S&P			0	3	DBRS	Fitch	Moody's	S&P	8	39
Manufacturing	S&P	CBRS	DBRS	Moody's	10	17	DBRS	S&P	Moody's	CBRS	8	125
Media	S&P	DBRS	CBRS	Moody's	17	39	Moody's	S&P			17	35
Real Estate	S&P	DBRS			22	6	Moody's	CBRS	DBRS		47	4
Retail	Moody's	S&P			28	2	S&P	DBRS	Moody's		9	17
Services												
Technology	S&P	Moody's			28	4	S&P	CBRS	DBRS	Moody's	13	7
Telecom	S&P	DBRS	Fitch	Moody's	12	43	Fitch	CBRS	DBRS	Moody's	4	195
Transport	CBRS	DBRS	S&P	Moody's	55	5	CBRS	Fitch	DBRS	S&P	7	140
Utility	CBRS	Moody's	DBRS		31	4	CBRS	S&P	Moody's		35	15

Appendix 2: Analysis of USA Data

S&P 500 Constituents from 1 January 1980 to 26 November 2005

Table 24: Initial Data for US S&P

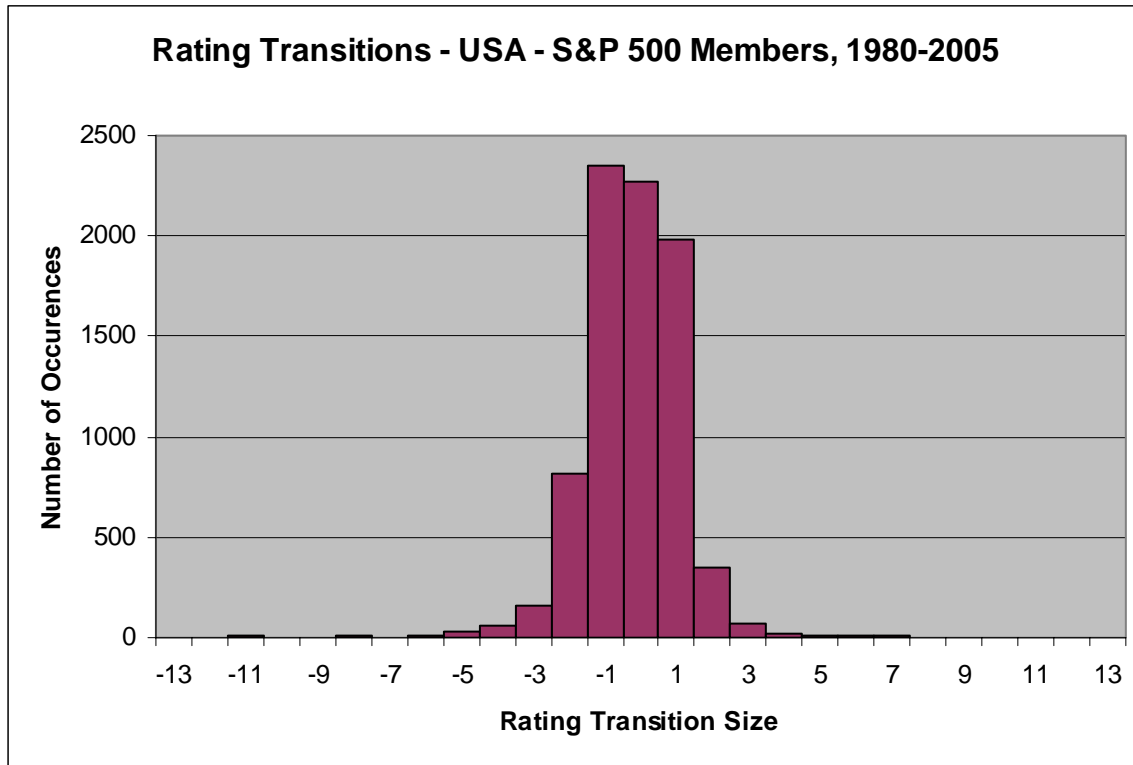
	Fitch	Moody's	S&P	Other Agencies	Total
# Companies Covered	320	434	444	-	-
Total Ratings Records	2686	7292	7365	566	17909
Other/Not useful				-	
Useful	1887	5973	4926	-	13038
Initiations	647	1369	789	139	2944
Upgrades	281	1082	1080	10	2453
Downgrades	528	1457	1428	35	3448
Withdrawals	78	429	94	15	616
No Change	353	1636	1535	53	3577
Creditwatch upgrade	136	658	526	6	1326
Creditwatch unchanged	20	23	34	15	92
Creditwatch downgrade	197	955	975	32	2159

Table 25: Comparable Data for US S&P:

	Fitch	Moody's	S&P	Total
Upgrades	281	1082	1080	2443
Downgrades	528	1457	1428	3413
Creditwatch upgrade	136	658	526	1320
Creditwatch downgrade	197	955	975	2127

A summary of all rating transitions looks as follows:

Figure 3: The size of rating transitions for USA S&P:



The largest grouping is for a one rating notch downgrade. A zero notch migration and a one notch upgrade are the next most common events.

Table 26: Number of Ratings Transitions by Type for US S&P:

	Fitch	Moody's	S&P	Total
<i>I / Upgrade</i>	175	598	721	1502
<i>I / Downgrade</i>	350	981	1110	2469
<i>I / CW upgrade</i>	79	380	377	839
<i>I / CW downgrade</i>	165	713	847	1752
<i>S / Upgrade</i>	66	338	207	613
<i>S / Downgrade</i>	116	275	174	568
<i>S / CW upgrade</i>	57	278	149	487
<i>S / CW downgrade</i>	32	242	128	407
<i>I → S Downgrade</i>	62	201	144	411
<i>S → I Upgrade</i>	40	146	152	338

A summary of the number of ratings that lead or lag those from other companies is listed in table 27. Note that this was done for both a 92 day and a 31 day “window”.

Table 27: Lead or Lag versus other rating Agencies for US S&P:

		Moody's				S & P			
		Upgrade		Downgrade		Upgrade		Downgrade	
	Fitch	92 day	31 day	92 day	31 day	92 day	31 day	92 day	31 day
#Leading		63	36	256	145	42	20	198	113
#Same		4	2	56	53	14	14	85	81
#Lagging		54	26	216	119	32	20	216	135
Mean		-5	-4	-1	-1	-3	0	0	0
Median		-1	-1	0	0	0	0	0	0
	Moody's								
#Leading						146	91	443	247
#Same						14	14	130	136
#Lagging						168	93	538	352
Mean						5	0	0	1
Median						2	0	0	0

Looking at aggregating timing for each agency's for upgrades (lead/lag versus other agencies for average of median and mean):

Table 28: Summary of Leading versus Lagging Upgrades for US S&P

Agency	Upgrade Lead/Lag	Downgrade Lead / Lag
Fitch	2/0	1/1
Moody's	0/2	0/2
S&P	1/1	2/0
Timeliness Order:	Fitch S&P Moody's	S&P Fitch Moody's

Table 29: Summary of Upgrades and downgrades and the order of Rating Agency timeliness by industry for US S&P

Category	Upgrades				Gap Size (days)	Total # Ratings	Downgrades				Gap Size	Total # Ratings
	First	Second	Third	4th			First	Second	Third	4th		
#N/A												
Advertising	S&P	Fitch	Moody's		5	14	Moody's	Fitch	S&P		5	61
Aerospace	Moody's	S&P			14	2	Moody's	S&P			4	26
Agriculture	Moody's	S&P			26	2	Moody's	S&P			12	3
Beverages	Moody's	Fitch	S&P		11	3	S&P	Moody's			1	9
Chemical	Moody's	S&P			3	3	Fitch	S&P	Moody's		20	39
Clothing							Moody's	S&P			26	7
Commercial	Moody's	S&P			25	5	Moody's	S&P			4	4
Commodity	Fitch	S&P	Moody's		20	70	S&P	Fitch	Moody's		1	177
Construction	Fitch	Moody's	S&P		36	6	S&P	Moody's			39	6
Education												
Entertainment & Rec							Moody's	S&P	Fitch		15	8
Finance	Moody's	S&P	Fitch		11	68	Fitch	Moody's	S&P		5	83
Food	Moody's	S&P			4	17	Fitch	Moody's	S&P		3	58
Government												
Healthcare	S&P	Moody's	Fitch		9	69	Fitch	S&P	Moody's		5	168
Insurance							Fitch	Moody's	S&P		7	125
Manufacturing	Fitch	S&P	Moody's		8	37	Fitch	S&P	Moody's		5	290
Media	S&P	Moody's	Fitch		12	35	Fitch	Moody's	S&P		12	59
Real Estate	Moody's	S&P	Fitch		22	9	S&P	Moody's	Fitch		48	19
Retail	Fitch	S&P	Moody's		20	55	Fitch	S&P	Moody's		12	75
Services	S&P	Moody's	Fitch		3	11	Moody's	S&P	Fitch		13	66
Technology	S&P	Moody's	Fitch		26	45	S&P	Fitch	Moody's		9	155
Telecom	Fitch	S&P	Moody's		13	28	Moody's	Fitch	S&P		2	203
Transport	S&P	Fitch	Moody's		26	19	Fitch	S&P	Moody's		4	206
Utility	S&P	Fitch	Moody's		13	49	S&P	Fitch	Moody's		3	271

Appendix 3: Analysis of USA Data:

All Corporates from 1 January 2005 to 26 November 2005

Table 30: Initial Data for US All Corporates

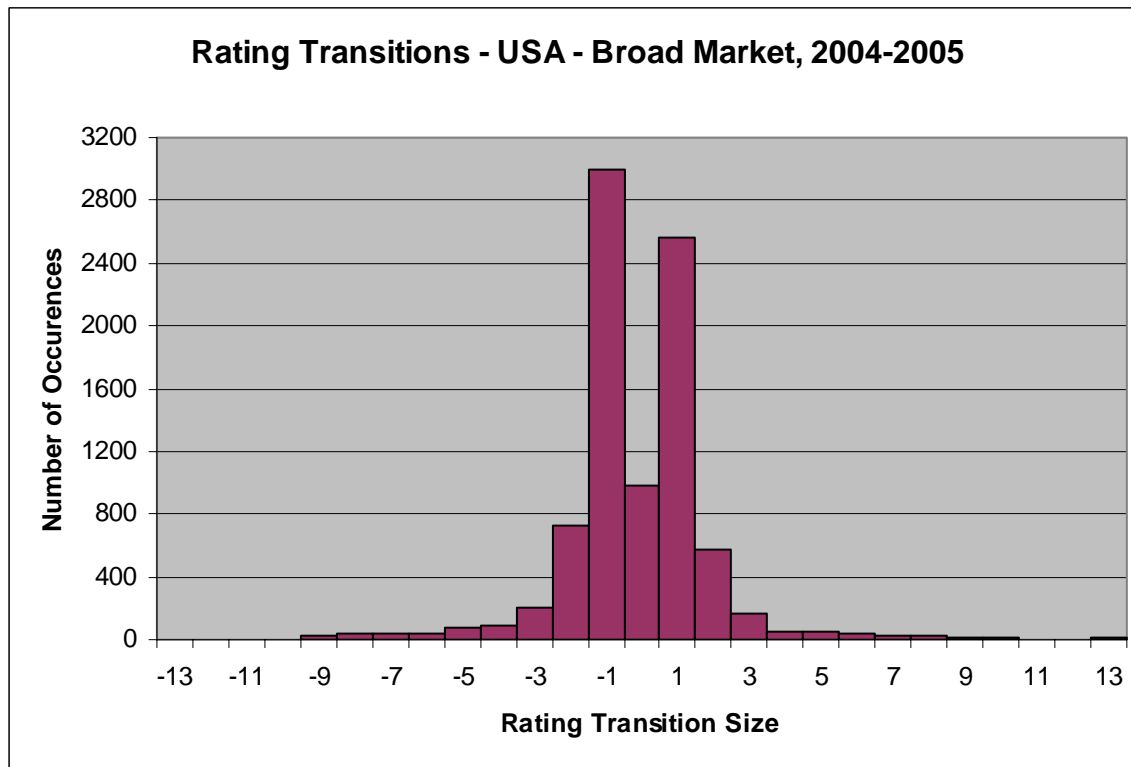
	DBRS	Fitch	Moody's	S&P	Other Agencies	Total
# Companies Covered	321	2100	3663	3515	-	-
Total Ratings Records	1016	5098	13636	12246	3832	35828
Other/Not useful	504	2092	3311	3809	-	13548
Useful	512	3006	10325	8437	-	22280
Initiations	353	545	1674	1043	-	3615
Upgrades	20	634	1646	1219	-	3519
Downgrades	36	550	1790	1854	-	4230
Withdrawals	6	289	2104	820	-	3219
No Change	97	988	3111	3501	-	7697
Creditwatch upgrade	12	490	1654	1526	-	3682
Creditwatch unchanged	41	38	85	194	-	358
Creditwatch downgrade	44	460	1372	1781	-	3657

Table 31: Comparable data for US All Corporates

	DBRS	Fitch	Moody's	S&P	Total
Upgrades	20	634	1646	1043	3343
Downgrades	36	550	1790	1854	4230
Creditwatch upgrade	12	490	1654	1526	3682
Creditwatch downgrade	44	460	1372	1781	3657

A summary of all rating transitions looks as follows:

Figure 4: The size of rating transitions in US for all Corporates:



The largest grouping is a one notch downgrade. A one notch upgrade is the next most common transition.

Table 32: Number of Ratings Transitions by Type for All US Corporates:

	DBRS	Fitch	Moody's	S&P	Total
<i>I / Upgrade</i>	12	328	455	446	1241
<i>I / Downgrade</i>	26	328	387	582	1323
<i>I / CW upgrade</i>	6	295	604	673	1578
<i>I / CW downgrade</i>	37	349	623	1022	2031
<i>S / Upgrade</i>	6	224	1036	645	1911
<i>S / Downgrade</i>	6	172	1277	1145	2600
<i>S / CW upgrade</i>	6	195	1050	853	2104
<i>S / CW downgrade</i>	7	111	749	759	1626
<i>I → S Downgrade</i>	4	50	126	128	307
<i>S → I Upgrade</i>	2	82	155	128	367

A summary of the number of ratings that lead or lag those from other companies is listed in table 33. Note that this was done for both a 92 day and a 31 day “window”.

Table 33: Lead or Lag versus other rating Agencies for All US Corporates:

		Fitch				Moody's				S & P			
		Upgrade		Downgrade		Upgrade		Downgrade		Upgrade		Downgrade	
		92d	31d	92d	31d	92d	31d	92d	31d	92d	31d	92d	31d
	DBRS												
#Leading		6	6	13	8	0	0	39	35	12	8	12	8
#Same		0	0	5	5	0	0	6	6	2	2	2	2
#Lagging		9	9	18	12	8	8	21	13	21	2	21	12
Mean		-2	-2	8	-1	8	8	-5	-8	10	-4	11	0
Median		1	1	9	0	9	9	-7	-15	-5	-5	11	4
	Fitch												
#Leading						144	100	169	100	82	60	143	77
#Same						21	21	61	61	38	38	73	70
#Lagging						140	82	173	84	57	42	167	107
Mean						-1	-1	0	-1	-3	-2	-1	0
Median						0	0	0	0	0	0	0	0
	Moody's												
#Leading										211	127	445	229
#Same										51	51	160	148
#Lagging										274	182	603	391
Mean										1	1	0	1
Median										1	1	0	1

Looking at aggregating timing for each agency's for upgrades (lead/lag versus other agencies for average of median and mean):

Table 34: Summary of Leading versus Lagging Upgrades for All US Corporates

Agency	Upgrade Lead/Lag	Downgrade Lead / Lag
DBRS	0.5 / 2.5	1 / 2
Fitch	3 / 0	1.5 / 1.5
Moody's	1 / 2	0.5 / 2.5
S&P	1.5 / 1.5	3 / 0
Timeliness Order:	Fitch S&P Moody's DBRS	S&P Fitch DBRS Moody's

Table 35: Summary of Upgrades and downgrades and the order of Rating Agency timeliness by industry for all US Corporates

Category	Upgrades				Gap Size (days)	Total # Ratings	Downgrades				Gap Size	Total # Ratings
	First	Second	Third	4th			First	Second	Third	4th		
#N/A												
Advertising							S&P	Moody's			5	10
Aerospace	Fitch	S&P	Moody's		12	8	Fitch	S&P	Moody's		35	8
Agriculture												
Beverages	Moody's	Fitch			13	1						
Chemical	Moody's	S&P	Fitch		3	34	S&P	Fitch	Moody's		3	58
Clothing	S&P	Moody's	Fitch		22	8	Moody's	S&P			6	22
Commercial	S&P	Moody's	Fitch		15	18	S&P	Moody's	Fitch		7	40
Commodity	Moody's	Fitch	S&P		3	106	Fitch	Moody's	S&P		7	83
Construction	Fitch	Moody's	S&P		17	14	S&P	Moody's			1	16
Education												
Entertainment & Rec	Moody's	Fitch	S&P		9	13	S&P	Moody's	Fitch		16	37
Finance	Moody's	Fitch	S&P	DBRS	5	227	Moody's	S&P	Fitch	DBRS	9	147
Food	S&P	Moody's	Fitch		24	23	DBRS	S&P	Fitch	Moody's	7	60
Government												
Healthcare	S&P	Fitch	Moody's		21	39	Fitch	S&P	Moody's		4	116
Insurance	Fitch	Moody's	S&P		13	34	Fitch	S&P	Moody's	DBRS	4	77
Manufacturing	Fitch	S&P	Moody's		11	36	Fitch	DBRS	S&P	Moody's	7	265
Media	Fitch	Moody's	S&P		13	15	DBRS	S&P	Fitch	Moody's	24	81
Real Estate	Fitch	Moody's	S&P		8	23	Moody's	S&P	Fitch		14	29
Retail	Fitch	Moody's	S&P		23	41	S&P	Fitch	Moody's		2	155
Services	S&P	Moody's	Fitch		4	20	S&P	Moody's	Fitch		5	78
Technology	S&P	Moody's	Fitch		17	23	Fitch	Moody's	S&P		7	16
Telecom	Fitch	Moody's	DBRS	S&P	7	128	S&P	Fitch	Moody's	DBRS	9	111
Transport	S&P	Fitch	Moody's		9	34	S&P	Moody's	DBRS	Fitch	4	436
Utility	S&P	Fitch	Moody's		6	164	Moody's	S&P	Fitch		6	112

Appendix 4: Rating Equivalences

The different rating agencies each have their own series of credit rating levels. However, for long term corporate bond ratings, each uses a similar scale with 26 steps. In this study, we will use the following translation between ratings by different agencies:

Table 36: Rating Equivalences

Code	CBRS	DBRS	Fitch	Moody's	S&P
26	AAA	AAA	AAA	Aaa	AAA
25	AA+	AAH	AA+	Aa1	AA+
24	AA	AA	AA	Aa2	AA
23	AA-	AAL	AA-	Aa3	AA-
22	A+	AH	A+	A1	A+
21	A	A	A	A2	A
20	A-	AL	A-	A3	A-
19	BBB+	BBBH	BBB+	Baa1	BBB+
18	BBB	BBB	BBB	Baa2	BBB
17	BBB-	BBBL	BBB-	Baa3	BBB-
16	BB+	BBH	BB+	Ba1	BB+
15	BB	BB	BB	Ba2	BB
14	BB-	BBL	BB-	Ba3	BB-
13	B+	BH	B+	B1	B+
12	B	B	B	B2	B
11	B-	BL	B-	B3	B-
10	CCC+	CCCH	CCC+	Caa1	CCC+
9	CCC	CCC	CCC	Caa2	CCC
8	CCC-	CCCL	CCC-	Caa3	CCC-
7	CC+	CCH	CC+	Ca	CC+
6	CC	CC	CC	Ca	CC
5	CC-	CCL	CC-	Ca	CC-
4	C+	CH	C+	C	C+
3	C	C	C	C	C
2	C-	CL	C-	C	C-
1	D	D	D	D	D
0	NR	NR	NR	NR	NR
0	WR	WR	WR	WR	WR

Appendix 5: Rating Types

The data from Bloomberg included a number of different types of rating. For this particular study, we chose to only look at long term credit ratings. We also required meaningful amounts of data – at least two agencies and a statistically significant number of data points.

Table 37: Rating Types

Code	Name	Sufficient Data	CBRS	DBRS	Fitch	Moody's	S&P	We Will Use
1	Asset Backed Short Term	.	✓	✓	✓	✓	✓	
2	Bank Financial Strength	✓	.	.	.	✓	.	✓
3	Bank Loan Debt	.	.	.	✓	✓	.	
4	CC LT Foreign Bank Depst	.	.	.	.	✓	.
5	CC LT Foreign Curr Debt	.	.	.	.	✓	.
6	CC ST Foreign Curr Debt	.	.	.	.	.	.
7	Claims Paying ability	.	.	✓	.	.	.	
8	Commercial Paper	.	.	.	.	.	.
9	Corporate Credit	✓	✓	✓	.	.	.	✓
10	Cummulative Preferred	✓	✓	✓	.	✓	.	✓
11	Equity Linked	.	✓	✓	✓	✓	.	
12	FC Curr Issuer Rating	✓	.	.	.	✓	.	
13	Financial Strength	.	.	.	✓	.	✓	
14	Finl Strength Outlook	.	.	.	.	.	.
15	Foreign Currency LT Debt	.	.	✓	✓	✓	✓	
16	Foreign Currency ST Debt	.	.	.	✓	✓	✓	
17	Foreign LT Bank Deposits	.	.	.	.	.	.
18	Government Issues	✓	✓	.	.	.	.
19	Insurance Finl Strength	.	.	.	.	✓	.
20	Insurance Paying Ability	.	.	.	.	.	.
21	Investment Strength	✓	✓	.	.	.	.	✓
22	Issuer Rating	✓	.	.	.	✓	.	✓
23	JR Subordinated Debt	.	✓	✓	✓	✓	.	
24	LC Curr Issuer Rating	.	.	.	.	✓	.
25	Local Currency LT Debt	.	.	✓	✓	✓	✓	
26	Local Currency ST Debt	.	.	.	.	✓	✓
27	Local LT Bank Deposits	.	.	.	.	✓	.
28	Long Term	✓	.	.	✓	.	.	✓
29	Long Term Bank Deposits	.	✓	✓	✓	✓	.	
30	Long Term Counterparty	✓	✓	.	.	✓	.	✓
31	Long Term Issuer Credit	.	.	.	.	.	.
32	Long Term Outlook	✓	.	.	.	.	✓
33	LT Credit Outlook	.	.	.	.	.	✓
34	LT Foreign Crncy Outlook	✓	.	.	.	.	✓
35	LT Foreign Issuer Credit	.	.	.	.	.	✓
36	LT Local Crncy Outlook	✓	.	.	.	.	✓
37	LT Local Issuer Credit	.	.	.	.	.	✓

38	Mortgage Debt	.	.	.	.	.	.	.
39	Non-Cumm. Preferred	✓	✓	✓	✓	✓	✓	✓
40	Outlook	.	.	✓	✓	✓	✓	.
41	Preference Stock	.	.	✓	.	✓	.	.
42	Preferred	✓	✓	✓	.	.	.	✓
43	Preferred Stock	.	✓	✓	✓	✓	.	.
44	Senior Debt	✓	.	.	.	.	.	✓
45	Senior Implied Issuer	✓	.	.	.	✓	.	✓
46	Senior Secured Debt	✓	✓	✓	✓	✓	✓	✓
47	Senior Subordinate	✓	✓	✓	✓	✓	.	✓
48	Senior Unsecured Debt	✓	✓	✓	✓	✓	.	✓
49	Short Term	.	✓	✓	✓	✓	.	.
50	Short Term Issuer Credit	.	.	.	.	.	✓	.
51	Short Term Outlook	.	.	.	.	.	.	.
52	ST Foreign Issuer Credit	✓	.	.	.	.	✓	.
53	ST Local Issuer Credit	✓	.	.	.	.	✓	.
54	Subordinated Debt	.	✓	✓	✓	✓	.	.

Appendix 6: Industry Assignments

To aggregate by industry, the following industry classifications were used. This industry allocation scheme was performed to achieve the aim of aggregating into a small number of distinct industry types. It does not exactly follow the North American Industry Classification System (NAICS) that is the standard one used for classifying industries within Canada, Mexico and the United States. There are two reasons for this: First, the data also includes Australia, and second, the aim was to achieve a small number of industry groups, and a custom grouping that follows the same philosophy as NAICS can arrive at the desired number of industry groupings.

Table 38: Industry groups

Code	Name	Category
1	Advertising Agencies	Advertising
1	Advertising Services	Advertising
2	Aerospace/Defense	Aerospace
2	Aerospace/Defense-Equip	Aerospace
3	Agricultural Operations	Agriculture
3	Pastoral&Agricultural	Agriculture
4	Beverages-Non-alcoholic	Beverages
4	Beverages-Wine/Spirits	Beverages
4	Brewery	Beverages
5	Agricultural Chemicals	Chemical
5	Chemicals-Diversified	Chemical
5	Chemicals-Fibers	Chemical
5	Chemicals-Other	Chemical
5	Chemicals-Plastics	Chemical
5	Chemicals-Specialty	Chemical
5	Coatings/Paint	Chemical
6	Apparel Manufacturers	Clothing
6	Athletic Footwear	Clothing
6	Athletic Equipment	Clothing
6	Intimate Apparel	Clothing
6	Footwear&Related Apparel	Clothing
7	B2B/E-Commerce	Commercial
7	Commercial Services	Commercial
7	Distribution/Wholesale	Commercial
7	Divers Oper/Commer Serv	Commercial
7	Diversified Operations	Commercial
7	Funeral Serv&Rel Items	Commercial
7	Import/Export	Commercial
7	Office Supplies&Forms	Commercial
7	Printing-Commercial	Commercial
7	Rental Auto/Equipment	Commercial
7	Storage/Warehousing	Commercial
8	Coal	Commodity
8	Diversified Minerals	Commodity
8	Fisheries	Commodity
8	Forestry	Commodity
8	Gold Mining	Commodity
8	Invest Comp - Resources	Commodity
8	Metal-Aluminum	Commodity
8	Metal-Copper	Commodity
8	Metal-Diversified	Commodity
8	Metal-Iron	Commodity
8	Mining Services	Commodity
8	Non-Ferrous Metals	Commodity
8	Oil Comp-Explor&Prodtn	Commodity
8	Oil Comp-Integrated	Commodity
8	Oil Field Mach&Equip	Commodity
8	Oil Refining&Marketing	Commodity
8	Oil&Gas Drilling	Commodity
8	Oil-Field Services	Commodity
8	Pipelines	Commodity
8	Platinum	Commodity
8	Precious Metals	Commodity
8	Quarrying	Commodity
8	Steel-Producers	Commodity
8	Sugar	Commodity
8	Wool	Commodity
9	Airport Develop/Maint	Construction
9	Bldg Prod-Air&Heating	Construction
9	Bldg Prod-Cement/Aggreg	Construction
9	Bldg Prod-Doors&Windows	Construction
9	Bldg Prod-Light Fixtures	Construction
9	Bldg Prod-Wood	Construction
9	Bldg&Construct Prod-Misc	Construction
9	Bldg-Mobil Home/Mfd Hous	Construction
9	Bldg-Residential/Commer	Construction
9	Building&Construct-Misc	Construction
9	Building-Heavy Construct	Construction
9	Building-Maint&Service	Construction
10	Schools-Day Care	Education
11	Casino Hotels	Entertainment & Rec
11	Casino Services	Entertainment & Rec
11	Cruise Lines	Entertainment & Rec
11	Gambling (Non-Hotel)	Entertainment & Rec
11	Golf	Entertainment & Rec
11	Leisure&Rec Products	Entertainment & Rec
11	Music	Entertainment & Rec
11	Night Clubs	Entertainment & Rec
11	Professional Sports	Entertainment & Rec
11	Racetracks	Entertainment & Rec
11	Recreational Centers	Entertainment & Rec
11	Resorts/Theme Parks	Entertainment & Rec
11	Theaters	Entertainment & Rec
12	Building Societies	Finance
12	Closed-end Funds	Finance
12	Commer Banks Non-US	Finance
12	Commer Banks-Central US	Finance
12	Commer Banks-Eastern US	Finance
12	Commer Banks-Southern US	Finance
12	Commer Banks-Western US	Finance
12	Commercial Serv-Finance	Finance
12	Cooperative Banks	Finance
12	Diversified Finan Serv	Finance
12	Export/Import Bank	Finance
12	Fiduciary Banks	Finance

12	Finance-Auto Loans	Finance	15	Disposable Medical Prod	Healthcare
12	Finance-Commercial	Finance	15	Drug Delivery Systems	Healthcare
12	Finance-Consumer Loans	Finance	15	Health Care Cost Contain	Healthcare
12	Finance-Credit Card	Finance	15	Hospital Beds/Equipment	Healthcare
12	Finance-Invest Bnkr/Brkr	Finance	15	Feminine Health Care Prd	Healthcare
12	Finance-Investment Fund	Finance	15	Medical Instruments	Healthcare
12	Finance-Leasing Compan	Finance	15	Medical Labs&Testing Srv	Healthcare
12	Finance-Mtge Loan/Banker	Finance	15	Medical Products	Healthcare
12	Finance-Other Services	Finance	15	Medical-Biomedical/Gene	Healthcare
12	Internet Financial Svcs	Finance	15	Medical-Drugs	Healthcare
12	Invest Mgmt/Advis Serv	Finance	15	Medical-Generic Drugs	Healthcare
12	Investment Companies	Finance	15	Medical-HMO	Healthcare
12	Money Center Banks	Finance	15	Medical-Hospitals	Healthcare
12	Mortgage Banks	Finance	15	Medical-Nursing Homes	Healthcare
12	Regional Bank	Finance	15	Medical-Outptnt/Home Med	Healthcare
12	Regional Banks-Non US	Finance	15	Medical-Whsle Drug Dist	Healthcare
12	S&L/Thrfts-Central US	Finance	15	MRI/Medical Diag Imaging	Healthcare
12	S&L/Thrfts-Eastern US	Finance	15	Optical Supplies	Healthcare
12	S&L/Thrfts-Southern US	Finance	15	Pharmacy Services	Healthcare
12	S&L/Thrfts-Western US	Finance	15	Phys Practice Mgmt	Healthcare
12	Special Purpose Banks	Finance	15	Phys Therapy/Rehab Cntrs	Healthcare
12	Special Purpose Entity	Finance	15	Respiratory Products	Healthcare
12	Specified Purpose Acquis	Finance	15	Retirement/Aged Care	Healthcare
12	Super-Regional Banks-US	Finance	15	Therapeutics	Healthcare
12	Supranational Bank	Finance	15	Veterinary Diagnostics	Healthcare
12	Venture Capital	Finance	15	Vitamins&Nutrition Prod	Healthcare
13	Food-Baking	Food	16	Financial Guarantee Ins	Insurance
13	Food-Canned	Food	16	Insurance Brokers	Insurance
13	Food-Catering	Food	16	Life/Health Insurance	Insurance
13	Food-Confectionery	Food	16	Multi-line Insurance	Insurance
13	Food-Dairy Products	Food	16	Mutual Insurance	Insurance
13	Food-Meat Products	Food	16	Property/Casualty Ins	Insurance
13	Food-Misc/Diversified	Food	16	Reinsurance	Insurance
13	Food-Retail	Food	17	Advanced Materials/Prd	Manufacturing
13	Food-Wholesale/Distrib	Food	17	Appliances	Manufacturing
13	Poultry	Food	17	Audio/Video Products	Manufacturing
14	Municipal-City	Government	17	Batteries/Battery Sys	Manufacturing
14	Municipal-County	Government	17	Ceramic Products	Manufacturing
14	Municipal-Education	Government	17	Consumer Products-Misc	Manufacturing
14	Municipal-Local Auth	Government	17	Containers-Metal/Glass	Manufacturing
14	Public Thoroughfares	Government	17	Containers-Paper/Plastic	Manufacturing
14	Regional Agencies	Government	17	Diagnostic Equipment	Manufacturing
14	Regional Authority	Government	17	Diversified Manufact Op	Manufacturing
14	Schools	Government	17	Electronic Connectors	Manufacturing
14	Sovereign	Government	17	Engines-Internal Combust	Manufacturing
14	Sovereign Agency	Government	17	Filtration/Separat Prod	Manufacturing
15	Cosmetics&Toiletries	Healthcare	17	Garden Products	Manufacturing
15	Dental Supplies&Equip	Healthcare	17	Home Furnishings	Manufacturing
15	Diagnostic Kits	Healthcare	17	Home Decoration Products	Manufacturing
15	Dialysis Centers	Healthcare	17	Housewares	Manufacturing

17	Industrial Gases	Manufacturing
17	Mach Tools&Rel Products	Manufacturing
17	Machinery-Constr&Mining	Manufacturing
17	Machinery-Electrical	Manufacturing
17	Machinery-Farm	Manufacturing
17	Machinery-General Indust	Manufacturing
17	Machinery-Machinery Handl	Manufacturing
17	Machinery-Material Handl	Manufacturing
17	Machinery-Pumps	Manufacturing
17	Metal Processors&Fabrica	Manufacturing
17	Metal Products-Fasteners	Manufacturing
17	Miscellaneous Manufactur	Manufacturing
17	Office Furnishings-Orig	Manufacturing
17	Optical Recognition Equi	Manufacturing
17	Paper&Related Products	Manufacturing
17	Photo Equipment&Supplies	Manufacturing
17	Rubber/Plastic Products	Manufacturing
17	Rubber-Tires	Manufacturing
17	Soap&Cleaning Prepar	Manufacturing
17	Shipbuilding	Manufacturing
17	Steel Pipe&Tube	Manufacturing
17	Steel-Specialty	Manufacturing
17	Textile-Apparel	Manufacturing
17	Textile-Home Furnishings	Manufacturing
17	Textile-Products	Manufacturing
17	Tobacco	Manufacturing
17	Tools-Hand Held	Manufacturing
17	Toys	Manufacturing
17	Wire&Cable Products	Manufacturing
18	Broadcast Serv/Program	Media
18	Cable TV	Media
18	Industr Audio&Video Prod	Media
18	Internet Content-Info/Ne	Media
18	Motion Pictures&Services	Media
18	Multimedia	Media
18	Publishing-Books	Media
18	Publishing-Newspapers	Media
18	Publishing-Periodicals	Media
18	Radio	Media
18	Television	Media
19	Hotels&Motels	Real Estate
19	Property Trust	Real Estate
19	Real Estate Mgmt/Servic	Real Estate
19	Real Estate Oper/Develop	Real Estate
19	REITS-Apartments	Real Estate
19	REITS-Diversified	Real Estate
19	REITS-Health Care	Real Estate
19	REITS-Hotels	Real Estate
19	REITS-Manufactured Homes	Real Estate
19	REITS-Mortgage	Real Estate
19	REITS-Office Property	Real Estate
19	REITS-Regional Malls	Real Estate
19	REITS-Shopping Centers	Real Estate
19	REITS-Single Tenant	Real Estate
19	REITS-Storage	Real Estate
19	REITS-Warehouse/Industr	Real Estate
20	Retail-Apparel/Shoe	Retail
20	Retail-Arts&Crafts	Retail
20	Retail-Auto Parts	Retail
20	Retail-Automobile	Retail
20	Retail-Bedding	Retail
20	Retail-Bookstore	Retail
20	Retail-Building Products	Retail
20	Retail-Catalog Shopping	Retail
20	Retail-Computer Equip	Retail
20	Retail-Consumer Electron	Retail
20	Retail-Convenience Store	Retail
20	Retail-Discount	Retail
20	Retail-Drug Store	Retail
20	Retail-Fabric Store	Retail
20	Retail-Home Furnishings	Retail
20	Retail-Jewelry	Retail
20	Retail-Leisure Products	Retail
20	Retail-Mail Order	Retail
20	Retail-Major Dept Store	Retail
20	Retail-Misc/Diversified	Retail
20	Retail-Music Store	Retail
20	Retail-Office Supplies	Retail
20	Retail-Pet Food&Supplies	Retail
20	Retail-Petroleum Prod	Retail
20	Retail-Propane Distrib	Retail
20	Retail-Regnl Dept Store	Retail
20	Retail-Restaurants	Retail
20	Retail-Sporting Goods	Retail
20	Retail-Toy Store	Retail
20	Retail-Video Rental	Retail
20	Retail-Vision Serv Cntr	Retail
20	Retail-Vitamins/Nutr Sup	Retail
21	Advertising Sales	Services
21	Auction House/Art Dealer	Services
21	Collectibles	Services
21	Computer Services	Services
21	Consulting Services	Services
21	Direct Marketing	Services
21	E-Marketing/Info	Services
21	Engineering/R&D Services	Services
21	E-Services/Consulting	Services
21	Human Resources	Services
21	Internet Security	Services
21	Lottery Services	Services

21	Marine Services	Services	22	X-Ray Equipment	Technology
21	Multilevel Dir Selling	Services	23	Cellular Telecom	Telecom
21	Non-Profit Charity	Services	23	Satellite Telecom	Telecom
21	Private Corrections	Services	23	Telecom Eq Fiber Optics	Telecom
21	Protection-Safety	Services	23	Telecom Services	Telecom
21	Security Services	Services	23	Telecommunication Equip	Telecom
21	Seismic Data Collection	Services	23	Telephone-Integrated	Telecom
21	Traffic Management Sys	Services	23	Wireless Equipment	Telecom
21	Travel Services	Services	24	Airlines	Transport
22	Agricultural Biotech	Technology	24	Auto Repair Centers	Transport
22	Applications Software	Technology	24	Auto/Trk Prts&Equip-Orig	Transport
22	Circuit Boards	Technology	24	Auto/Trk Prts&Equip-Repl	Transport
22	Communications Software	Technology	24	Auto-Cars/Light Trucks	Transport
22	Computer Aided Design	Technology	24	Auto-Med&Heavy Duty Trks	Transport
22	Computer Software	Technology	24	Electronic Parts Distrib	Transport
22	Computers	Technology	24	Motorcycle/Motor Scooter	Transport
22	Computers-Integrated Sys	Technology	24	Transport-Air Freight	Transport
22	Computers-Memory Devices	Technology	24	Transport-Equip&Leasng	Transport
22	Computers-Peripher Equip	Technology	24	Transport-Marine	Transport
22	Data Processing/Mgmt	Technology	24	Transport-Rail	Transport
22	Decision Support Softwar	Technology	24	Transport-Services	Transport
22	Drug Detection Systems	Technology	24	Transport-Truck	Transport
22	E-Commerce/Products	Technology	24	Whsing&Harbor Trans Serv	Transport
22	E-Commerce/Services	Technology	0	Inactive/Unknown	Unknown
22	Educational Software	Technology	0	N.A.	Unknown
22	Electric Products-Misc	Technology	0	N/A	Unknown
22	Electronic Compo-Misc	Technology	25	Air Pollution Control Eq	Utility
22	Electronic Compo-Semicon	Technology	25	Alternative Waste Tech	Utility
22	Electronic Measur Instr	Technology	25	Electric-Distribution	Utility
22	Electronics-Military	Technology	25	Electric-Generation	Utility
22	Enterprise Software/Serv	Technology	25	Electric-Integrated	Utility
22	Entertainment Software	Technology	25	Electric-Transmission	Utility
22	Industrial Automat/Robot	Technology	25	Energy-Alternate Sources	Utility
22	Instruments-Controls	Technology	25	Gas-Distribution	Utility
22	Instruments-Scientific	Technology	25	Gas-Transportation	Utility
22	Internet Applic Sftwr	Technology	25	Hazardous Waste Disposal	Utility
22	Internet Infrastr Sftwr	Technology	25	Independ Power Producer	Utility
22	Medical Information Sys	Technology	25	Non-hazardous Waste Disp	Utility
22	Networking Products	Technology	25	Pollution Control	Utility
22	Office Automation&Equip	Technology	25	Power Conv/Supply Equip	Utility
22	Research&Development	Technology	25	Recycling	Utility
22	Semicon Compo-Intg Circu	Technology	25	Remediation Services	Utility
22	Semiconductor Equipment	Technology	25	Utilities	Utility
22	Transactional Software	Technology	25	Water	Utility
22	Web Portals/ISP	Technology	25	Water Treatment Systems	Utility

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Moody's

Fitch Ratings

Websites: www.standardandpoors.com

www.moodys.com

www.fitchratings.com

www.dbrs.com

www.ambest.com

Software Credits:

All code was custom written for this project, with the help of the following standard

libraries:

Java 1.5.0_06	Standard Java language from Sun Microsystems
Netbeans IDE 5.0	Sun's Java Integrated Development Environment
JExcelApi (JXL)	Java interface library to Excel, allowing reading and writing from Excel spreadsheets. Used under LGPL (Lesser General Public License)

PREMIA IN THE INDIAN ADR MARKET
An Analysis of Trends and Causes

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April 3, 2006

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I INTRODUCTION

Indian Companies' ADRs/GDRs Premiums, Discounts for July 5
2005-07-04 18:30 (New York)

July 5 (Bloomberg) -- The following table of American and global depository receipts of Indian companies compares their closing prices with the most recent closes in local trading. Price adjustments are based on a currency value of 43.55 rupee per dollar, along with the number of shares per ADR or GDR.

Company	ADR/GDR Ticker	Close	% Chg	Local Equiv.	Local Close	ADR/GDR % Prem	Shares/ ADR/GDR
Dr Reddy's	RDY	17.10	+1.06	744.62	775.90	-4.03	1.0
HDFC Bank	HDB	47.89	+2.97	695.12	631.70	+10.04	3.0
ICICI Bank	IBN	22.00	+0.69	479.00	429.15	+11.61	2.0
Infosys Technologies	INFY	76.47	-1.46	3,329.89	2,394.85	+39.04	1.0
MTNL	MTE	6.58	+3.95	143.26	121.85	+17.57	2.0
Ranbaxy Labs	RBXD	24.70	-0.04	1,075.56	1,078.40	-0.26	1.0
Reliance Industries	RIGD	29.53	+1.48	642.94	643.85	-0.14	2.0
Satyam Computers	SAY	26.40	+1.54	574.79	511.00	+12.48	2.0
State Bank of India	SBID	41.75	+0.60	909.00	710.60	+27.92	2.0
Tata Motors	TTM	9.70	+0.21	422.39	426.75	-1.02	1.0
Wipro	WIT	20.58	-1.34	896.16	744.00	+20.45	1.0

Companies are listed based on a market capitalization of more than \$1 billion, average daily trading of at least 1,000 ADRs or GDRs during the last three months, and a history of trading at least four days a week.

--New Delhi newsroom, 91-11-5179-2020

11 Indian companies have their ADRs listed on the stock exchanges in the US.

The above article provides a list of the companies with ADRs listed in US, along with data regarding ADR prices in US, the underlying equity share prices in the Indian stock markets and the premium at which these ADRs are trading in the US stock markets vis-à-vis price of the underlying equity in Indian stock market.

Exhibit I a

Company	Listing in US stock Markets
Infosys Technologies	Mar-99
Wipro	Oct-00
ICICI Bank	Mar-00
Satyam Computers	May-01
HDFC Bank	Jul-01
MTNL	Jan-98

We observe that in case of Infosys, Wipro, State Bank of India and MTNL the premium is substantial ($> 15\%$) while in the case ICICI Bank, HDFC Bank and Satyam Computers, the ADR premium is a material figure. What is pertinent is the fact that these premiums are not a one time aberration but have been in existence for a long time (in case of Infosys, the premium of $>30\%$ can be traced back to its listing in the US in March 1999). Most of the ADRs have been listed in the US for some time but continue to trade at premiums. Exhibit I a indicates when some of the Indian companies were listed in the US.

If we accept the notion of efficiency of stock markets (no matter to what degree), it seems improbable that such significant premiums can be allowed to exist for long by arbitrageurs. The very fact that this data is being reported daily on Bloomberg means that the ADR premiums are public knowledge.

Exhibit I b

Economy	# of stocks	Date	Average ADR premium	Maximum	Minimum
India	11	5-Jul-05	12.15%	39.04%	-4.03%
Germany	18	5-Jul-05	0.26%	0.96%	-1.58%
China (listed Hong Kong)*	15	5-Jul-05	0.15%	2.44%	-1.76%
South Korea	11	6-Jul-05	1.32%	6.22%	-1.41%
Hong Kong	17	4-Jul-05	-0.14%	2.22%	-2.59%
Taiwan	13	4-Jul-05	1.95%	12.51%	-2.70%
Singapore	4	5-Jul-05	-0.14%	1.35%	-1.77%
Australia	19	4-Jul-05	0.41%	3.12%	-1.35%
UK	48	5-Jul-05	1.23%	4.48%	-5.35%

*excludes Yanzhou Coal, a significant outlier

To check whether this phenomenon is peculiar to Indian ADRs only, we analyzed the premiums at which ADRs of other countries trade in the US. We included ADRs from Germany, South Korea, China (shares listed in Hong Kong), Taiwan, Hong Kong, Singapore, Australia and UK in our sample. The results are presented in Exhibit I b.

We observe that Indian ADRs not only trade at a relatively higher premium compared to other ADRs, but also at a significant premium in absolute terms. The highest ADR premium for India is 39% (Infosys). In fact, apart from Taiwan, ADRs of countries other than India trade at negligible premiums. This makes the phenomenon of Indian ADR premiums remarkable.

The phenomenon of existence of ADR premiums can be compared to at least 3 other cases in contemporary finance, viz.

- *Royal Dutch/ Shell group conundrum* – Royal Dutch Shell group was a joint venture between Royal Dutch Petroleum Company (RDP) of the Netherlands and the Shell Transport and Trading Company plc (STT) of UK in the ratio of 60:40. Even though RDP and STT had rights to cash flows of Royal Dutch Shell in 60:40 ratio (and no other assets), their share prices were never in 60:40 ratio i.e. cash flows with similar risk-return characteristics were valued differently by same set of investors.
- *The closed end mutual fund puzzle* – Closed end funds trade at a discount to their NAVs. This is a puzzle since prima facie there is no reason why the market price for a closed-end fund is usually different from the current value of the portfolio held by the fund, or its net asset value (NAV). In this regard, we would take a look at the closed end India Fund (IFN), its price versus NAV in Section IV (Investigating ADR premiums).¹
- *3Com/Palm case* – In September 1999, 3Com announced its intentions to carve out Palm Computing, and subsequently spin it off. When Palm started traded publicly in March 2000, the market cap of Palm was \$53.4 billion, much higher than 3Com’s \$28.5 billion value, even though 3Com still owned 94% of Palm and also other assets. Based on 3Com’s 94% ownership, 3Com’s stake in Palm was worth approximately \$50 billion, giving substantial negative value to 3Com’s other assets, an almost perfect violation of the law of one price.²

1 “Asymmetric Information and the Closed-End Fund Puzzle” - Oh & Ross 1993
 “Investor Sentiment and the Closed-End Fund Puzzle” – Lee, Shleifer & Thaler 1990

2 “The Valuation and Market Rationality of Internet Stock Prices” – Ofek & Richardson, 2001
 “The Parent Company Puzzle – When is the whole less than one of its parts?” – Cornell & Liu, 2000

Research Objectives

This research aims to analyze the continued existence of premiums on Indian ADRs over the last 3-4 years and investigate the reasons for the same. If any security, carrying the same risk-reward characteristics, trades at two different prices in different markets, the arbitrageurs will soon step in to take advantage of the situation, till the time the security trades at one price, across all markets. That has not happened in the case of these Indian ADRs.

The paper looks at the following possible sources of the premium:

1. *Legal / Institutional*: Laws regarding capital account transactions in India, including the rules and exact procedures for investment by foreign nationals in Indian securities market and repatriation of those funds. If the foreign nationals have limited or no access to Indian stock markets, it is probable that ADRs in the US markets are valued under different assumptions compared to the valuation of underlying equity in the Indian stock markets (which is, to an extent, same as saying that the two securities have two different bodies of investors, with different expectations and assumptions).
2. *Liquidity*: Measuring the relative liquidity of ADRs in the US to the underlying stock in India, which may be a partial cause of the premiums. In case the liquidity of

ADRs is higher, the ADRS would carry certain liquidity premium vis-à-vis equity listed on the Indian stock markets.

3. *Risk preferences:* The investors may assign different risk-reward characteristics to Indian equities and Indian ADRs on account of currency risk, repatriation risk or risk of procedural delays in security transactions in India. This may also result in a premium on ADRs.

The remainder of this paper is divided into three sections. Section II focuses on analyzing the ADR premiums, their trends and correlations with concerned stock markets and securities. Section III attempts to delineate the differences between institutional frameworks that govern capital account transactions in India and three vibrant economies in world markets – Germany, Hong Kong and South Korea. We attempt to analyze whether these differences may be causing ADR premiums. Section IV covers an investigation of the likely causes of ADR premiums.

Section V summarizes our findings and analyses.

II ANALYSIS OF ADR PREMIUMS OVER TIME

This section divided into two parts. Part A is aimed at analyzing the trends in ADR premiums and the movement in ADR premium levels in recent years. Part B explores the relationship between returns on ADRs with the returns on the underlying equity, and with the returns on broad market indices (viz S&P 500 and the Bombay Sensex in India). The analyses in this section would help us put the issue of ADR premiums in perspective, against a backdrop of long terms trends in ADR premiums, and the relationship of ADRs with underlying equity and the US and Indian stock markets.

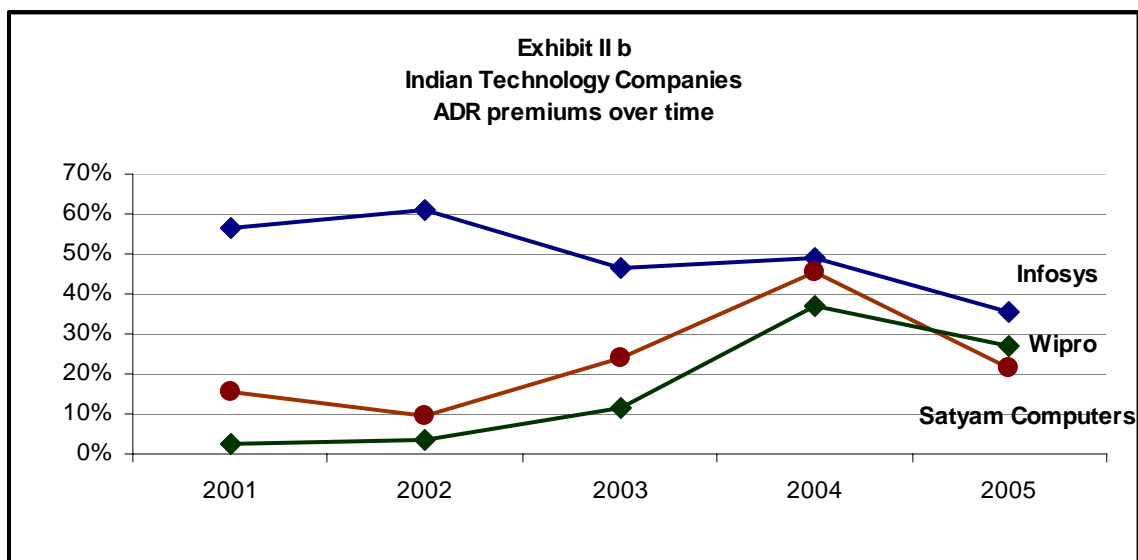
A. Trend Analysis of the ADR Premiums

We have analyzed the ADR premiums trend over a period of last 5 years. The results are detailed in Exhibit II a.

Graphically, we present Exhibit II b - d, the ADRs with relatively the highest premiums over time among Indian ADRs.

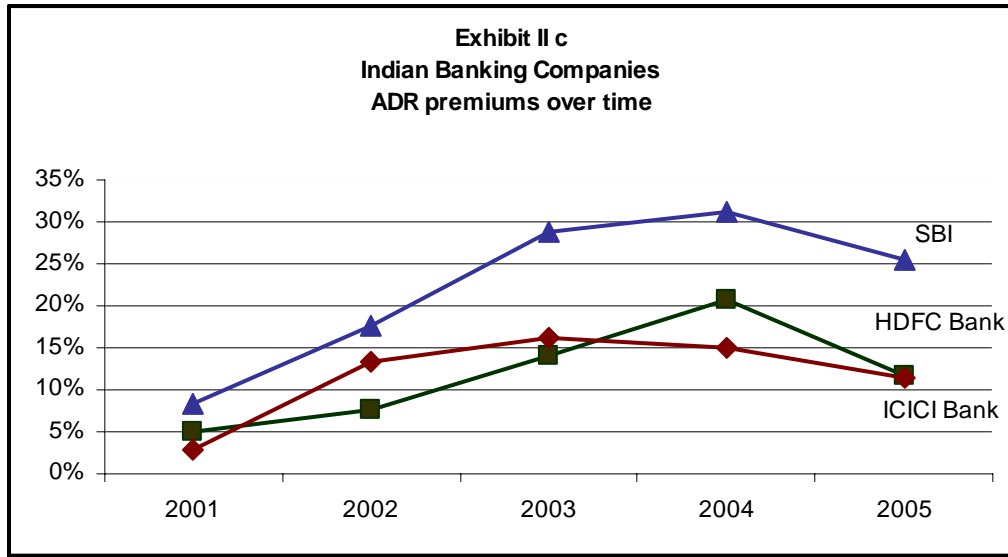
Exhibit II a

ADR Stock	Ticker	2001	2002	2003	2004	2005	Average
Dr Reddy's	RDY	7%	2%	1%	3%	2%	3%
HDFC Bank	HDB	5%	8%	14%	21%	12%	12%
ICICI Bank	IBN	3%	13%	16%	15%	11%	12%
Infosys	INFY	57%	61%	46%	49%	36%	50%
MTNL	MTE	5%	1%	1%	21%	15%	9%
Ranbaxy Lab.	RBXD	13%	8%	9%	2%	1%	7%
Reliance Industries	RIGD	38%	38%	37%	43%	31%	37%
Satyam Computers	SAY	15%	10%	24%	45%	21%	23%
SBI	SBID	8%	18%	29%	31%	26%	22%
Tata Motors	TTM	0	0	0	1%	0%	0%
Wipro	WIT	2%	3%	12%	37%	27%	16%
Average		14%	15%	17%	24%	16%	17%

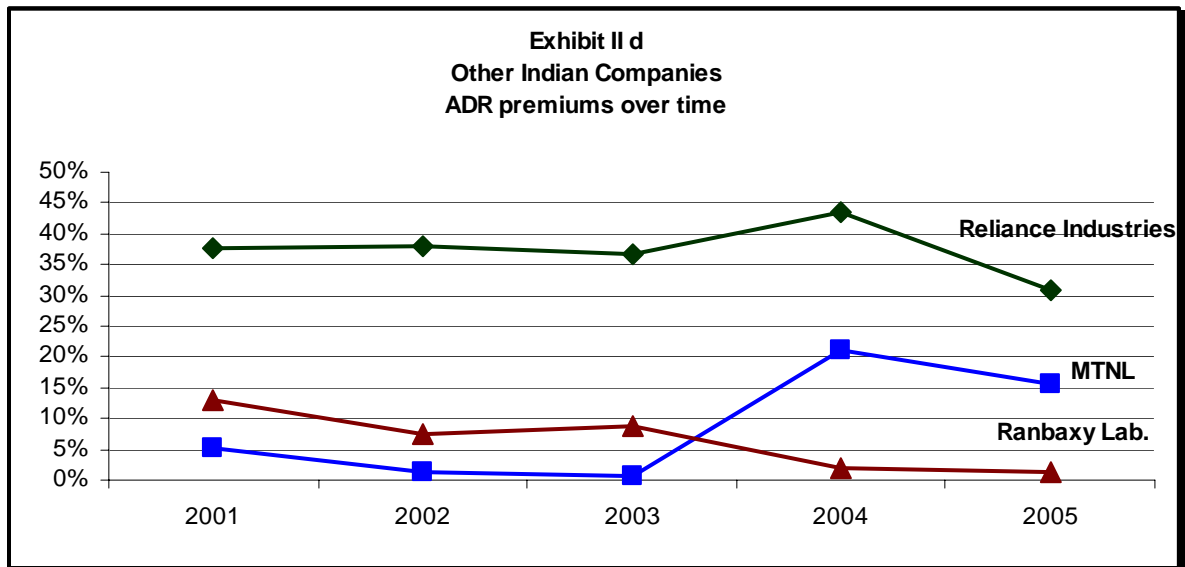


We observe that ADRs in information technology sectors have historically traded at premiums. We also observe that Infosys exhibits the highest premium among Indian ADRs (almost 60% in 2002), but the premium is trending down and is almost half of its 5 year high in 2005. In fact, currently the Infosys ADR premium is around 17%, which certainly is remarkable given the fact that it is a historic low. Wipro and Satyam Computers, in contrast, had low ADR premiums initially, peaked at 35%-45% in 2004

and trended down to over 20% in 2005. Currently, Wipro trades at 24% ADR premium while Satyam trades at 16% premium.



The banking sector of India has shown continued strength, and it is, therefore, no surprise that the bellwethers of Indian banking sector, State Bank of India (SBI), ICICI Bank and HDFC Bank, have shown continuous increase in ADR premiums till 2004. In 2005, however, premiums on all three ADRs has declined significantly. Currently, these banking sector ADRs trade at 13%-15% premiums.



Of the remaining ADRs, in our sample, Reliance Industries has maintained the most stable premium of 30-40% in last 5 years, but in 2006, the premium is down to <5%. While MTNL ADR premium declined to almost 0% by 2003, Ranbaxy's hovered around low teens and high single digits in 2001-03. In the last two years (i.e. 2004 & 2005) MTNL ADR premiums have shot up to over 15%, while Ranbaxy's declined precipitously to almost zero.¹ Two other ADRs in our sample, Dr Reddy's (Pharmaceuticals) and Tata Motors (Automobiles) have shown negligible premiums (<5%) for the period under study.

Across the board, however Indian ADRs have shown a decline in ADR premiums over the period 2001-2005. The simple average for 11 ADRs has declined from 2004 high of 24% to 16% in 2005 and was only 11% in February 2006.

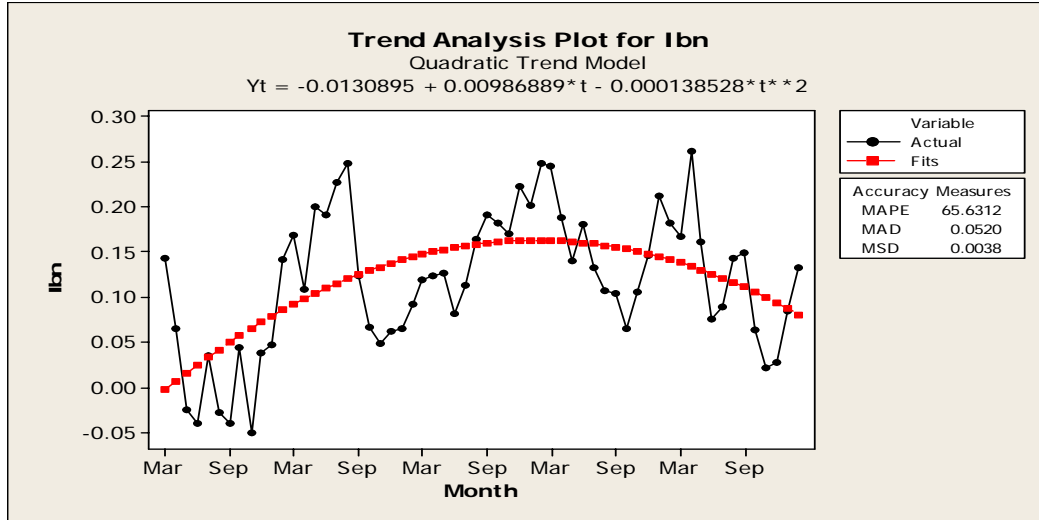
¹ MTNL and Ranbaxy recently had their GDRs converted to ADRs, so the data relates partly to GDRs and partly to ADRs. Reliance (RIGD) is a GDR.

A trend analysis of all 11 ADRs has been conducted. The results shown a clear downtrend in ADR premiums over time, which indicates that the cause of ADR premiums is somehow being removed, or corrected, if you will, over time.

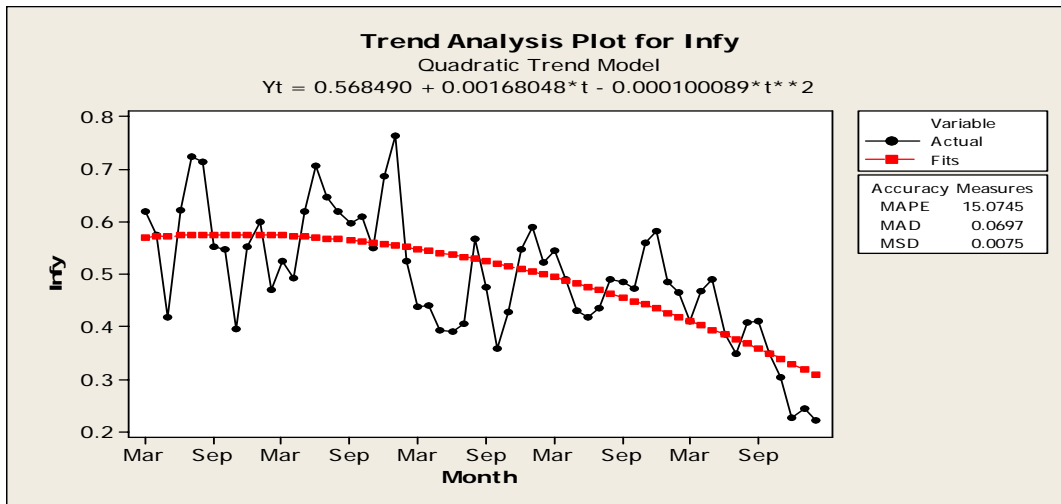
Trend Analysis of ADR premiums over 2001-2005

(Please refer to Appendix V for trend analysis of the entire sample of Indian ADRs)

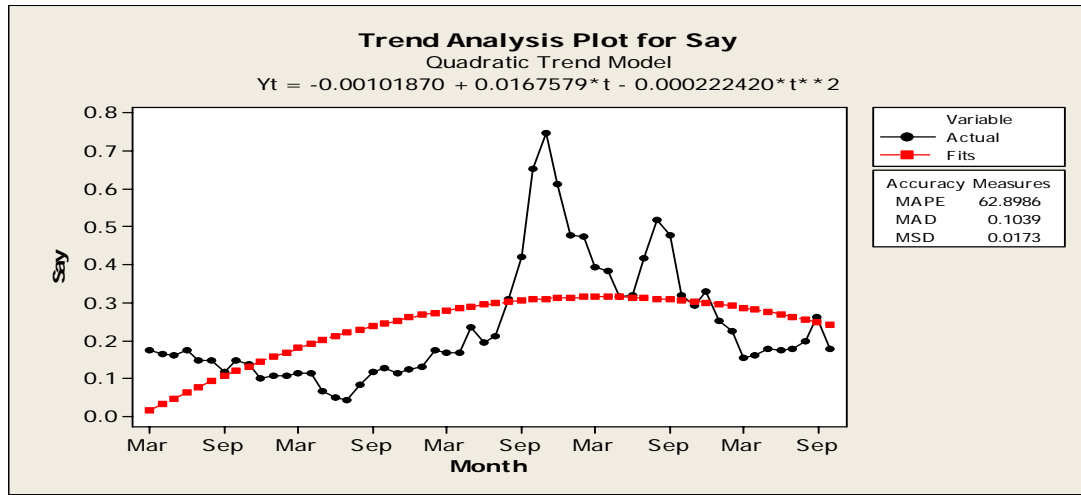
ICICI Bank (IBN)



Infosys Technologies (INFY)



Satyam Computers (SAY)



B. Risk – Return characteristics of ADRs

Although the ADRs are a derivative of underlying equity, yet there exists a significant difference in the ADR prices compared to the price of underlying equity (i.e. the ADR premium). We look to understand the movements of ADR prices, vis-à-vis the underlying equity, the S&P 500 (where the ADRs trade), and the Indian stock market i.e. the Bombay Sensex (where the underlying equity trade). Towards this end, we conduct a correlation and regression analysis of ADR returns versus underlying equity returns, S&P 500 returns and Sensex returns. This would, to some extent, explain the *movements* in ADR premiums over time, by exhibiting the impact of US stock market movements, Indian stock market movements, and underlying equity price changes, on the ADR premiums. In this way, it would help us understand the relative sensitivity of ADRs to US stock markets versus the Indian stock markets, which may cause some divergence in prices of ADR and the underlying equity (i.e. the ADR premiums)

To gain further insight into price movements of ADRs and Indian equity (which would to an extent, explain the movement in ADR premium), we conducted simple regression analyses of ADR returns, separately with Indian equity returns (adjusted for currency movements and ADR:Equity ratios), with S&P 500 Index returns and with Bombay Sensex index returns. This analysis has been conducted specifically for the period June 2004 to December 2005, when we have seen considerably decline in the ADR premiums.

Exhibit II e

ADR Name	T-Statistic versus			R2 (Correlation) with			P-value			Higher Correlation with	Correlation of less than 30% with underlying
	S&P 500	Sensex	Underlying Equity	S&P 500	Sensex	Underlying Equity	S&P 500	Sensex	Underlying Equity		
Dr Reddy's	5.67	7.79	12.68	7.5%	13.6%	29.5%	0.00%	0.00%	0.00%	Sensex	Yes
HDFC Bank	5.54	7.2	8.39	7.1%	11.9%	15.5%	0.00%	0.00%	0.00%	Sensex	Yes
ICICI Bank	7.68	7.22	9.2	12.9%	11.9%	18.0%	0.00%	0.00%	0.00%	S&P 500	Yes
Infosys Technologies	7.53	5.94	7.57	12.4%	8.4%	13.0%	0.00%	0.00%	0.00%	S&P 500	Yes
MTNL	4.28	4.34	9.6	4.4%	4.7%	19.3%	0.00%	0.00%	0.00%	Sensex	Yes
Ranbaxy Labs	0.67	7.66	24.92	0.1%	13.2%	62.2%	50.40%	0.00%	0.00%	Sensex	No
Reliance Industries	2.03	15.81	29.62	1.0%	39.2%	69.9%	4.30%	0.00%	0.00%	Sensex	No
Satyam Computers	8.33	6.07	8.24	14.8%	8.7%	15.0%	0.00%	0.00%	0.00%	S&P 500	Yes
State Bank of India	0.87	12.14	17.19	0.2%	27.6%	43.9%	38.70%	0.00%	0.00%	Sensex	No
Tata Motors	3.11	13.62	23.05	3.0%	38.0%	63.8%	0.20%	0.00%	0.00%	Sensex	No
Wipro	7.09	8.17	9.67	11.2%	14.8%	19.5%	0.00%	0.00%	0.00%	Sensex	Yes
Average	5.32	9.33	13.96	7.8%	19.3%	33.6%					
Bombay Sensex	1.21			0.4%			22.70%				

Exhibit II e contd.

ADR Name	Beta versus		
	S&P 500	Sensex	Underlying Equity
Dr Reddy's	0.67	0.59	0.48
HDFC Bank	0.81	0.67	0.44
ICICI Bank	1.16	0.72	0.45
Infosys Technologies	1.11	0.59	0.44
MTNL	0.74	0.49	0.46
Ranbaxy Labs	0.10	0.68	0.77
Reliance Industries	0.28	1.11	0.92
Satyam Computers	1.33	0.65	0.43
State Bank of India	0.12	0.95	0.62
Tata Motors	0.53	1.20	0.79
Wipro	1.10	0.82	0.49
Average	0.79	0.81	0.56
Bombay Sensex	0.10		

Exhibit II f

	Price as on		Change in S&P and ADR prices	Price as on		Adjusted for exchange rate		Change in Sensex and Indian Equity	Difference in Price change	ADR Premium		Δ ADR Premium
	28-May-04	31-Dec-05		28-May-04	31-Dec-05	28-May-04	31-Dec-05			28-May-04	31-Dec-05	
S&P 500	\$ 1,120.68	\$ 1,248.29	11%	Rs	Rs	45.465	45.195					
Sensex				4759.62	9397.93	104.69	207.94	99%	87%			
RDY	18.52	21.60	17%	887.55	978.50	19.52	21.65	11%	-6%	-5.1%	-0.2%	4.9%
HDB	28.32	50.90	80%	369.75	707.45	8.13	15.65	92%	12%	16.1%	8.4%	-7.7%
IBN	12.87	28.80	124%	246.35	584.70	5.42	12.94	139%	14%	18.8%	11.3%	-7.5%
INFY	41.38	80.86	95%	1,264.21	2,996.75	27.81	66.31	138%	42%	48.8%	21.9%	-26.8%
MTE	5.83	6.90	18%	111.70	144.20	2.46	3.19	30%	11%	18.6%	8.1%	-10.5%
RBXD	10.88	7.99	-27%	494.90	362.35	10.89	8.02	-26%	0%	-0.1%	-0.3%	-0.2%
RIGD	21.35	37.55	76%	331.57	684.34	7.29	15.14	108%	31%	46.4%	24.0%	-22.4%
SAY	19.54	36.59	87%	305.05	737.80	6.71	16.32	143%	55%	45.6%	12.1%	-33.5%
SBID	24.45	50.50	107%	484.85	907.45	10.66	20.08	88%	-19%	14.6%	25.8%	11.1%
TTM*	8.97	14.37	60%	403.35	653.00	8.87	14.45	63%	2%	1.1%	-0.5%	-1.7%
WIT	7.40	11.95	61%	250.75	463.45	5.52	10.25	86%	23%	34.2%	16.5%	-17.6%
Average			64%					79%	15%			-10%

* prices as on Sep 30, 2004 and Dec 31, 2005 due to lack of prior trading data

The data in Exhibit II e indicates that the ADR prices do not move in lock-step with the prices of Indian equity. This is substantiated by the regression analysis that we have conducted on the ADR returns versus Bombay Sensex, S&P 500 and the underlying equity returns. We find that ADRs, on average, exhibit a lower beta with the underlying equity (0.56) vis-à-vis the Sensex or S&P 500 (0.80).

This is a surprising result. As mentioned earlier, the ADR is a derivative of the underlying equity, with exactly similar risk- return characteristics as the underlying equity. Given this fact, we would expect a beta near to 1 for ADR returns versus returns on the underlying equity. However, the average beta of ADRs with the underlying equity is only 0.56, (much lower than the average ADR beta of 0.81 for Sensex and average ADR beta of 0.79 for S&P 500). Thus, not only we have a difference in valuations of ADRs and underlying equity (the ADR premiums), but we also have changes in ADR premiums over time (as evidenced by lower sensitivity of ADRs to underlying equity price movements). Therefore a low beta should indicate an increase in ADR premiums during a bear run in the Indian stock market and a decline in ADR premiums when the Indian stock market is on a bull run (for e.g. from June 2004 onwards).

This observation is substantiated in Exhibit II f, which gives us details of price movement in ADRs and Indian Equity over the period, June 2004 – December 2005.

In general, we observe a decline in ADR premiums over this period. All ADRs (except RDY and SBID) have shown decline in ADR premiums and the average decline

is around 10%. At the same time the S&P 500 appreciated 11% vis-à-vis 99% appreciation in the Bombay Sensex (Indian Stock Market), a difference of 87%. However, ADR prices on an average increased only 64%, versus an average 79% increase in the prices of underlying equity shares – reflecting a beta of < 1 with the underlying equity

It should be mentioned here that the correlation between the Bombay Sensex and S&P 500 is very low (0.4%) and the beta is quite insignificant (0.10). Given this data, it can be safely said that US stock markets and Indian stock markets are quite uncorrelated.

It is interesting to note that Satyam Computers, Infosys and ICICI Bank have higher correlations and betas with S&P 500 than with the Sensex, and a correlation of less than 30% (average 33.6%) with the underlying equity. Wipro also has a higher beta with S&P 500 than with the Sensex, and a correlation of less than 30% (average 33.6%) with the underlying equity. These stocks, thus, move more in tandem with US stock markets, than with Indian stock markets. Interestingly, average ADR premium for these stocks is 25%, much higher than the average ADR premium of 17%

Regression of ADR returns versus S&P 500 is significant in all cases, except MTNL, State Bank of India and Ranbaxy. The correlation of ADR returns with S&P500 is on an average 7.8% (quite low), but is relatively high for Infosys, Wipro, Satyam Computers and ICICI Bank. The regression of ADR returns with Bombay Sensex and the underlying equity is significant in all cases and the correlations of ADR returns with the

Bombay Sensex and the underlying equity are also higher than the S&P 500 (average 19.3% and 33.6%, respectively), which appears consistent with market facts (i.e. the ADR is a derivative of underlying Indian equity that trades in Indian stock market). At the same time, average ADR returns' correlation with underlying equity is higher than with Sensex – again a consistent result.

III ANALYSIS OF INSTITUTIONAL FRAMEWORK¹

In this section, we focus on laws regarding capital account transaction in India, including the rules and exact procedures for investment by foreign nationals in Indian securities market and repatriation of those funds. In order to understand whether these laws maybe the reason for ADR premiums, we have also investigated laws regarding capital account transactions in Hong Kong, Germany, and South Korea (whose ADRs do not carry any significant premiums at all – refer Section I)

Portfolio investment is relatively straightforward in India. Even retail investors can trade freely via a sub-account with any registered Foreign Institutional Investor (FII). We find that there are virtually no restrictions on portfolio investment in Germany, Hong Kong and South Korea, too. Repatriation of capital, profits and dividends is also free of any restrictions in India, Germany, Hong Kong and South Korea. As far as these factors are concerned, Indian capital markets have the same structure as developed capital markets (like Germany) and some vibrant emerging markets (like Hong Kong and South Korea).

Please refer Appendix I for details.

There is, however a crucial difference in ADR provisions of India and these countries. It is possible to convert ADRs into equity shares and conversely, equity shares into ADRs, without restrictions, in Germany, Hong Kong and South Korea. In India, the rules are different. The ADRs have only “limited two way fungibility”. What this implies

¹ Source: Economist Intelligence Unit, The Economist

is that ADRs can be freely converted to equity shares, but equity shares in India can be converted to ADRs only to the extent of past conversion of ADRs in that company into shares. This is technically called “headroom”. If no ADR has been converted back into equity shares, it implies that no investor can buy shares in India and convert those shares into ADRs. The implication of ‘headroom’ provision is that if ADRs trade at a premium, it is not possible to conduct an arbitrage (i.e. short ADR and go long the Indian equity), because Indian equity cannot be converted into ADR (to close out the short sale), unless head room is available.

As mentioned above, ‘headroom’ is required in an ADR issue to allow arbitrage to happen. From my discussions with professionals in investment management, it appears that all the headroom has expired long time back and so conversion of local shares to ADR through this route is not possible right now. However, it is difficult to obtain the accurate and comprehensive information about “headroom” available for different ADRs, in terms of either current or historical data.

In the absence of “headroom”, it is difficult to convert Indian equity shares into ADRs (due to limited fungibility). Any arbitrage by way of short selling ADRs in US and buying the underlying security in India seems not possible. In that, the ADR provisions are certainly different from a developed market like Germany and emerging markets like Hong Kong and South Korea. It is realistically not possible to readily convert Indian equity shares into ADRs listed on the US equity markets, which makes it difficult for any investor to take advantage of ADR premiums.

Given the fact that “headroom” is not available, and ADR are trading at a premium, it implies that the higher ADR price is caused by the following factors:

1. Segmentation in the US and the Indian stock markets. This means that ADR and Indian equity are being valued differently by investors in these two separate markets.
2. Whether or not “headroom” is available, the existence of ADR premiums can be explained partially by (1) liquidity premium, (2) currency risk premium, and (3) cost for transactions / procedural hassles.

Section IV of the paper will investigate these questions.

IV INVESTIGATING ADR PREMIUMS

As discussed in Section I, we now return to an investigation into the reasons that may be the cause of ADR premiums. The following issues will be investigated in detail to gain insights into the reasons causing the residual ADR premiums

Liquidity Premium

Given the obvious ease of investing in ADRs, there is no doubt about their demand in the US, especially for an increasingly attractive success story like the Indian economy. If ADRs offer better liquidity than the underlying equity, it can be argued that the ADRs would be more attractive to investors who prefer liquidity.

It would be instructive to analyze the shareholding pattern of the ADRs and the underlying equity to investigate whether a relatively higher proportion of ADRs are owned by Institutional Investors (who prefer liquidity). Presuming ADRs are primarily held by Institutional Investors or broadly by investors who value liquidity (i.e. investors who trade a lot), the liquidity factor become important and may justify premiums on ADR prices.

There are several methods that have been used in the finance literature for gauging illiquidity which can be roughly divided into price-based measures (like the daily bid-ask spread divided by daily price) and volume-based measures (like daily trading

volume divided by shares outstanding). We have used a measure formulated by Amihud (2002) for gauging liquidity of ADRs and underlying equity. Amihud's measure calculates the average of daily ratio of absolute return to dollar trading volume.

$$\text{Specifically, Amihud's measure} = \frac{1}{D_t} \sum_{d=1}^{D_t} \frac{|R^{\text{adr } i, d}|}{\text{Vol}^{\text{adr } i, d}}$$

where D_t is the number of trading days in month t , $R^{\text{adr } i, d}$ is the daily return of ADR i on day d (within month t), and the $\text{Vol}^{\text{adr } i, d}$ is dollar trading volume of ADR i on day d , defined as number of shares traded times the ADR price on day d .

We use Amihud's (2002) liquidity measure for estimating the impact of liquidity on ADR premia. We calculated the daily Amihud measure for both the ADR and the underlying equity in Indian markets for the period from January 2001 to December 2005. The daily Amihud measure differential is then calculated in % terms in the following way; $[\text{Daily Amihud Measure (ADR)}/\text{Daily Amihud Measure (Indian equity)} - 1]$. This Daily Amihud Measure differential has then been used to derive monthly averages for each ADR from January 2001 to December 2005. Similarly we have calculated the daily premium at which ADRs trade in US markets (using the daily INR – USD exchange rate). This daily premium (in %) is then used to derive monthly average for each ADR over the period January 2001 to December 2005.

Exhibit IV illustrates the higher relative liquidity in 2004 for a sample of 4 ADRs, all of which have displayed high ADR premiums over a long period of time.

Exhibit IV a

ADR	Average monthly Amihud measure (ADR) / Average monthly Amihud measure (Underlying equity)
ICICI Bank	2.89
Infosys	2.29
Wipro	9.83
Reliance Industries	112.29

This indicates that ADRs in the US markets display a higher liquidity relative to the underlying equity in the Indian markets. As mentioned above, liquidity carries a premium and ADRs may be valued more by investors who prefer liquidity. Given this, we explore to what extent does liquidity play a part in the existence of ADR premiums.

We have, therefore, related the Monthly Amihud measure differential (an estimate of liquidity) to the premiums at which ADRs trade in the US markets.

Therefore, we have derived a regression equation for the data for all ADRs (11 in number) by a bunching together the monthly Amihud measure differentials and monthly ADR premiums. The results are presented below

Regression Analysis: ADR premium versus AM differential

The regression equation is

$$\text{ADR pre} = 0.186 + 0.000097 \text{ AM differential}$$

Predictor	Coef	SE Coef	T	P
Constant	0.185659	0.007771	23.89	0.000
AM differential	0.00009670	0.00006186	1.56	0.119

S = 0.175124 R-Sq = 0.4% R-Sq(adj) = 0.2%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	0.07494	0.07494	2.44	0.119
Residual Error	578	17.72641	0.03067		
Total	579	17.80135			

We observe that the T- value is only 1.56 and the P-value is high at 11.9%. Also the R-sq is only 0.4%. Although it is well proven that liquidity commands a premium, in case of Indian ADRs it appears that the impact of liquidity difference between the ADRs and underlying equity is not a good predictor for the ADR premium. In other words, the results of the above regression are not statistically significant.

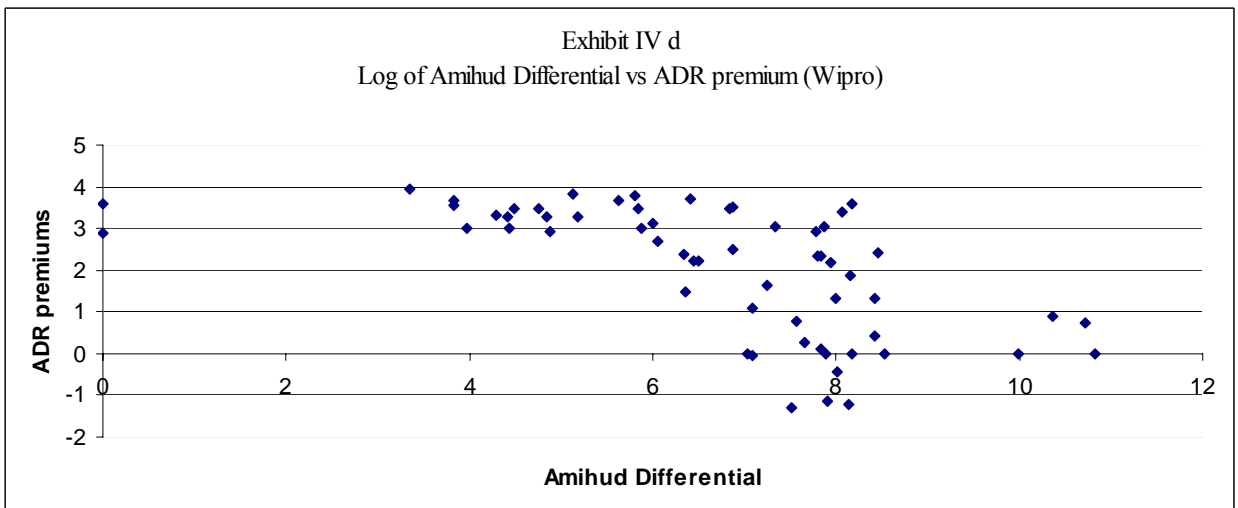
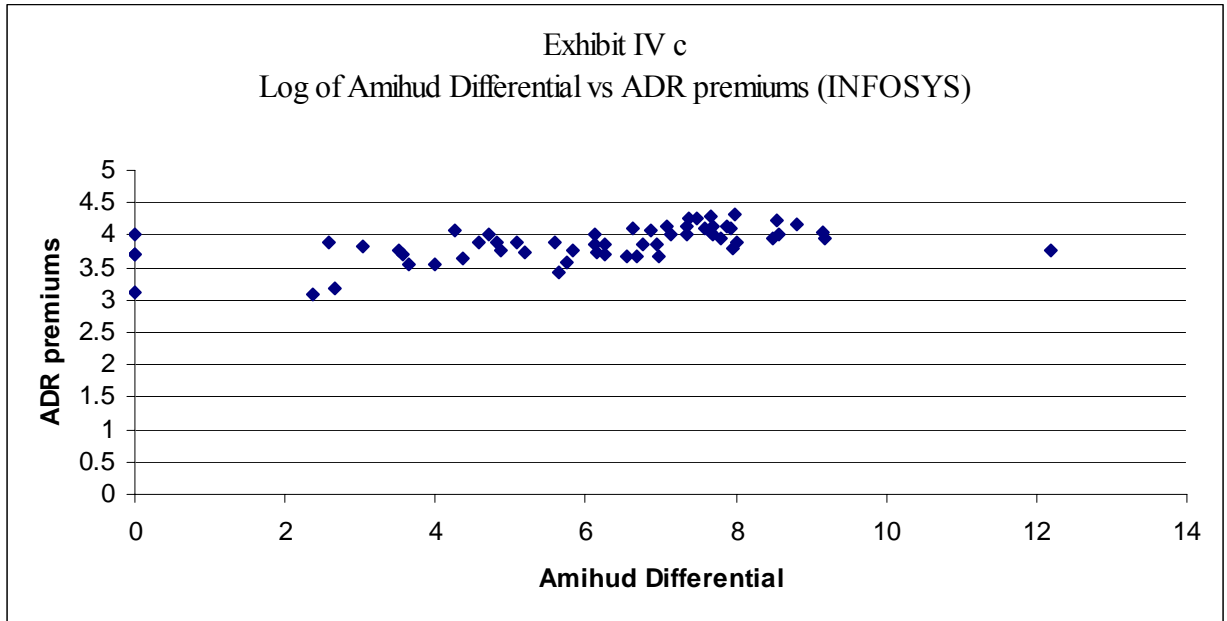
We have also attempted similar regressions for individual ADRs viz. WIT, INFY and IBN. The results are not materially different from those obtained by using the aggregated data.

A summary of results is presented Exhibit IV b (refer **Appendix II** for details)

We also present in Exhibit IV c & d, scatter plots of the log of differential between the Amihud measures of ADRs and underlying equity versus the ADR premiums for two Indian ADRs, Infosys and Wipro. We plot the monthly data for the period January 2001 to December 2005. As the plots show, it is difficult to say conclusively that there exists a significant relationship between the illiquidity measure and ADR premiums.

Exhibit IV b

Company	T-stat	P-value	R-sq.
Wipro	2.87	0.60%	12.40%
Infosys	0.20	84.40%	0.10%
ICICI Bank	1.68	9.80%	4.70%



The above analyses lead us to conclude that liquidity is not an important factor for predicting the premiums of ADRs prices over the prices of underlying equity.

Currency Risk

Exhibit IV e Indian Rupee Depreciation

Year	versus USD	versus GBP	USD vs GBP
1996	2.1%	12.1%	-8.9%
1997	9.3%	6.1%	3.0%
1998	8.2%	8.8%	-0.5%
1999	2.4%	-0.2%	2.6%
2000	7.3%	-0.9%	8.3%
2001	3.5%	0.6%	2.9%
2002	-0.6%	9.9%	-9.5%
2003	-5.1%	5.2%	-9.8%
2004	-4.1%	3.9%	-7.7%
2005	3.4%	-7.7%	11.9%
Average	2.6%	3.8%	-0.8%
Median	2.9%	4.5%	1.0%
High	9.3%	12.1%	11.9%
Low	-5.1%	-7.7%	-9.8%

Data Source: Yahoo.co.in, www.oanda.com

In case arbitrage is possible, any individual / corporate / institutional investor can invest in India freely through a sub-account with an FII, and convert it into ADR, rather than invest directly in a higher-priced, same-risk ADR. Any premium that exists may be partially due to Currency risk premium. In other words, the ADRs eliminate expected losses to investors due to depreciation of Indian Rupee (INR) versus USD (US Dollar). ADRs may trade at a premium because of this fact.

Since Indian Rupee has been traditionally weak versus USD, the currency depreciation will partially explain higher ADR prices. Currency risk is primarily the expected depreciation in the Indian Rupee over and above the depreciation expected due to interest rate differentials. This currency risk premium should partially account for ADR premiums. Again, over the last 4 years, the dollar has depreciated versus rupee, not

entirely due to the relative strengths of US and Indian economies but primarily because of general weakening of USD. We, therefore, examine the currency movements of Indian rupee (INR) versus USD, INR versus GBP, and Euro versus INR, over last 10 years, to gauge “general” rupee depreciation (and hence the currency risk).

Since the USD itself has depreciated on an average 0.8% versus GBP, INR depreciation versus GBP is a better indicator of average depreciation. Therefore, the actual currency risk (i.e. average depreciation expected, based on past currency movements) for INR is 3.8% per annum (refer Exhibit IV e). We, of course, assume here that (1) the average investment horizon (or holding period) for investors is 1 year, and (2) the currency movements of past 10 years form an appropriate basis for investor expectations about future currency depreciation and average depreciation of INR in the past is a good proxy for expected depreciation in future.

Given the above, if average depreciation expected for INR is approximately 4%, the currency risk explains only a small portion of ADR premium. It may be mentioned here that ADR premium on Indian ADRs average 17% over last 5 years, which implies that only a small proportion of ADR premium is explained by currency risk premium.

Cost for transactions / procedural hassles

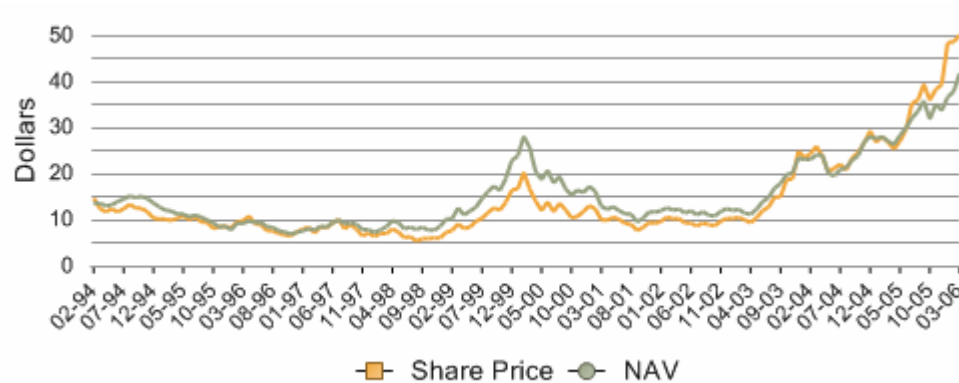
Cost of procedural hassles is more of a subjective issue and is difficult to assign a value to such a variable. In any case, the cost of any procedural hassle cannot be as high as premiums of 17% for any rational investor. In other words, it seems unlikely that high ADR premiums for Indian securities can be ascribed to procedural hassles. It is important to note that procedural hassle is same for all securities, whereas ADR premiums vary greatly for different ADRs and are negative for some of them (e.g. Dr Reddy's (RDY) and Tata Motors (TTM)).

Segmented Markets / Market Inefficiency

As we have mentioned earlier, ADRs are a pure derivative of the underlying equity with exactly similar cash flow and dividend rights. In other words, the risk-return characteristics of ADRs and underlying equity are same. Given this fact, if the prices of the ADR and the underlying equity still differ, it may be attributed to difference in investor preferences i.e. a market irrationality. In this context regard, we would like to mention the three comparable cases in contemporary finance that we touched upon in Section I (Introduction) –

- *Royal Dutch/ Shell group conundrum* – From 1907 till June 2005, Royal Dutch Shell group was a joint venture between Royal Dutch Petroleum Company (RDP) of the Netherlands and the Shell Transport and Trading Company plc (STT) of UK in the ratio 60:40. These two companies jointly owned all the operating companies in the group (and nothing else i.e. no other assets) and all earnings was always divided 60/40 in favor of Royal Dutch. However, the market prices of RDP and STT were never in the ratio of 60:40, even though both companies had claim to exactly the same cash flows (in 60:40 ratio), with similar risk-return characteristics. The difference in dividend policies of RDP and STT has been put forward as a possible reason for difference in share prices of RDP and STT (after adjusting for shareholding ratio in JV). However, a crucial difference here is that, in the case of ADRs, the dividend cash flows for ADRs and the underlying equity are *exactly* equal.

Exhibit IV f



- *The Closed End Mutual Fund puzzle* – Closed end funds trade at a discount to their NAVs. This is a puzzle, since prima facie there is no reason why the market price for a closed-end fund should be different from the current value of the portfolio held by the fund, or its net asset value (NAV). In this regard, we analyze the closed end India Fund (IFN), and its price versus NAV. Exhibit IV f shows that the India Fund has been trading at a discount for most of the last 10 years till mid-2005. Interestingly, the trend has reversed (i.e. Share Price has become greater than NAV) in the last 12 months. Again, the closed end IFN is a derivative of all the Indian equities that it holds in the Indian Stock market, so it seems irrational that the share price of IFN should be any different from its NAV (i.e. share prices of underlying equities). It should be mentioned here that the beta of IFN with S&P 500 is 1.59 versus a beta of 0.98 with the Bombay Sensex, which is interesting, given the fact that IFN consists of equities traded exclusively in the Indian stock market. However, it should be mentioned here, that, in the context of this paper, it is much more difficult to conduct an arbitrage between a closed end fund (i.e. IFN) traded in the US and the underlying equities traded in India.

- *3Com/Palm case* – On September 13, 1999 3Com announced its intentions to take one of its subsidiaries, Palm Computing (a leading manufacturer of handheld devices), public the following year. On March 2, 2000 Palm became publicly traded on the Nasdaq National Market. 3Com sold a 6% stake at \$38 a share which was well above the initial \$14 to \$16 range. At the time of the IPO, 3Com announced its intention to divest its remaining 94% ownership to 3Com shareholders within six months. On the first day of trading, Palm opened at \$145, reaching a high of \$165 before ending the day at \$95.06. This stock price translated to a \$53.4 billion value for Palm in contrast to 3Com’s \$28.5 billion value. Based on 3Com’s 94% ownership, 3Com’s stake in Palm was worth approximately \$50 billion, giving substantial negative value to 3Com’s other assets, an almost perfect violation of the law of one price.¹

A possible explanation for this anomaly has been the restrictions on arbitrage i.e. short selling Palm (and going long 3Com), due to a very small number of Palm shares available in the market. This effectively made arbitrage very difficult. In context of this paper, it is worth stating that although Palm was a part of 3Com but did not share the risk-return characteristics of 3Com in entirety (unlike ADR-underlying equity combination)

Further, since 3Com had announced its intention to divest Palm completely within six months, the arbitrage had to necessarily go away at the time of divestment i.e. 3Com

¹ “The Valuation and Market Rationality of Internet Stock Prices” – Ofek & Richardson, 2001
“The Parent Company Puzzle – When is the whole less than one of its parts?” – Cornell & Liu, 2000

and Palm share prices (adjusted for share exchange ratio) had to converge. In contrast, in case of ADRs, there is no event (like divestment / merger) that would necessarily cause the prices of the underlying and the ADR to converge.

In any case, the three cases above do provide though provoking examples of market inefficiencies, where securities with similar risk-return characteristics were valued very differently by same / different investors. Continuing this line of thought, we propose that a possible reason for the continued existence of ADR premiums is the difference in perceptions of the investors in US markets versus the investors in Indian markets. Although difficult to substantiate, this implies that there is a distinct dichotomy in the way these two markets are behaving as regards ADR premiums. Given the fact that there are no information asymmetries (as regards ADRs) and capital flow restrictions, it seems difficult that segmentation of markets may be a possible cause of ADR premiums. However, as we discussed in Section III, the absence of sufficient “headroom” is causing significant barriers to arbitrage and a veritable impediment to free flow of capital i.e. a segmentation of US and Indian stock markets. In the absence of sufficient “headroom”, arbitrage between the higher ADR prices and lower underlying equity prices seems quite difficult, which has allowed the ADR premiums (i.e. a market inefficiency) to persist for a long time. The magnitude of ADR premiums and the high correlations of certain ADRs (with relatively higher premiums) to S&P 500 seem to indicate the difference in investor expectations in US and India as a possible cause of ADR premiums.

V EPILOGUE

Current Data

February 1 (Bloomberg) -- The following table of American and global depository receipts of Indian companies compares their closing prices with the most recent closes in local trading. Price adjustments are based on a currency value of 44.12 rupee per dollar, along with the number of shares per ADR or GDR.

*T

Company	Ticker	ADR/GDR	Close	% Chg	Local Equiv.	Local Close	ADR/GDR % Prem	Shares/ ADR/GDR
Dr Reddy's	RDY		25.60	+0.24	1,129.42	1,119.60	+0.88	1.0
HDFC Bank	HDB		59.44	+4.56	874.12	762.55	+14.63	3.0
ICICI Bank	IBN		31.42	+0.03	693.09	609.15	+13.78	2.0
Infosys Technologies	INFY		76.22	+1.09	3,362.67	2,879.70	+16.77	1.0
MTNL	MTE		7.36	-0.68	162.35	141.70	+14.58	2.0
Ranbaxy Labs	REXD		9.23	+0.87	407.21	399.10	+2.03	1.0
Reliance Industries	RIGD		33.50	+0.66	738.98	713.70	+3.54	2.0
Satyam Computers	SAY		39.20	-0.73	864.71	746.65	+15.81	2.0
State Bank of India	SBID		46.17	-3.41	1,018.46	886.80	+14.85	2.0
Tata Motors	TTM		16.06	+2.23	708.54	709.30	-0.11	1.0
Wipro	WIT		14.85	+1.23	655.15	529.90	+23.64	1.0

The ADR premiums have declined further since July 2005 (when we initiated the research). For Infosys itself the premium is down from 39% to 16.7% currently. Given the fact that INFY ADR premium has been, on an average 50% in last 5 years, and was as high as 39% in July 2005, a decline of 23% is phenomenal indeed. Other ADRs that have experienced similar trend (though not as spectacular) are RIGD (average - 37%, current - 4%), SAY (average - 23%, current - 16%) and SBID (average - 22%, current - 15%).

The average ADR premium is down to 11% now, which is a significant decline. Even though real arbitrage seems difficult in case of Indian ADRs, it is possible for investors to short the ADRs in US, go long the Indian equity and invest the difference in risk-free securities. Since the correlation between ADRs and underlying equity is over 90%, the equity risk is somewhat hedged in such a transaction (even though the beta of ADR for underlying equity is 0.56). Also, ADR premium should more than compensate investors for the hedging cost of currency risk. The balance amount is, of course, “quasi” - arbitrage profit. Of course, such a transaction is predicated on the investors receiving the proceeds of short sale and borrowing costs (of ADRs short sold) being minimal.

Summary

We summarize the results of our analyses with the following observations.

Premiums on ADRs of Indian companies have been in existence for some time (around 5 years, starting 1999 till date), and the phenomenon is unique to Indian ADRs, vis-à-vis ADRs from other countries. Although, the ADR premiums have been trending down for some time lately, the average premium was still around 16% in 2005. The ADRs returns appear to be more sensitive to US stock markets, than the Indian stock markets and the underlying equity. More interestingly, the ADR prices do not move in lock-step with the prices of underlying equity, despite sharing exactly the same risk-return characteristics.

Certain institutional framework issues (viz. insufficient “headroom”) have had a substantial impact on the existence ADR premiums, in that these issues make it difficult for investors to take advantage of ADR premiums via arbitrage. Our research indicates that the impact of liquidity and currency risk premium on ADR premiums is relatively insignificant. A possible reason (though not conclusive) for such premiums does appear to be segmented markets, which does indicate market inefficiency, to a degree. In this context, we compare the phenomenon of ADR premiums to the Royal Dutch / Shell share prices, the Closed End fund puzzle, and the 3Com-Palm case. In all the three cases, securities with similar risk-return characteristics were valued differently by investors.

Further, the fact that ADR premiums are declining can have the following possible analyses:

- (1) Arbitrageurs have been able to effect quasi-arbitrage, which enables them to circumvent the barriers to arbitrage in institutional framework (described in Section III), and /or
- (2) The market inefficiency is being corrected gradually, or the segmented market hypothesis is being eliminated as investor expectation finally converge in US and Indian markets.

APPENDIX I

Description ¹	India	Hong Kong ²	Germany	South Korea
Portfolio Investment	Foreign institutional investors (FIIs) may invest directly in all securities traded on the primary and secondary markets in India, subject to certain caps	No specific restrictions apply to portfolio investment, and foreign investors may place funds directly in the stock and bond markets.	No obstacles exist to raising and moving capital in Germany.	Markets totally liberalized since 1997 crises. Even unlisted stocks and derivatives available for unlimited foreign investment. No individual or aggregate ceilings exist.

¹ Source: Economist Intelligence Unit, The Economist

² The underlying stock for ADRs of Chinese shares on the US stock exchanges are the shares of Chinese companies listed on Hong Kong Stock Exchange (called 'H' shares). These shares have been issued primarily for foreign investors, trade at a lower PE compared to shares listed on the Chinese Stock Exchanges (called 'A' & 'B' shares) and are subject to securities markets rules of Hong Kong.

Repatriation of Capital	Repatriation of portfolio investments is permitted on the same terms to all classes of non-resident investors. Under the Foreign Exchange Management Act, for portfolio investments made in secondary markets, repatriation of capital is allowed freely.	No restriction on the amount of local currency or foreign currency that can be brought into or taken out of Hong Kong.	No restrictions or special regulations apply.	Free repatriation of approved capital is guaranteed by law. Ex post facto reporting rules apply. Legitimacy of origins must be confirmed by remitting forex bank.
Repatriation of Profits/ Dividends	All foreign banks, companies and project offices can remit profits and dividends without permission from the Reserve Bank of India.	No restrictions on payment of dividends or other distributions to overseas or foreign shareholders.	No restrictions or special regulations apply.	Same as repatriation of capital. New legislation makes it for foreign funds difficult to avoid tax on capital gains.

ADR provisions	No approval required from Government for fresh ADR issue; only intimation within 30 days is required. Only limited fungibility of ADRs is allowed.	No restrictions are imposed on listed companies' issuance of GDRs or ADRs.	There is no government-imposed cap on GDR or ADR issuance.	Listed firms have been allowed to issue overseas securities in unlimited amounts since 1998. No special restrictions
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* We include ADRs of Chinese shares listed on Hong Stock Exchange in our dataset. Therefore, we have analyzed the institutional framework in Hong Kong (and not China) in this report.

India¹

Portfolio Investment

FIIIs include pension funds, mutual funds, investment trusts, insurance or re-insurance companies, asset-management companies, incorporated institutional portfolio managers, university funds, endowments, foundations and charitable trusts/societies with a track record. Secondary stock market operations are permitted only through registered intermediaries on the Indian stock exchanges. FIIIs are permitted to lend their securities through an approved intermediary.

Portfolio investments are subject to an aggregate ceiling of 24% of paid-up equity capital in one company for registered FIIIs and sub-accounts, with a sub-ceiling of 10% for any one FII. Indian companies can increase this 24% limit up to the FDI cap in the relevant sector, provided the company's board of directors approves the move and the general body of the corporation passes a resolution allowing it. Investments by FIIIs through offshore single/regional funds, Global Depositary Receipts, American Depositary Receipts and euro-convertibles are not counted towards FII limits.

¹ Economist Intelligence Unit, The Economist

FIIIs that are asset-management companies, investment advisers, nominee companies, institutional portfolio managers, trustees, power-of-attorney holders or banks may invest on behalf of sub-accounts. A sub-account can be a foreign company or individual, an institution, fund or portfolio established outside India. In the case of a fund or portfolio, it must be “broad-based”, meaning that it should have at least 20 investors, with no single individual investor holding more than 10% of its shares or units. The registration process for sub-accounts is simpler: FIIIs need only submit details of sub-accounts, an undertaking and a registration fee of US\$1,000. The SEBI registers them within three working days.

Repatriation of capital

Repatriation of capital is permitted for any class of foreign investor, including non-resident Indians (NRIs) and foreign institutional investors (FIIIs), if the original capital was remitted from abroad in foreign currency and if the equity has been sold on a stock exchange.

This therefore excludes investments in partnerships, which are not listed. However, NRIs can invest in partnership firms on a repatriation basis with government approval. Repatriation of portfolio investments is permitted on the same terms to all classes of non-resident investors. Under the Foreign Exchange Management Act, for portfolio investments made in secondary markets, repatriation of capital is allowed freely.

ADR provisions

From 2000 onwards, companies no longer require approval from the Ministry of Finance for overseas issues, but should inform both the ministry and the exchange-control department of the Reserve Bank of India (RBI) within 30 days of the issue. This rule applies to companies issuing ADRs/GDRs for the first time and those issuing a fresh set of ADRs/GDRs, provided that they issue new equity shares to support the offering and expand their capital bases. This automatic route also applies to the issue of employee stock options in the form of ADRs/GDRs by Indian software and other IT companies.

In February 2002 the RBI permitted limited two-way fungibility of ADRs/GDRs, meaning that ADRs or GDRs that have been converted into local shares can be converted back into ADRs or GDRs. This applies only to re-conversions. In November 2002 the RBI allowed Indian companies to sponsor ADR/GDR issues with overseas depositories against the shares held by their shareholders. In February 2003 it further said that resident shareholders that offer their shares for such conversions could receive the proceeds in foreign currency.

As per limited fungibility, any broker can convert shares to ADR but only to the extent of past conversion of ADRs in that company into shares. This is called 'Headroom'.

So up to the point that headroom is not fully utilized, anybody can buy in local market and convert to ADR and pocket the profit.

The other way to convert local shares to ADRs is very cumbersome and time consuming. This also requires regulatory permission. Also, the company has to pass a special resolution and appoint a merchant banker and make sure that an opportunity is given to all the shareholders to participate in this process.

Hong Kong¹

Hong Kong, subject to Chinese sovereignty but not its legal jurisdiction, has been good source of funds for companies in mainland China. More than 150 mainland companies were listed there in July 2005. The China Securities Regulatory Commission (CSRC) must examine and approve companies that intend to issue Hong Kong-listed H-shares. Furthermore, they need to bring their articles of association and their activities into conformance with the provisions of the Company Law, in addition to the necessary clauses for the articles of association of companies to be listed in Hong Kong.

ADR provisions

¹ Economist Intelligence Unit, The Economist

As per regulations, the depositary banks can create ADRs if investor(s) deliver H shares along with payment of applicable issuance fees/ taxes/ other charges. Additionally, investors are entitled to present ADRs to depositary bank for cancellation and then receive corresponding number of underlying shares, on payment of applicable cancellation fees/ taxes/ other charges.

Germany¹

Portfolio Investments

Foreign corporations and non-residents are free to acquire securities of any maturity. These include German stocks, bonds, money-market instruments or any other portfolio instruments. There is substantial liquidity in government bonds, Pfandbriefe (asset-backed, particularly mortgage bonds), and blue-chip stocks, and a growing interest in corporate bonds, too.

South Korea²

Portfolio investment

¹ Source: Economist Intelligence Unit, The Economist

² Source: Economist Intelligence Unit, The Economist

Foreign portfolio investment is governed by the Foreign Exchange Transaction Act and the Securities and Exchange Act. Foreign portfolio investment began with the opening of the country's equity market in 1992. Bonds and money-market instruments were off limits to foreign investors until late 1997. The closed markets were due to apprehensions regarding the large gap between prevailing international and domestic interest rates (once more than 5 percentage points above US Treasuries) which could have caused a flood of "hot" money.

The financial crisis of 1997 completely changed the scenario and during 1998–99, foreign portfolio investment in local stocks, bonds and money-market instruments was almost completely liberalized, as follows:

- Since December 1997 foreign investors have been allowed to invest in listed public and corporate bonds without restrictions.
- Since May 1998 the money market has been completely opened up to foreign investment, with certificates of deposit, repurchase agreements and other instruments freely traded for foreign investors' accounts. (Commercial paper and trade bills became available in February 1998.)
- Since May 1998 foreign investment in stocks listed on the Korea Stock Exchange and the Kosdaq market (both of which are now part of the Korea Exchange) has been fully liberalized, with no individual or aggregate ceilings. Futures and options are also freely available, and foreigners can also subscribe to rights issues.
- In July 1999 unlisted stocks and bonds became available for unlimited foreign investment.

Foreign portfolio investors can also invest in stock or bond investment trusts and mutual funds. A purchase of a stake of less than 10% in a South Korean company by a non-resident investor must be reported to a relevant forex bank. If it involves a stock swap (listed stocks only), then the Bank of Korea must be notified.

Repatriation of capital

Free repatriation of approved capital is guaranteed by law. No restrictions or requirements exist for reinvestment of profits. However, the forex bank that transfers repatriated capital must confirm the legitimacy of its origins. All remittances must be made from the same account at a designated forex bank, a rule that also applies to personal remittances. Ex post facto reporting rules set by the Foreign Exchange Transaction Act apply.

Remittance of dividends and profits

Free remittance of dividends and profits is guaranteed by law. However, forex banks conducting business with the foreign investors must verify the legitimacy of such remittances. Ex post facto reporting rules set by the Foreign Exchange Transaction Act apply.

New legislation is making it more difficult for foreign funds—most notably US investment funds—operating from tax-haven outposts around the world to take profits out of South Korea in tax-free dollars under the conventional protection of bilateral tax treaties. A new special provision written into the existing Law for the Co-ordination of International Tax Affairs allows the National Tax Service (NTS) to levy local withholding taxes on

dividends, interest, and capital gains collected by foreign funds registered in some tax-haven jurisdictions, irrespective of any bilateral tax treaties that permit tax-free repatriation of profits. The measure, included in South Korea's annual tax-reform package effective in January 2006, should affect the operations of private-equity funds and other investment funds doing business in South Korea.

GDRs/ADRs provisions

Global Depositary Receipts (GDRs) and American Depositary Receipts (ADRs) are available and are a popular source of overseas funds for South Korean firms. GDRs/ADRs issued by blue-chip companies such as POSCO, Korea Electric Power, Samsung Electronics, Hyundai Motor and KB (Kookmin Bank) are traded on exchanges in New York, London and Luxembourg.

Listed firms have been allowed to issue overseas securities in unlimited amounts since 1998, and practically all remaining restrictions on GDR/ADR issues (such as minimum dividend pay-outs) disappeared in that year. Companies seeking to issue GDRs/ADRs based on their own shares bought back from shareholders can do so immediately after they complete the buyback program. GDRs/ADRs can be issued in private placements. Since 2001, companies have been able to offer GDRs/ADRs at a discount larger than the official limit of 30%, with approval from the Financial Supervisory Commission.

APPENDIX II

Regression Analysis: Wip D (ADR premium) versus Wip A (Amihud measure differential)

The regression equation is

$$\text{Wip D} = 0.184 - 0.000555 \text{ Wip A}$$

Predictor	Coef	SE Coef	T	P
Constant	0.18441	0.01984	9.29	0.000
Wip A	-0.0005547	0.0001934	-2.87	0.006

S = 0.142236 R-Sq = 12.4% R-Sq(adj) = 10.9%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	0.16641	0.16641	8.23	0.006
Residual Error	58	1.17341	0.02023		
Total	59	1.33982			

Unusual Observations

Obs	Wip A	Wip D	Fit	SE Fit	Residual	St Resid
7	506	-0.0200	-0.0965	0.0923	0.0765	0.71 X
8	317	0.0200	0.0083	0.0569	0.0117	0.09 X
10	450	0.0200	-0.0650	0.0815	0.0850	0.73 X
46	0	0.5100	0.1843	0.0198	0.3257	2.31R

R denotes an observation with a large standardized residual.
 X denotes an observation whose X value gives it large influence.

Regression Analysis: Infy D (ADR premium) versus Infy A (Amihud measure differential)

The regression equation is

$$\text{Infy D} = 0.498 - 0.000012 \text{ Infy A}$$

Predictor	Coef	SE Coef	T	P
Constant	0.49758	0.01578	31.53	0.000
Infy A	-0.00001216	0.00006152	-0.20	0.844

S = 0.120107 R-Sq = 0.1% R-Sq(adj) = 0.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	0.00056	0.00056	0.04	0.844
Residual Error	58	0.83670	0.01443		
Total	59	0.83726			

Unusual Observations

Obs	Infy A	Infy D	Fit	SE Fit	Residual	St Resid
23	29	0.7600	0.4972	0.0155	0.2628	2.21R
25	1977	0.4400	0.4735	0.1197	-0.0335	-3.38RX
58	-0	0.2300	0.4976	0.0158	-0.2676	-2.25R
59	0	0.2400	0.4976	0.0158	-0.2576	-2.16R
60	0	0.2200	0.4976	0.0158	-0.2776	-2.33R

R denotes an observation with a large standardized residual.
 X denotes an observation whose X value gives it large influence.

Regression Analysis: IBN d (ADR premium) versus IBN A (Amihud measure differential)

The regression equation is
 IBN d = 0.123 - 0.000280 IBN A

Predictor	Coef	SE Coef	T	P
Constant	0.12327	0.01044	11.81	0.000
IBN A	-0.0002799	0.0001663	-1.68	0.098

S = 0.0758329 R-Sq = 4.7% R-Sq(adj) = 3.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	0.016282	0.016282	2.83	0.098
Residual Error	58	0.333537	0.005751		
Total	59	0.349818			

Unusual Observations

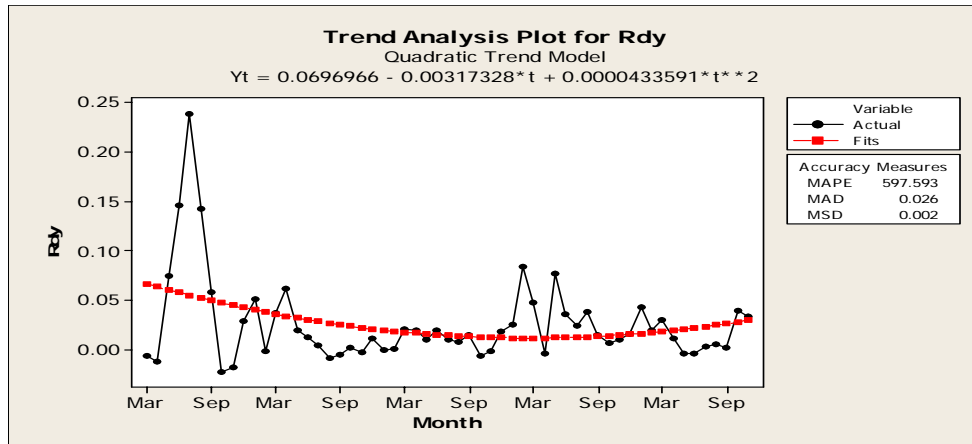
Obs	IBN A	IBN d	Fit	SE Fit	Residual	St Resid
4	7	-0.04000	0.12135	0.01010	-0.16135	-2.15R
6	177	-0.03000	0.07369	0.02763	-0.10369	-1.47 X
7	-0	-0.04000	0.12337	0.01046	-0.16337	-2.18R
9	13	-0.05000	0.11975	0.00991	-0.16975	-2.26R
21	413	0.05000	0.00763	0.06583	0.04237	1.13 X

R denotes an observation with a large standardized residual.
X denotes an observation whose X value gives it large influence.

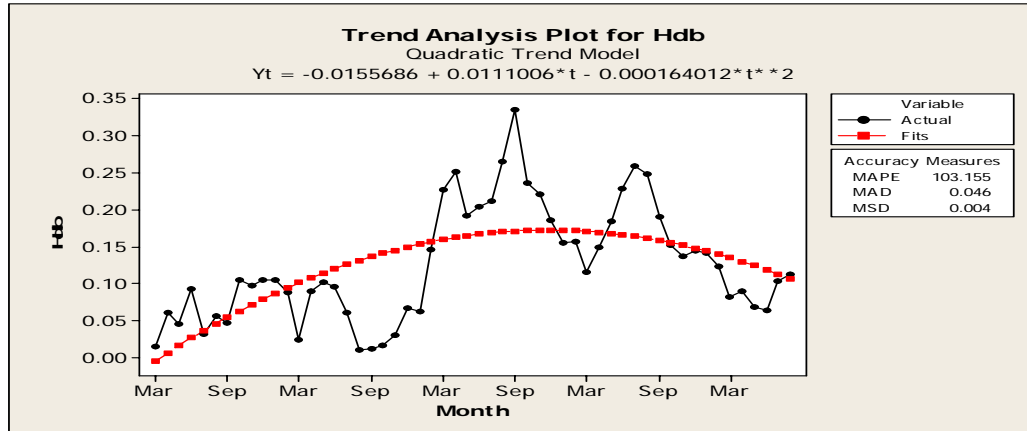
APPENDIX III

Trend Analysis of ADR premiums over 2001-2005

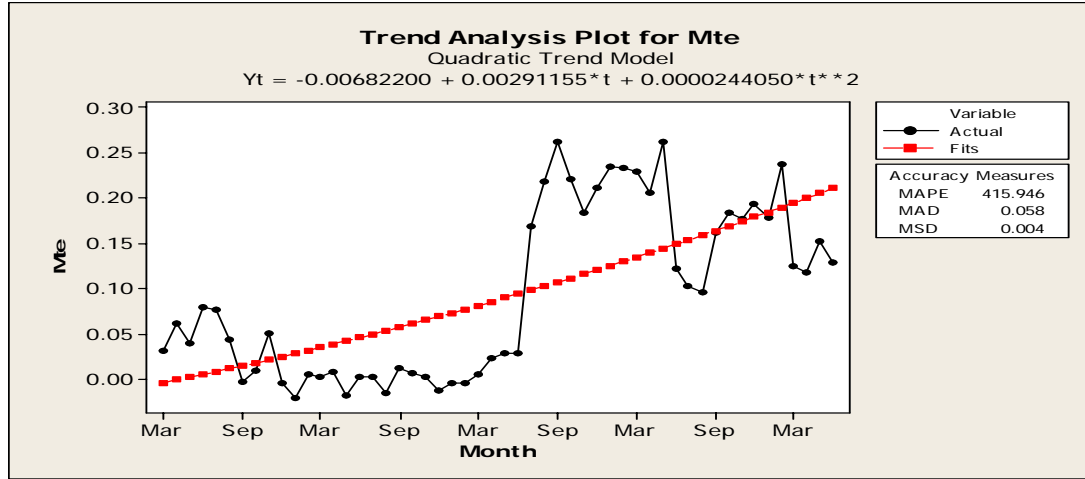
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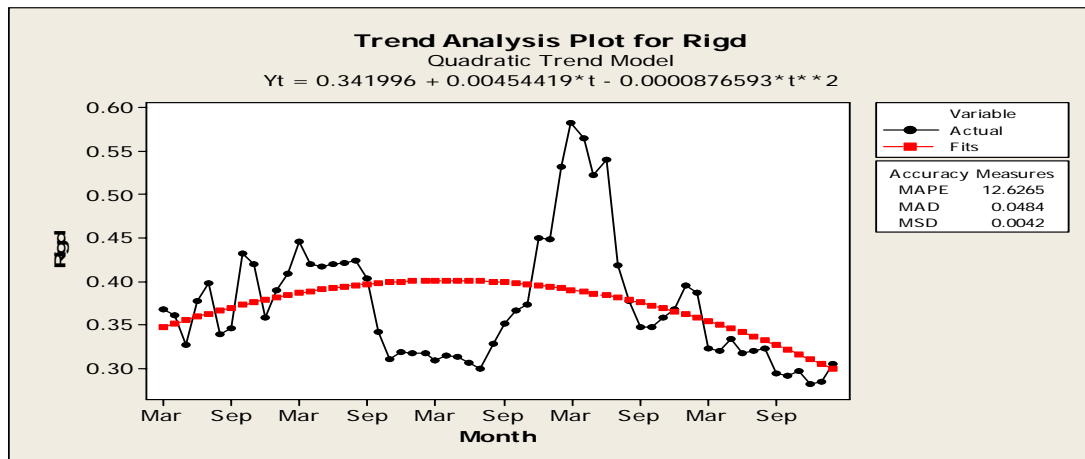
HDFC Bank (HDB)



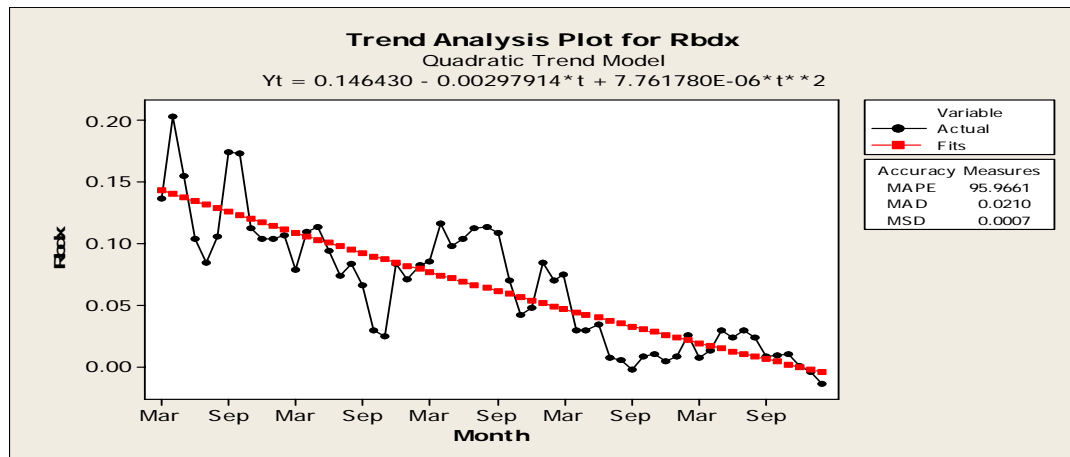
MTNL (MTE)



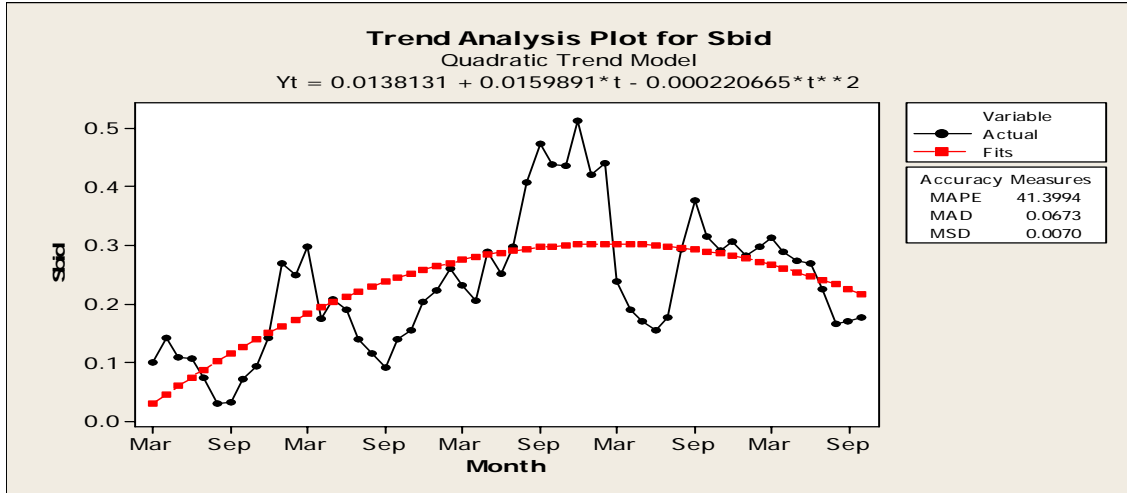
Reliance Industries (RIGD)



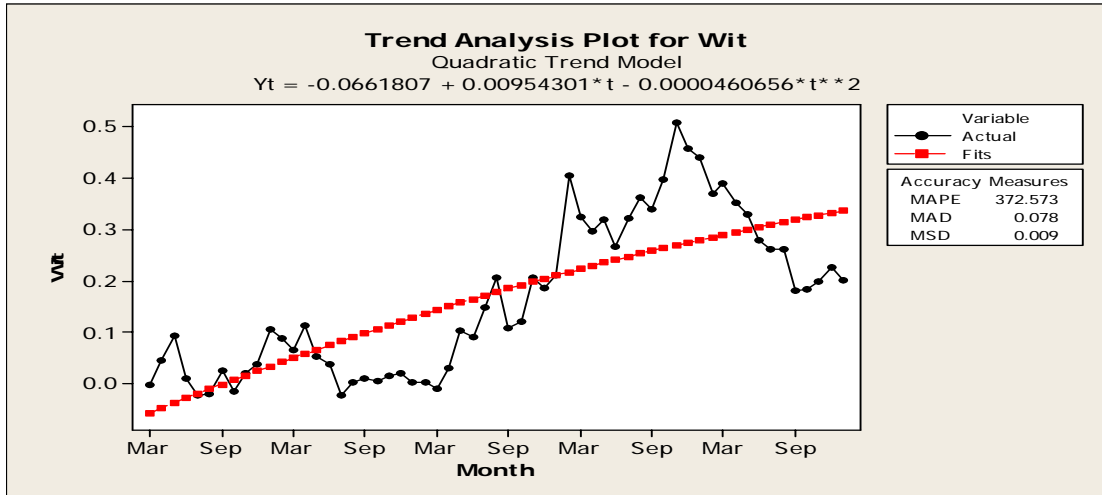
Ranbaxy Lab (RBXD)



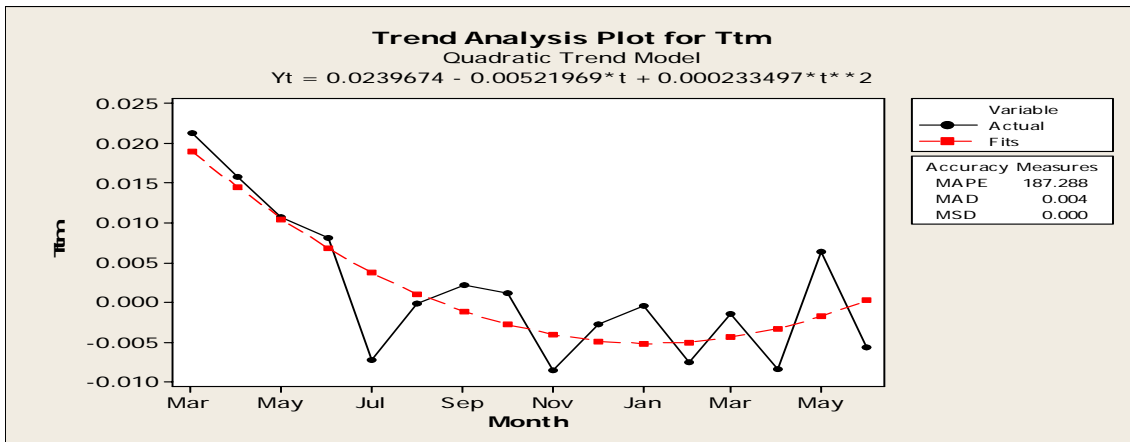
SBI (SBID)



Wipro (WIT)



Tata Motors (TTM)



**Examining Market Reaction to
Activist Investor Campaigns by Hedge Funds**

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Glucksman Institute for Research in Securities Markets
Faculty Advisor: Yakov Amihud
April 3, 2006

I. Introduction

Individual investors and institutional shareholders have long attempted to influence the behavior of management in hopes of increasing equity returns. In the past such efforts were typically limited to voting on specific governance procedures with little immediate or direct effect on the underlying business or composition of the management team. In effect, early activist investors worked to ensure that the board of directors acted as an effective agent of the shareholders.¹ This type of activism was essentially passive, limiting shareholders to voting on board proposals or campaigning for certain marginal corporate governance measures. Shareholder activism was partially restrained by Securities and Exchange Commission rules that limited shareholder access to the issuer-funded proxy process. In 1992, however, the SEC promulgated Rule 14a-8 giving shareholders easier access to company proxy materials. This new rule and other factors led to an increase in shareholder activism in the proxy process and through informal negotiations with management.²

Despite this increase in shareholder activism over the past decade, studies suggest activist shareholders have had little impact on stock returns.³ These studies find no systematic effect of activist shareholder campaigns since the passage of Rule 14a-8. Authors suggest individual and institutional investors fail to effect shareholder returns because they are either too small, in the case of individual investors, or unable to trade their positions, in the case of institutional investors (Gillian and Starks (1996)).

¹ Stuart L. Gillian and Laura T. Starks, *Corporate governance proposals and shareholder activism: the role of institutional investors*, 57 *Journal of Financial Economics* 275 (1996).

² Georgeson Shareholder Annual Corporate Governance Review, (2005).

³ S. Wahl *Pension Fund Activism and Firm Performance*, *Journal of Financial and Quantitative Analysis*, Vol. 31 (1996).

Recently, a new type of investor has become more involved: professional money managers operating as activist investors, notably hedge funds. With abundant capital to invest, hedge funds have purchased non-controlling positions in companies and pushed management for corporate actions that, these investors argue, increase shareholder returns. These modern activist investors typically seek to win board seats or to convince management to take specific action such as selling non-core businesses or returning more cash to shareholders. These activist campaigns are carried out either through formal proxy contests or private negotiations with management that are disclosed to the public through SEC filings or the business press.

Although professional investors have long engaged in battles for corporate control, recent efforts represent a shift in strategy. Specifically, in the past professional investors often sought to purchase a company outright and take action to change the management and operations in order to unlock value. In a corporate buy-out the professional investor has unfettered power to make corporate changes and capture most of the increase in value, less any premium paid during the buy-out. Today, many professional investors do not seek full ownership, or even effective control, but rather purchase a block of shares to gain a voice with management and benefit from increases in share returns. Using this strategy professional investors purchase or control a minority position, that is typically less than 20%, thereby risking less capital but allowing them to exercise greater influence over corporate affairs than their share ownership would suggest.⁴

This paper examines activist investor campaigns and attempts to measure whether their efforts increase shareholder value.

⁴ While activist investors may hold less than 20% in a company to limit their risk, an additional explanation for the small ownership percentage is the investor's need to remain below ownership levels that would trigger a poison pill (often less than 20% ownership will trigger a poison pill).

II. Background on Proxy Contests

A common vehicle for activist campaigns is the annual or special shareholder meeting proxy solicitation process. Proxy contests require specific public filings with the SEC that inform the public of the activist investor's efforts. As an initial matter, any person or group of persons who acquires 5% or more of the shares of a reporting company must file a Schedule 13D or Schedule 13G with the SEC to report the holdings. Both schedules must be updated following additional purchases or sales of the securities and include disclosure of the investor's identity, percentage of shares held and any intent to influence management or seek control of the company. If a shareholder pursues a formal proxy contest, the shareholder is required to file preliminary and definitive proxy materials providing specific information on the investor's proposals. These documents give public notice of the progress of the proxy contest enabling investors to vote in support of the activist investor or incumbent management.

III. Prior Research

Existing research on shareholder proposals does not focus on hedge funds, most likely because professional activist investing has become a major factor in the market only recently as investment funds have more capital to invest and stock market returns have moderated as compared to the 1990s. Past research has instead focused on shareholder proposals that were contained in company proxy materials and proposed simple corporate governance changes such as redeeming a poison pill or declassifying the board of directors. Existing research also focuses on the effects of pension funds such as CalPERS and has drawn varying conclusion as to the effect of proxy contests. For example, Gillian and Starks (1999), study the differences in support gained by shareholder proposals sponsored by individuals, groups and institutional investors finding that proposals offered by institutions garner more support than those offered by

individuals or investor groups.⁵ Similarly, Bradley, Brav, Goldstein and Jang (2005) find that the revised SEC rules from 1992, and more recently as part of the Sarbanes-Oxley Act of 2002, have reduced the costs of the formal proxy contests and have, therefore, led to an increase in such contests.⁶

While institutional shareholders may have more influence in a proxy contest than individual investors, Monks and Minnow (1995) find that pension funds and other similar institutions do not have broad based support from their beneficiaries to engage in aggressive activist investing. They conclude that institutional investors can be an important constituency for individual investors to work with when pushing for significant corporate or management change.⁷ Summing up existing research, Karpoff (2001) concludes that studies disagree on the effect of activist campaigns mostly because there are differences in the samples selection as well as definitions of a successful campaign.⁸

This paper will measure the effect of professional activist investors, as defined below, on shareholder returns in recent activist campaigns. Activist investors claim that their interests are aligned with other shareholders thus we should expect that, with their outsized influence over management, they will increase returns for all shareholders. This paper will then attempt to define financial characteristics of companies that make it more likely that an activist campaign will yield positive excess returns.

⁵ Gillian and Starks, *Corporate Governance, Corporate Ownership, and the Role of Institutional Investors: a Global Perspective*, University of Delaware Working Paper.

⁶ Michael Bradley, Alon Brav, Itay Goldstein and Wei Jang, *Costly Communication, Shareholder Activism and the Limits of Arbitrage*, (2005).

⁷ Robert Monks and Nell Minnow, *Corporate Governance*, Cambridge, Massachusetts, Blackwell.

⁸ Jonathan M. Karpoff, *The Impact of Shareholder Activism on Companies: A Survey of Empirical Findings*, Emory University (2001).

IV. Data Sample

In this study a critical question is the definition of an activist investor. In this analysis, activist investors were defined as professional investors who are not corporate insiders and are seeking to initiate significant corporate actions to improve their investment returns (*e.g.*, election of directors and pursuing a sale of the company). In addition to excluding corporate insiders such as existing board members, the definition of activist investor excludes investors who have been shareholders for an extended period of time and are blocking an action proposed by the company such as a merger. The definition of activist investors does, however, include investors who have purchased shares in a company after management has proposed a merger or other significant action.⁹ The logic behind this definition is to examine cases where professional investors make an investment in a company and work to make changes that would not have occurred in the absence of the investor.

The key period for measuring excess returns in the sample was the announcement of the initiation of a campaign and the ultimate resolution of the activist campaign. When an activist pursues a formal proxy challenge there are a series of public filings required which are often accompanied by press releases and independent press coverage. In cases where there is no formal proxy contest, an activist who owns more than 5% of the shares must file a Schedule 13D disclosing their ownership stake as well as their intentions to advocate for changes with management. All dates for the sample were based on the first public announcement of either the initiation or completion of an activist campaign through SEC filings or press coverage as available on Lexis-Nexis.

⁹ For example, this sample includes Carl Icahn's investment in Mylan Laboratories following its announced acquisition King Pharmaceuticals where Mr. Icahn made his investment and then attempted to block the proposed acquisition.

The sample time period for activist investor efforts was set from 2001 through 2005 with increasing emphasis in 2004 and 2005 in order to capture the characteristics of the recent increase in activist investor efforts. The initial screen for relevant activist efforts was the Georgeson Shareholder Annual Corporate Governance Review for each of the relevant years. During this time period there were approximately 200 contested proxy solicitations by shareholders (Georgeson 2005). Proxy contests were screened to include only those initiated by activist investors, as defined above. In addition to the Georgeson Shareholder Annual Corporate Governance Review reports, business and financial press reports included in Lexis-Nexis provided additional cases of activist efforts that were not formal proxy contests. This screen reduced the overall size of the sample to about 75. This sample was further reduced by those companies for which the CRSP database (maintained by the Center for Research in Security Prices) did not have excess return information. The CRSP database contains excess returns for shares listed on NYSE, Amex and Nasdaq. The limitation based on CRSP caused a disproportionate reduction in the number of activist efforts involving smaller companies which tend not to be covered by CRSP.

In the final sample, events classified as successful campaigns exceeded those classified as failures (27 of 40 cases were classified as successes). This potential bias in favor of successful campaigns is likely the result of the classification of settlements of proxy contests between the activist investor and management. Cases that were settled before a proxy vote, in the case of a formal proxy contest, were classified as a success because in all observed cases of a settlement the activist investor achieved the major objective of the campaign.

V. Data Analysis

The CRSP database computes excess returns for stocks traded on the major stock exchanges. Stocks are categorized into deciles based on certain characteristics and excess returns are benchmarked against other companies in the relevant deciles. CRSP uses deciles based on Beta, standard deviation of returns and market capitalization. In this analysis the Beta deciles were the relevant benchmark to measure each company's relative performance against other companies with similar exposure to market risk.

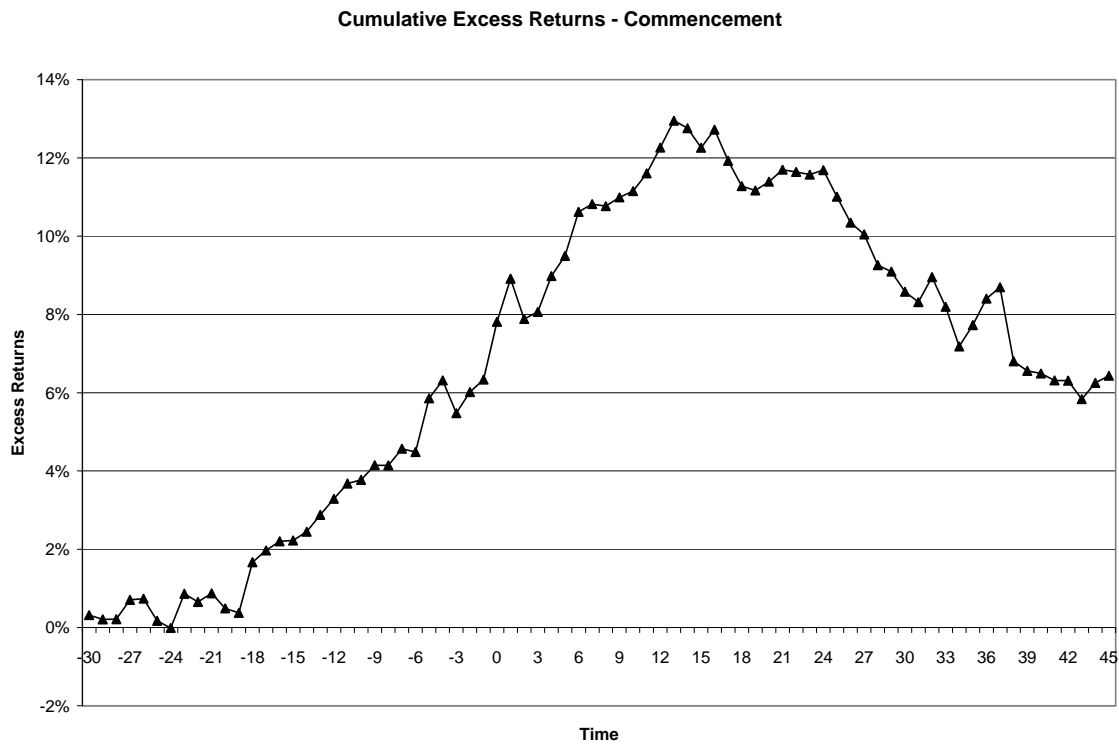
The CRSP database provides Beta excess returns on a daily basis. For the analysis, each daily excess return was converted into a continuously compounded rate using the natural logarithm. The compounded excess returns were measured over a variety of event windows ranging from as much as 30 days before to 45 days after each announcement to as little as 2 days before and after each announcement. This technique of examining differing time periods was designed to both capture the key excess return periods in the analysis and to determine if the market was able to discount rumors or other non-public predictors of announcements.

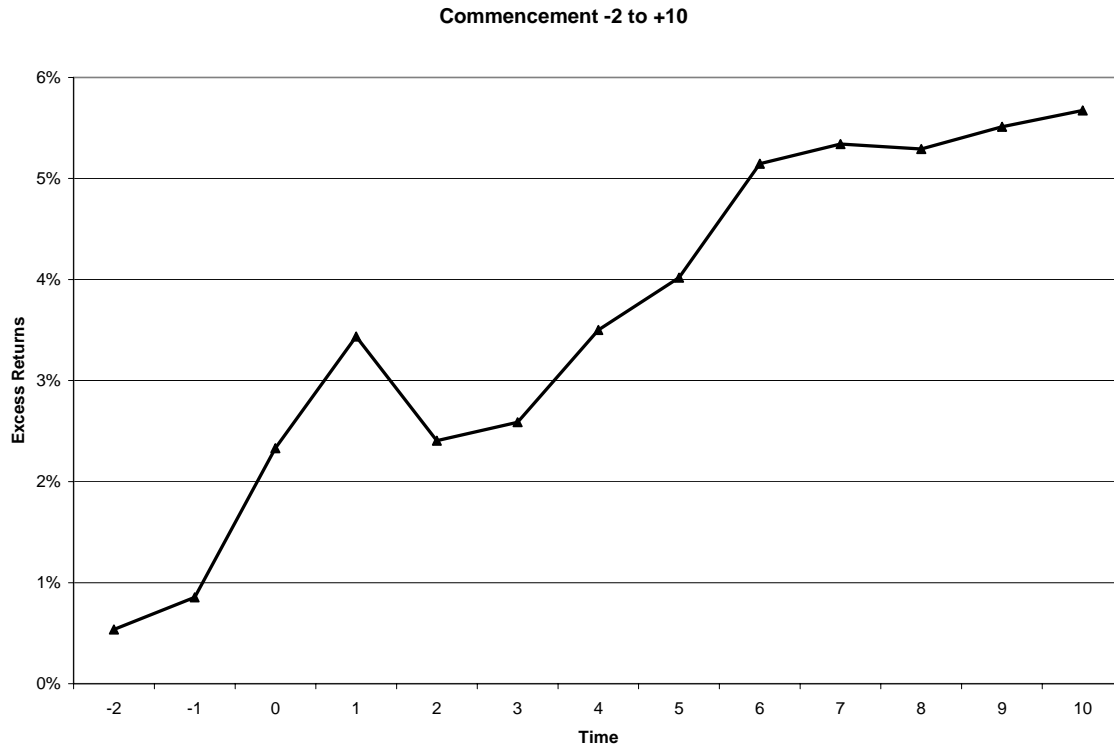
VI. Event Study Results

A. Commencement

Windows of -30 to +30 (the "61-day Period") and -30 to +45 (the "76-day Period") were used to measure cumulative excess returns following the public announcement of an activist investor's commencement of a campaign to influence management and following the public announcement of the conclusion of the campaign. Mean cumulative excess returns during the 61-day Period surrounding commencement was +8.6% significant at 5% and the median excess return was 9.1%. During the 76-day Period surrounding commencement the mean excess return fell to +6.4% with a t statistic of 1.22, while the median excess return was 9.6%. While excess

returns during the 76-day Period were not necessarily significant in a strict sense, the trend is consistent with the 61-day Period. Both time periods show that excess returns become positive in the period leading up to the first announcement and reach their apex approximately 13 trading days after the announcement. These trends are shown in more detail in the graphs below for the 76-day Period as well as for the period immediately surrounding the announcement.





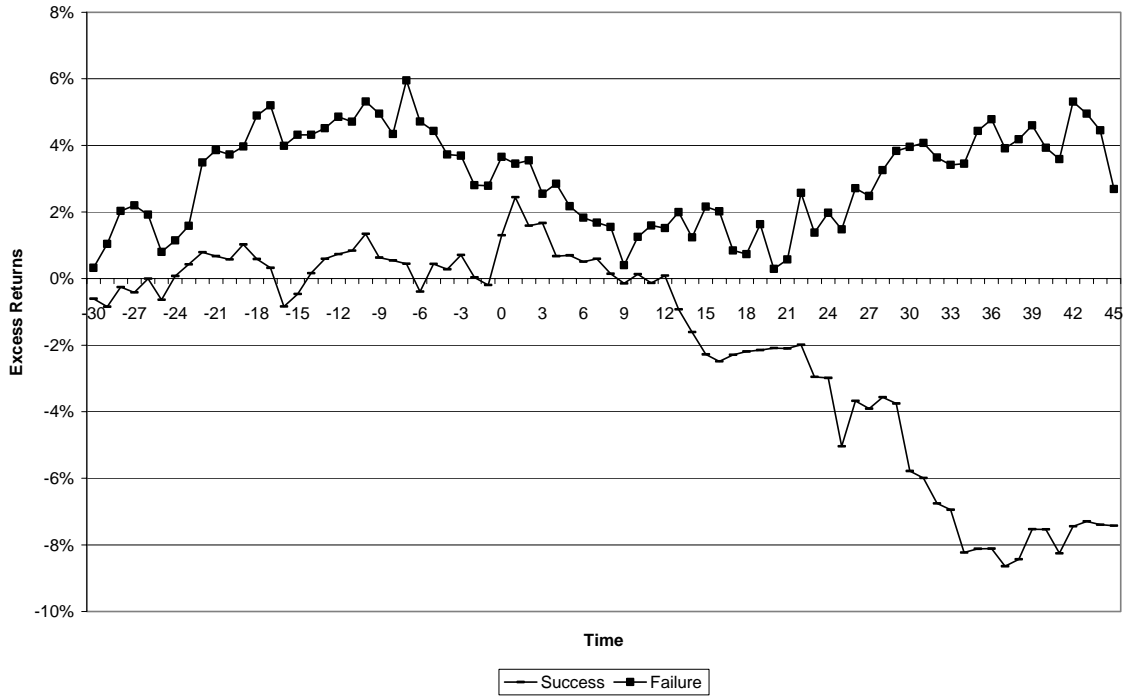
B. Conclusion

At the conclusion of activist investor campaigns, the trend in cumulative excess returns is less clear. The table below shows the mean, median and t statistic for cases of activist investor success, failure and all conclusions.

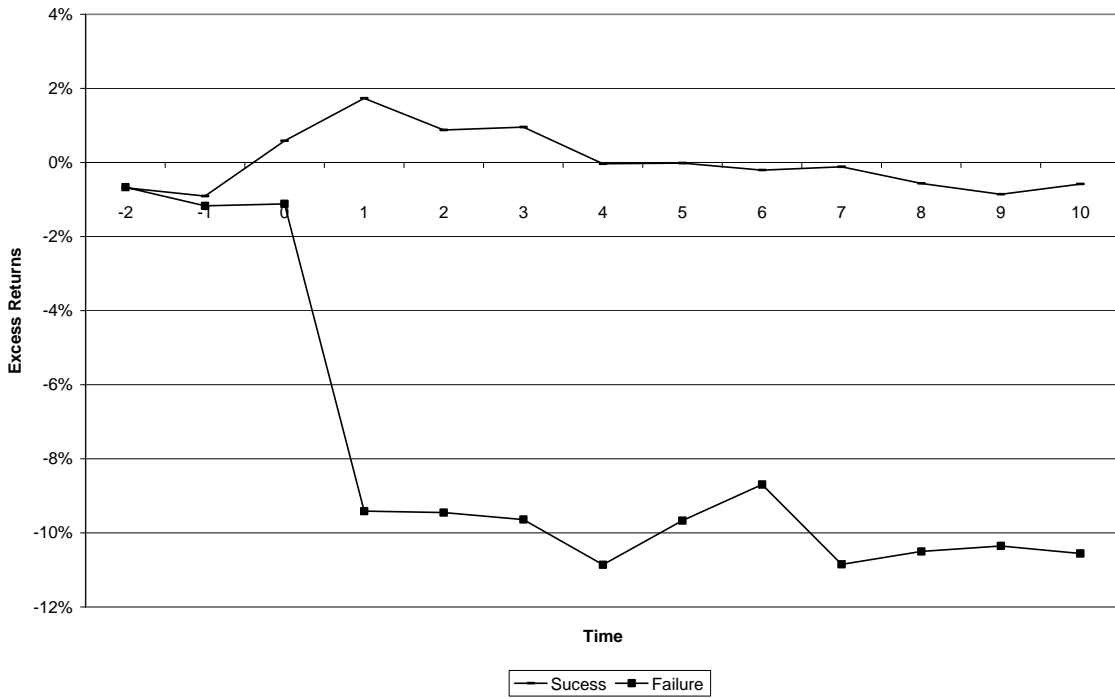
	Excess Returns - Conclusion					
	-30 to +30			-30 to +45		
	Mean	Median	t statistic	Mean	Median	t statistic
Activist Success	(0.058)	(0.002)	(1.18)	(0.074)	(0.055)	(1.75)
Activist Failure	0.040	(0.003)	1.17	0.027	0.018	0.68
All Conclusions	(0.025)	(0.003)	(0.73)	(0.041)	(0.053)	(1.27)

Excess returns during the period 76-day Period surrounding conclusion of a campaign are generally negative in the case of an activist investor's success and slightly positive in the case of failure. The trend in excess returns is shown in the graph below for the 76-day Period as well as for the period immediately surrounding the conclusion.

Cumulative Excess Returns - Conclusion



Conclusion -2 to +10



Showing negative or zero excess returns at the conclusion of all campaigns appears to be inconsistent with the positive excess returns following the initiation of an activist campaign. In addition, excess returns over the 76-day Period appear to be more negative in the cases where an activist is successful as compared to when an activist fails. A plausible explanation for better returns in the case of a failed campaign is that when activist investors fail, they often continue to publicly pressure management and have the option to re-initiate a campaign. The data also show that success by an activist investor leads to near zero excess returns in the period leading up to the conclusion, positive excess return when success is announced, followed by negative excess returns thereafter. This may represent the market discounting the possibility of improved corporate performance or a potential sale of the company prior to the conclusion when it is apparent that the activist investor will prevail. When the activist is ultimately successful, however, the activist may not be willing or able to implement all value enhancing proposals and the price premium may, therefore, be reduced.

Cumulative excess returns at the commencement and conclusion of activist campaigns suggest that the market is able to discount the commencement of the campaign and predict whether the campaign will be successful. In terms of the announcement, excess returns become positive in the trading days immediately preceding the public announcement which likely reflects rumors in the market of an imminent challenge to management. Specifically, modern activist campaigns are often led by one activist investor but other hedge funds may formally join the effort, or take a position in the shares alongside the lead activist.¹⁰ This phenomenon could cause activist investors to begin taking a position in the shares before the formal announcement. Provided the investors own less than 5% of the shares there is no required disclosure of the

¹⁰ Dan Roberts and Stephen Schurr, *Tyco Now Targeted by Activist Hedge Funds*, Financial Times, February 27, 2006.

ownership stake which would delay the public announcement of the campaign. Similarly, as an activist investor purchases shares in preparation for a campaign, they have an incentive to begin publicizing their efforts to unlock shareholder value to begin gaining shareholder support for their campaign. These efforts can often include assembling a group of other activist investors to purchase blocks of shares which would further boost returns prior to a public announcement. All of these factors would contribute to the market anticipating the start of a contest. In terms of the conclusion of the campaign, the market appears to be able to predict the outcome – with a low statistical significance. The ability to predict the outcome is likely the result of the ongoing public nature of the campaign that is covered in the press, in SEC filings and often in other public announcements by third party corporate governance evaluators such as Institutional Shareholder Services.

The table below displays the cumulative excess returns over a series of time periods in relation to the announcement date. The mean and median points show that the data tend to be skewed because of several observations with very high excess returns. The mean has, therefore, been supplemented with a p-value derived from a non-parametric test measuring positive or negative excess returns regardless of the size of the return and computed the probability of positive returns as .5. The p-values displayed below show the probability that the number of observed announcements with positive returns would equal or exceed the number actual observed if the probability of positive returns was .5. Both the analysis of the sample mean as well as the non-parametric test show positive excess returns surrounding the announcement date and positive excess returns in the period just before and immediately following conclusion of an activist campaign.

	Cumulative Excess Returns in the Period Surrounding Announcement Date															
	Commencement				Success				Failure				All Conclusions			
	Mean	Median	t stat	p-value	Mean	Median	t stat	p-value	Mean	Median	t stat	p-value	Mean	Median	t stat	p-value
T + 2	0.015	0.006	1.14	0.04	0.018	0.012	1.94	0.00	0.008	0.006	0.58	0.13	0.014	0.008	1.93	0.00
+/- 2	0.024	0.012	1.60	0.00	0.009	0.016	0.77	0.04	(0.001)	(0.003)	(0.10)	0.50	0.005	0.008	0.61	0.10
T + 5	0.032	0.020	2.22	0.02	0.009	0.011	0.83	0.01	(0.006)	(0.002)	(0.43)	0.13	0.004	0.007	0.45	0.01
-2 - +5	0.040	0.039	2.35	0.00	(0.000)	0.009	(0.01)	0.08	(0.015)	(0.001)	(0.85)	0.29	(0.005)	(0.001)	(0.47)	0.10
+/- 5	0.050	0.055	2.02	0.00	0.011	0.008	0.76	0.28	(0.025)	(0.028)	(1.33)	0.87	(0.001)	(0.005)	(0.11)	0.63
T + 10	0.048	0.035	2.79	0.00	0.003	(0.002)	0.23	0.58	(0.015)	(0.019)	(0.86)	0.95	(0.003)	(0.004)	(0.26)	0.90
-2 - +10	0.057	0.065	2.73	0.00	(0.006)	0.003	(0.32)	0.42	(0.024)	(0.029)	(1.25)	0.87	(0.012)	(0.005)	(0.88)	0.74
+/- 10	0.075	0.081	2.15	0.00	(0.007)	0.013	(0.35)	0.28	(0.035)	(0.050)	(1.63)	0.95	(0.016)	(0.021)	(1.07)	0.74
T + 30	0.022	0.024	1.00	0.02	(0.056)	(0.029)	(1.77)	0.72	0.012	0.016	0.39	0.29	(0.033)	(0.005)	(1.41)	0.63
-2 - +30	0.031	0.064	1.23	0.08	(0.065)	(0.011)	(1.90)	0.72	0.003	0.062	0.09	0.13	(0.042)	(0.005)	(1.68)	0.50
+/- 30	0.086	0.091	2.00	0.00	(0.058)	(0.002)	(1.18)	0.16	0.040	(0.003)	1.17	0.29	(0.025)	(0.003)	(0.73)	0.17
-30/+45	0.064	0.096	1.22	0.00	(0.074)	(0.055)	(1.75)	0.92	0.027	0.018	0.68	0.29	(0.041)	(0.053)	(1.27)	0.83

VII. Predicting Excess Returns

Activist investors claim that their interests are completely aligned with other shareholders and that their campaigns maximize returns to all shareholders. Assuming that this is true, investors should attempt to identify companies that are potential targets of activist campaigns in order to capture the positive excess returns from the initial announcement of a campaign. To find predictors of companies that will yield positive excess returns, all activist campaigns with excess returns data were used in a least squares linear regression model. The usable sample was 34 companies that had faced an activist challenge in the period 2001 to 2005. Using this data, the linear regression did not show a significant linear relationship between financial factors of the firm and excess returns.¹¹ The lack of a relationship across different years included in the sample may be evidence of what some market commentators suggest is a shift in the types of investments made by activist investors; specifically, that activist investors have begun targeting larger companies.¹² As recently as 2004, activist investors were focused primarily on companies with a market capitalization of less than \$4 billion. This has changed with high profile activist

¹¹ The financial factors used in the Best Subsets and subsequent least squares model were: # of Employees, Market Capitalization, Cash/Total Assets, Diluted EPS, Net Income, 2-year price change in common stock, 2-year EBIT growth, Price/Book, P/E (Diluted), ROE, Pre-tax ROA, Stockholders Equity/Total Assets, Cash Flow from Operations/Total Liabilities and Percentage of shares held by the Activist Investor.

¹² James Altucher, *What's Behind Carl Icahn's Headlines*, available at www.thestreet.com May 16, 2005. Suggesting that activist investors are initiating campaigns in larger companies.

campaigns at large companies such as Carl Icahn's recent successful battle with Time Warner and Eddie Lampert's efforts to complete the Kmart and Sears merger in late 2004.¹³

In order to identify key financial factors in more recent activist campaigns the sample was adjusted to include data on campaigns grouped by the year the campaign was initiated. Using this analysis, the regression model for 2005 was an effective predictor of excess returns. The y variable in the regression was the compounded excess returns from -5 to +5 from the initial announcement. This time period was used because it captured the excess returns realized before the announcement as well as the initial positive excess returns in the period immediately following the announcement. Using a Best Subsets analysis and the x variables used for the analysis of all years, the following regression model was derived:

$$\text{BXRET } +/-5 \text{ (St)} = 0.493 + 3.93 \text{ Csh/Assets} - 0.220 \text{ Price/Book} - 4.01 \text{ ShEquity/Assests} \\ + 1.45 \text{ CFO/Tot Liab} + 8.65 \text{ Activist \%} - 0.158 \text{ 2-yr Prc Chng} \\ + 0.000521 \text{ Net Inc} + 0.00930 \text{ P/E (Dil)}$$

Predictor	Coef	SE Coef	T	P
Constant	0.49337	0.08158	6.05	0.002
Csh/Assets	3.9330	0.5948	6.61	0.001
Price/Book	-0.21986	0.02570	-8.55	0.000
ShEquity/Assests	-4.0085	0.4250	-9.43	0.000
CFO/Tot Liab	1.4473	0.2755	5.25	0.003
Activist %	8.654	1.147	7.55	0.001
2-yr Prc Chng	-0.15812	0.06998	-2.26	0.073
Net Inc	0.0005208	0.0001091	4.78	0.005
P/E (Dil)	0.009301	0.001437	6.47	0.001

S = 0.0753487 R-Sq = 96.5% R-Sq(adj) = 90.8%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	8	0.778190	0.097274	17.13	0.003
Residual Error	5	0.028387	0.005677		
Total	13	0.806577			

Source	DF	Seq SS
Csh/Assets	1	0.002036
Price/Book	1	0.047251
SEQ/Assests	1	0.123650
CFO/Tot Liab	1	0.076496
Activist %	1	0.069024
2-yr Prc Chng	1	0.129101
Net Inc	1	0.092790
P/E (Dil)	1	0.237841

¹³ John Garper, *Hedge Fund Agitators Deserve to be Heard*, Financial Times, November 17, 2005.

This regression output suggests that activist investors are more likely to achieve positive excess returns investing in companies that provide significant liquidity from operations with a strong balance sheet but are priced at a discount. Specifically, both Price/Book value and 2-year stock performance have negative coefficients, while Cash/Total Assets and Cash Flow from Operations/Total Liabilities are positive. These coefficients are consistent with activist investors seeking value investments and working with management to unlock the value, often by selling a business line or increasing dividends and share repurchases. Lastly, the percentage ownership by the activist investor had a coefficient of 8.7 significant at .1% suggesting that for a larger percentage of shares owned by the activist investor higher excess returns will be predicted. In this analysis the share ownership percentage included shares beneficially owned by the activist investor and those shares held by another party that was part of a voting group with the activist investor. The shares held by the activist investor also included shares that were bought immediately before the announcement of the activist campaign.

This same regression model was fit on excess returns for the periods -10 to +10 and -30 to +30. The regression model for period -10 to +10 was similar to the period -5 to +5 although with a lower R^2 and higher p-values for each x variable. This is to be expected because of its high correlation with the -5 to +5 period. The model for the -30 to +30 period however did not show a significant linear relationship with the factors. This is likely due to the higher variance in the -30 to +30 period as compared with the period immediately before and after the announcement. This relationship is also consistent with positive excess returns being clustered in the period immediately before and for two weeks following the initial announcement.

One relationship not reflected in the regression model was the overall relationship between the size of the company and excess returns. When approaching this study *a priori*,

market capitalization was expected to be a strong predictor of excess returns with a negative sign to its coefficient. This expectation was based on past experience with activist investors that focused on smaller companies with the idea that an activist could purchase a larger percentage of shares and wield more influence at a smaller company. There are two possible explanations for this counterintuitive result. First, the CRSP database does not provide information on excess returns for many small companies, causing a possible bias in the sample towards larger market capitalization companies. Second, and perhaps more important for future activist efforts, hedge funds today have more capital to invest and have deployed that capital by pushing for corporate changes at larger companies.¹⁴

An area for further study in this analysis is to compare excess returns from shareholder actions by traditional institutional investors such as labor unions or pension funds. Institutional investors have traditionally favored focusing on pushing for corporate governance improvements at larger companies and not seeking board seats or asset sales. Such a comparison may show that traditional institutional investors are focused on larger companies and there may be less of a relationship between value (Price/Book and P/E) than is evident for hedge funds.

VIII. Conclusion

Activist investors appear to create positive excess returns at the commencement of an activist campaign. Because these investors are not seeking control, but rather to influence management and other shareholders, the market appears to be able to discount activist campaigns in the days before the official announcement. Further, activist investor campaigns provide positive excess returns for investors in the two-week period following the announcement. These positive excess returns are likely the result of the activist investor's need to build public support

¹⁴ Andrew Ross Sorkin, *Activist Investors change the Landscape; Corporate Boards Cannot Ignore them*, The Grand Rapids Press, January 8, 2006.

for their campaign which will lead the investor to communicate publicly their recommendation to increase shareholder. Lastly, in the limited number of activist investor campaigns by hedge funds included in this sample, companies with underperforming shares, strong cash flow and significant holdings by the activist investor are most likely to provide excess returns that exceed the overall average for activist campaigns.

Appendix A – List of Activist Investor Campaigns

Activist Campaigns with Excess Returns Information					
	Year	Company	Activist	Success	Activist %
1	2001	Alltrista Corp.	Marlin Partners II LP	Yes	9.76%
2	2001	Computer Associates	Sam Wyly	No	0.50%
3	2001	Hercules, Inc.	Samuel Heyman	Yes	9.90%
4	2001	ICN Pharmaceuticals	Sp Situation Partrs and Providence Cap.	Yes	4.50%
5	2001	Mayor's Jewelers	Opportunity Partners	Yes	9.60%
6	2001	Visx, Inc.	Carl Icahn and Barberry Corp	Yes	10.50%
7	2002	Aetna Inc.	Providence Investors LLC	No	16.80%
8	2002	Chad Therapeutics	Committee to Restore Sharhlder Value	No	7.30%
9	2002	Elite Pharmaceuticals	The Elite Value Committee	Yes	8.60%
10	2002	Kankakee Bancorp, Inc.	Lawrence Seidman	No	5.80%
11	2002	Tyco International Ltd	Relational Investors	Yes	16.00%
12	2002	United Industrial Corp.	Steel Partners	Yes	10.00%
13	2003	Chad Therapeutics	McDowell Investments LP	No	4.20%
14	2003	Dave & Busters	Dolphin Ltd. Partnership I LP	No	9.50%
15	2003	Equidyne Corp.	MFC Bancorp Ltd.	Yes	14.50%
16	2003	Hercules, Inc.	Shareholders Comm for Managt	No	9.06%
17	2003	JC Penney	Relational Investors	Yes	4.80%
18	2003	National Semiconductor	Relational Investors	Yes	7.00%
19	2003	Post Properties, Inc.	John A. Williams	No	2.30%
20	2003	Visx, Inc.	Carl Ichan	No	11.00%
21	2004	Alaska Air Group	Steve Nieman	No	0.50%
22	2004	Bally Total Fitness Corp.	Liberation Investments Group	Yes	5.81%
23	2004	Mylan Labs	Carl Icahn	Yes	9.80%
24	2004	Payless Shoesource Inc	Barrington Capital Group	No	1.10%
25	2004	Water Pik Technologies	Tennenbaum Capital Partners	Yes	19.20%
26	2005	Airnet Systems	Opportunity Partners	Yes	9.00%
27	2005	Beverly Enterprises Inc.	Formation Capital LLC	Yes	8.10%
28	2005	BKF Capital Group, Inc.	Steel Partners II, L.P.	Yes	16.80%
29	2005	Blockbuster, Inc.	Carl Ichan	Yes	9.70%
30	2005	Cenveo	Burton Capital Mgmt/Robert Burton	Yes	9.60%
31	2005	Cornell Companies	Pirate Capital LLC	Yes	13.20%
32	2005	Kerr McGee	Carl Ichan	Yes	8.00%
33	2005	OfficeMax Inc	K Capital	Yes	6.20%
34	2005	Six Flags	Daniel Snyder/ Red Zone LLC	Yes	11.70%
35	2005	Sizeler Property Investors Inc	First Union Real Estate Equity	Yes	9.90%
36	2005	SPX Corp	Relational Investors	No	5.70%
37	2005	Star Gas	Third Point LLC	Yes	6.00%
38	2005	Temple Inland	Carl Icahn	No	2.00%
39	2005	Time Warner	Carl Icahn	Yes	6.00%
40	2005	Wendys International	Pershing Square Cap/Highfields Cap	Yes	10.00%