This paper will attempt to answer several questions related to the nature of the effects that international events have on the price movements of U.S. stocks. It will start by examining how U.S. investors in closed-end country funds react to international events. It will then research whether international events have a greater impact on U.S. companies that are more internationally exposed (i.e., have a larger than average percent of their total sales, assets and employees outside of U.S.). The final part of the analysis will attempt to examine the benefits of international diversification for U.S. investors. Specifically, based on observed correlations between U.S. and foreign markets, it will try to answer whether or not it pays for U.S. investors to diversify their risks by investing in the stocks of foreign companies, and whether international diversification of U.S. firms plays a major role today.

Part I: U.S. investors reactions to salient news in closed-end country funds [1].

I. Introduction: In their paper "Reaction to Salient News in Closed-End Country Funds", Peter Klibanoff, Owen Lamont and Thierry A. Wizman use panel data on prices and net asset values to test whether dramatic country-specific news affects the response of closed-end country fund prices to asset value. The article concludes that in a typical week, prices underreact to changes in fundamentals; the short-run elasticity of price with respect to asset value is significantly less than one (almost inelastic). In weeks with news appearing on the front page of *The New York Times*, prices react much more; the elasticity of price with respect to asset value is closer to one. These results are consistent with the hypothesis that international news events lead some U.S. investors to react more quickly than others.

The hypothesis examined here is that "individual investors assign more importance to more prominent news and assign less importance to less prominent news, even if two pieces of

news have the same effect on fundamental value" [1], (673). Specifically, the article tests whether the high level of salience generated by the coverage of a major news event on the front page of *The New York Times* (the *Times*) is correlated with the degree of reaction in financial asset prices. Closed-end country funds' prices and net asset values (NAVs) provide a natural way of testing the hypothesis concerning the salience of news because NAV is an accurate measure of fundamental value. The NAV is a benchmark against which we can gauge the response of the price of a country fund to changes in fundamentals in the presence of news. A basic assumption made here is that the information on the front page of the *Times* is redundant if one knows the NAV, because the NAV already incorporates fundamental information. Under this assumption, the investor derives no pertinent information from reading the *Times* that he could not infer directly from the NAV.

II. Closed-end country funds: Country funds are publicly traded closed-end investment companies that hold portfolios of equities of particular foreign countries. In December 1984, only 4 U.S.-listed country funds existed. By December 1994, 54 single-country funds traded on the New York Stock Exchange (NYSE), each specializing in one of 30 countries. In 2002, there were 517 such funds, specializing in over 50 countries. The emergence of country funds during the 1980s and early 1990s parallels the growth in capitalization and liquidity of foreign stock markets.

Like most publicly traded closed-end funds, country funds typically trade at a discount or premium to the underlying NAV of the portfolio they hold. Dramatic deviations of price from the NAV sometimes occur in the wake of prominent news regarding the host country. For example, in autumn of 1989, the fall of Berlin Wall was accompanied by a large (but temporary) rise in the premium of the Germany Fund, which reached 100% in January 1990. Closed-end fund

discounts and premiums contradict the value-additivity principle of efficient and frictionless capital markets. One literature states that discounts usually reflect circumstances that preclude costless cross-border transactions, such as official and unofficial barriers to capital movements, transaction costs and the risk arising from the time required to complete a full arbitrage transaction. Time variation in the discounts is caused by time variation in these barriers, costs and risks. A competing literature concludes that factors which are both empirically plausible and economically rational cannot fully explain the joint behavior of discounts and returns. This literature explores the role of irrational investors, called "noise traders", who are prominent in the closed-end fund market and who interact in this market with rational investors. Another literature shows that the fund prices are "sticky", i.e., they do not move as much as their respective NAVs following movements in the host country's stock market. On the other hand, it points out, fund prices are overly sensitive to movements in world and domestic (U.S.) stock returns, especially returns on small-capitalization U.S. stocks, which have a clientele (small retail investors) that resembles that of country funds.

III. The Theoretical Framework: The authors of the article make the following hypothesis about the behavior of traders: 1) "some traders in the closed-end country fund market form expectations incorrectly", 2) these traders "are usually slow to react to changes in fundamentals", and, most importantly, 3) "major news events" lead these traders to "temporarily react more quickly than usual to changes in fundamentals" [1], (675).

The model for the closed-end country fund market consists of two markets: a market for the underlying assets in the country fund's host country, and a market for the closed-end country fund shares in the public market of the country in which the country fund is listed. Traders in the market for the fund's underlying assets (in the country fund's host country) are assumed to be

fully rational and thus make use of all relevant available information that might be reported in the news. In the public market for fund shares (in this case, the U.S.), however, there are non-fundamental influences on price. Some participants in this market "form their expectations incorrectly and trade on the basis of these incorrect expectations." Specifically, these "unsophisticated investors underweigh current public information and overweight lagged public information in forming their expectations." Another assumption is that "salient news coverage temporarily reduces the extent to which unsophisticated investors underweigh current information." Because some investors incorporate new information faster in the presence of news coverage the fund price "will also temporarily incorporate new information faster. [1], (693)" Finally, markets are assumed to be incomplete. "Market incompleteness is quite realistic for country funds" [1], (677). This is because for many of the funds that were studied, trading in the underlying security is "difficult for U.S. investors because of regulatory restrictions on investing and repatriating funds [1], (677)." And even legal restrictions aside, "high trading costs can create effectively segmented markets"[1], (677).

IV. Data: *1) Sample of Country Funds:* The sample of country funds consisted of 39 single-country publicly traded funds that were covered in *Barron's* publicly traded funds column from January 1986 through March 1994, and that had at least twelve months of price and NAV data. Weekly data was collected representing 25 countries: Argentina, Australia, Austria, Brazil, Chile, France, Germany, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Malaysia, Mexico, the Philippines, Portugal, Singapore, Spain, Switzerland, Taiwan, Thailand, Turkey, and the United Kingdom. Since foreign markets always close on a given day prior to the close of markets in New York, "prices and NAVs [are] only approximately synchronous, even though they correspond to the same calendar day's trading sessions" [1], (678). Because of these differences

in closing times, the fund data collected were weekly instead of daily: weekly closing values provide much more overlap in trading times between New York and international markets than do daily returns. There was a total of 9781 fund-weeks of observations; on average there were 250 weeks of observations per fund and 23 fund-observations per week. From the summary statistics for the country funds used in the sample, several points stand out. First, "although country funds on average traded at a discount during the [studied] period, the average discount [was] only about 1%" [1], (678). Second, discounts and premiums varied enormously, from a premium of 205% to a discount of 56%. Third, the prices of country funds were "far more variable than their NAVs" [1], (678). Last, measured price returns were "significantly negatively auto-correlated, but NAV returns [were] significantly positively correlated" [1], (679). The return on price was defined as:

$$R_p(t) = \ln (P(t)) + D(t) - \ln (P(t-1)),$$

and the return on NAV was defined as:

$$R_n(t) = \ln (N(t)) + D(t) - \ln (N(t-1)),$$

where P(t) was the price of the fund, N(t) was the Net Asset Value (NAV), and D(t) was the total distribution (dividend income + capital gains) made from the fund or the NAV.

2) News Events: The goal was to find recent (to the studied time period) historical events that were "salient", that is, dramatic, large, and, "in the opinion of the average individual investor, important for stock market returns of the relevant country" [1], (679). The salience of major news events was measured using the column width of front page articles in the *Times*. To focus on the most prominent news stories, only those stories whose width was greater than or equal to two columns were used in the analysis. In the final sample, salient news occurred in 66 different weeks. Since some events were attached to more than one fund, there were a total of 97

fund-weeks in which salient news events took place, which was about 1% of the total fund-week sample (97 / 9781 = 0.992%). For each fund-week, an indicator variable, NEWS (t), was created, which was set equal to one if a news event occurred within the week t. It was found that the absolute value and standard deviation of both price returns and NAV returns were sharply higher in news weeks. Since these increases were statistically significant, it confirmed to the authors that they correctly identified fund-specific news that affected specific funds during specific weeks.

V. The basic results: *1) Underreaction:* After regressing $R_p(t)$ on $R_n(t)$, the systematic underreaction of fund prices to fund NAVs was discovered. This is seen in four major observations from the regression analysis. First, when NAV rose by 1% in a given week, prices only rose 0.64%. Second, even two weeks after the initial change in asset value, fund prices only incorporated 80% of the asset return. This shows that "two weeks ago is still making its way into this week's price return", showing underreaction [1], (682). Third, the regression has produced "a standard result in the closed-end fund literature: discounts and premia help forecast fund returns" [1], (682). Finally, "the idiosyncratic components of price returns only reflect half of the idiosyncratic contemporaneous NAV returns", slightly increasing estimated underreaction.

2) The effect of news: The researchers' null hypothesis was that "the presence of news events does not change the reaction of price to contemporaneous changes in NAV" [1], (683). The regressions show that the "reaction to contemporaneous NAV is significantly higher in news weeks" [1], (683). In non-news weeks, the elasticity of prices with respect to NAV is 0.47, significantly below 1. In news weeks, the elasticity is 0.80, significantly higher than 0.47, but not significantly different from 1.To account for higher volatility in news weeks, the authors estimated their regressions using weighted least squares. They also entered the NEWS(t) dummy

variable itself as a control variable, although "it is never significant and does not affect the coefficient of interest" [1], (683). One of the concerns that the researchers had was that large changes in NAV ($R_n(t)$), and not the salient news, could be the reason for large movements in the funds' prices ($R_p(t)$). This concern arose due to the fact that "large changes in NAV are more easily observable to market participants who set prices" [1], (685). But this concern was dismissed after an observation was made that "large movements in NAV result in a (statistically significant) smaller proportional response in price returns, not a bigger response, and the response of prices in news weeks is still significantly larger than for non-news weeks" [1], (685). In summary, the evidence found was consistent with the hypothesis that "investors underreact to the mundane changes in NAV that take place every week, but change their behavior when they observe dramatic news" [1], (685). In weeks where news events occur, "they respond much more to the change in fundamentals" [1], (685). The researchers were unable to answer the question of whether the investors overreact to exciting news.

3) Volume and News: If irrational investors react more to salient news, "one might expect [trading] volume to rise during news weeks as irrational traders increase their market participation." Results show that trading volume was 41% higher than average during the weeks in which news event occurs. Controlling for last's week volume and for aggregate volume movements that affected all funds, volume was 25% to 34% higher in news weeks [1], (686). Thus, the evidence on volume was "consistent with the presence of unsophisticated investors whose willingness to trade increase[d] with news" [1], (686). However, the volume evidence is "certainly not conclusive, because it is consistent with many other explanations, such as different (rational) interpretation of news" [1], (686). In other words, the increases in trading volume

might just as well result from sophisticated investors rationally analyzing the news and reacting to them.

VI. Conclusion: The basic result of the research is that when there is a significant international event that caused big moves in the NAV(s) of the closed-end country fund(s), U.S. investors are likely to react quicker if this international news is reported in *The New York Times* (salient news) than if this news is not reported by *The Times.* In the latter case, U.S. investors underreact to international events.

This research tested the "hypothesis that the relative salience of news plays a role in the magnitude if investors' reaction to changes in economic fundamentals" [1], (689). Closed-end country funds were used to test this hypothesis because they "provide both an obvious measure of fundamentals, the NAV, and an obvious measure of salient news, front-page *Times* articles" [1], (690). Their framework shows that "if some investors react more to fundamentals after important and well-publicized news events focus attention on the host country (as suggested by the relative salience hypothesis), then prices will react more to NAV after these events" [1], (691). The empirical results support this hypothesis. First, "the results from estimating simple return-generating equations indicate that price returns are in fact sticky, in that they display dependence on past changes in fundamentals in addition to current changes in fundamentals" [1], (691). Second, "using the country-specific news events to construct a measure of prominent news, regression results suggest that the reaction to changes in fundamentals is quicker after news events. The short-term elasticity of prices to fundamentals temporarily rises" [1], (691).

One important conclusion is that "the information on the front page headlines of *The Times* is redundant if one has access to NAV (from the *Wall Street Journal* or *Barron's*) and if NAV is a good measure of fundamentals", and that "…newspapers could play a role in focusing

the attention of rational, though computationally constrained, investors" only if the NAV measure is imperfect [1], (691). However, evidence suggests that NAV is a "good measure of fundamental value", both in news weeks and in non-news weeks. Thus, "there seems little reason for rational investors to react more to NAV in news weeks" [1], (691).

Part II: U.S. equity investors reaction to International Events (my study)

Wesley S. Chan of M.I.T., in his paper called "Stock Price Reaction to News and No-News: Drift and Reversal After Headlines" states that "there is a large amount of evidence that stock prices are predictable" [2], (p. 2). "In the last decade," says he, "various studies have shown that stock returns exhibit reversals at weekly and 3-5 year intervals, and drift over 12-month periods. Some research shows that stock prices appear to drift after important corporate events for up to several months. This suggests that some of the drift is driven by underreaction to information" [2], (p. 2). However, there are also numerous days when "financial markets move dramatically, but without any apparent economic news or stimulus" [2], (p. 2). In other words, he states that there appears to be "excess volatility" in asset prices, which suggests that investors may react (or overreact) to unobserved stimuli. He thus attempts to answer the question of whether there is a predictable difference between stock returns after public news announcements and returns after large price movements, but no public news. Using a database of news stories about companies from major news sources, Mr. Chan looks at stock returns after two sources of information. The first is major public announcements, which "are identifiable from headlines and extreme concurrent returns". The second source is "large price movements unaccompanied by any identifiable news".

In abstract, he examines returns to a subset of stocks after public news about them is released. He then compares them to other stocks with similar monthly returns, but no identifiable public news. He states that there is a major difference between return patterns for the two sets. He finds evidence of post-news drift, which supports the idea that investors underreact to information. “This is strongest after bad news”, which means that “prices are slow to reflect bad public news” [2], (p. 3). He also finds some evidence of reversals after extreme price movements that were unaccompanied by public news. “Stocks that had no news stories in the event month tend to reverse in the subsequent month” [2], (p. 3). These patterns were seen “even after excluding earnings announcements, controlling for potential risk exposure, and other adjustments”, after controlling for size, book-to-market, and liquidity influences [2], (p. 3). However, these appear to apply mainly to smaller stocks. Furthermore, he finds evidence that trading frictions, such as short-sale constraints, “may play a role in the post-bad-news drift pattern” [2], (p.3). It “takes some time to see the full impact of a single news item on a stock, due to frictions”. Finally, he discovers that after investors are slow to respond to valid information, which causes drift, they overreact to price shocks, causing “excess” trading volume and volatility and leading to a reversal. He concludes by stating that “the underreaction appears to result not from barriers to ‘knowing’ news, but barriers to ‘understanding’ it”, which is a distinction between information dissemination and information interpretation.

Using Mr. Chan’s paper as a framework, I attempt to answer my own question of whether there is overreaction or underreaction by U.S. investors to international events. The U.S. stocks that I look at are the 30 companies in the Dow Jones Industrial Average (please Table #1). I collected weekly stock price data for these 30 companies, as well as for the Dow as a whole, and the S&P500 Index for the period of 12 years, from 1990 to 2001, for a total of about 636 weekly

observations for each stock. I want to test whether the stock prices of the most internationally exposed companies in the Dow (Top Dow, or multinationals) react more then the stock prices of least internationally exposed companies in the Dow (Bottom Dow, or domestics). Based on the information from Bloomberg, Foreign Investment Reports, Annual Reports and corporate web sites of each of the 30 companies in the Dow, I rank all 30 companies in the Dow based on their Foreign Sales, Assets and Employees as a percentage of Total Sales, Assets and Employees, as well as the company's TransNationality Index (TNI) (I assign different weights to each of these factors, please see enclosed Table #2a through Table #2i for complete details). Based on these rankings, I form my portfolios of Top Dow and Bottom Dow companies for each year during the 1990-2001 period. Each Top Dow portfolio consists of 4 to 5 companies with the highest international exposure rankings for that year, and each Bottom Dow portfolio consists of 4 to 5 companies with the lowest international exposure rankings for that year. To see the magnitude of the U.S. investor's reaction to international events, I perform a series of event studies, testing how each portfolio in a given year reacts to the international events in that year.

In performing my event studies, I use the following methodology:

1) Collect International Events. "The initial task of conducting an event study is to define the event of interest and identify the period over which the security prices of the firms involved in the event will be examined – the event window" [3]. My event window for the analysis is eight weeks (two months), four weeks before the event (marked as time 0) and four weeks after the event. Since I am dealing with the returns of the international markets, I decided to take weekly returns instead of daily ones in order to smooth out the time differences between the markets opening and closing times.

Using the Yearbook of World Events, my goal is to choose between 40 and 50 major events in different categories (wars, political elections & reforms, financial crises, economic treaties & reforms, etc). I chose 43 of those events, including such events as the collapse of the USSR, the Persian Gulf war, the reunification of Germany, the Russian and Asian crises, and the signing of NAFTA (North American Free Trade Agreement). In choosing my events, I look at the size of the article (at least 2-3 columns) and its location on the front page of major newspapers (primarily *The New York Times,* and *The Wall Street Journal*). Thus, the events that I study were the most significant international events that found their way to the front page of *The New York Times* between the period of 1990 and 2001 (please see Table #3).

2) Calculate Stock Returns (Rp(t)). I first calculate the weekly returns on the stocks of the companies in the Top Dow and Bottom Dow portfolios and on the S&P 500 (the market), using the following formula: $(P(t) - P(t - 1)) / P(t) = Rp(t)$, where $P(t)$ is the stock price at time t, and $P(t-1)$ is the stock price one week prior.

3) Calculate Company Betas (β). Each company has a beta with respect to the overall market (S&P500). A company's beta is that company's risk compared to the risk of the overall market. If the company has a beta of 1.5, then it is said to be 1.5 times more risky than the overall market (S&P 500).

I calculate the betas for each year for each of the stocks in my portfolios by regressing the stocks' weekly returns against the weekly returns on the market. I calculate betas separately for each year to accommodate potential time-variation in company betas. Thus, I calculate 8 to 10 betas for each year, for a total of over 100 betas.

4) Calculate Abnormal Returns (AR) and Average Abnormal Returns (AAR). The abnormal return over the event window is defined as "a measure of the impact of the event on the

value of the firm (or its equity)" [3]. It measures the degree of stock's reaction to anything that the market (which the stock is a part of) is not reacting to. The formula for a stock's Abnormal Return at time t is $AR(t) = R_p(t) - \beta R_m(t)$, which is the difference between the actual return on the stock at time t [$R_p(t) = (P(t) - P(t - 1)) / P(t)$] and the return on the stock at time t which is explained by the company's beta and the return on the market [$\beta R_m(t)$]. (If the entire $R_p(t)$ was explained by $\beta R_m(t)$, then the Abnormal Return is zero). The methodology implicitly assumes that the "event is exogenous with respect to the change in market value of the security" [3]. In other words, it assumes that the change in the stock price of the firm is caused by the event. In most cases, this methodology is appropriate, but there are exceptions. There are examples where "an event is triggered by the change in the market value of security, in which case the event is endogenous" [3]. For these cases, the usual interpretation will be incorrect.

After calculating the weekly ARs for each of the stocks in two portfolios (a total of 52 ARs for each stock), I calculate the Average Abnormal Returns (AARs) for two portfolios, by first averaging the weekly ARs of all the stocks in the Top Dow, and then averaging the weekly ARs of all the stocks in the Bottom Dow.

5) Calculate and Graph Cumulative Average Abnormal Returns (CAAR). The AAR observations must be aggregated in order to draw overall inferences for the event of interest. The aggregation is done alone two dimensions – through time (adding up all AAR from –4 weeks to +4 weeks) and across securities (averaging out the ARs across 4-5 securities)

After calculating CAARs for a given event window of –4 weeks to +4 weeks, I graph them, with the x-axis representing the event window (-4 to +4 range) and the y-axis representing the CAAR (-8% to +8% range). Please see enclosed Graphs (Graph #1 through Graph #43).

6) Testing the significance of CAARs. Next, I test the significance of the Cumulative Average Abnormal Returns (CAARs), using the standard normal test statistic. For a CAAR over n weeks (e.g. 4 weeks), the Test Statistic = CAAR over n weeks / (SQRT (n) * ST DEV (Wkly AARs for the portfolio)) = $CAAR_n / \sqrt{(n)} * \sigma(AAR_{portfolio})$. This is approximately standard normal under the null hypothesis (i.e., the standardized Weekly Average Abnormal Returns should be normally distributed with a mean of 0 and a standard deviation of 1). Thus, numbers for the test statistic that are bigger than 1.645 or less than –1.645 are significant at the 10% level, numbers bigger than 1.96 or less than –1.96 are significant at 5% level.

As seen from the enclosed Table #4, for each of the 43 international events under study, I calculated: a) their significance during the entire event window (from week –4 to week +4) to see their overall importance for my two portfolios, b) their significance prior to the public announcement (from week –4 to week –1) to see whether there was any anticipation of the event by the U.S. firms, due to possible news leakages, c) their significance during the actual public announcement (week 0), and d) their significance after the public announcement (from weeks +1 to +4) to test for possible over or underreaction by U.S. firms in my portfolios. For the period from Week –4 to Week +4 (entire event), $CAAR_n$ = CAAR over 9 weeks = CAAR at Week +4 and n = 9. For the period from Week –4 to Week –1 (pre-event), $CAAR_n$ = CAAR over 4 weeks = CAAR at Week -1 and n = 4. For the period during Week 0 (the event becomes public news), $CAAR_n$ = CAAR over 1 week = CAAR at Week 0 – CAAR at Week –1, and n = 1. And for the period from Week +1 to Week +4 (post-event), $CAAR_n$ = CAAR over 4 weeks = CAAR at Week +4 – CAAR at Week 0 and n = 4.

The significance tests were all performed at the 10% confidence level, and produce the following results. Out of the 43 events studied, only 1 event was statistically significant over the

entire Weeks –4 to +4 period for the Top Dow portfolio (2.33% of total events), and 6 were significant for the same period for the Bottom Dow portfolio (13.95%). For the Weeks –4 to –1 period, 4 events were significant for Top Dow (9.30%) and 3 were significant for the Bottom Dow (6.98%). For the Week 0 period, a total of 9 events were significant for Top Dow (20.93%), and only 3 were significant for the Bottom Dow (6.98%). Finally, for the Weeks +1 to +4 period, only 1 event was significant for Top Dow (2.33%) and 5 events were significant for Bottom Dow (11.63%). These results are summarized in the enclosed Table #5.

7) Interpreting the graphs and the results of significance tests. Comparing the above numbers to 10% confidence level, we can identify three occasions when the number of significant observations is greater than 10%. These three cases are: Week 0 for the Top Dow portfolio, Weeks –4 to +4 for Bottom Dow and Weeks +1 to +4 for Bottom Dow. From this, we can conclude that a) the stock prices of most internationally exposed companies in the Dow do react to international events during weeks when these events reach the major U.S. newspapers, b) the stock prices of least internationally exposed companies in the Dow also react to international events, but only when we consider the entire 9-week period of the event, i.e., include the pre- and post-event time window, and on a much lesser scale, and c) the stock prices of least internationally exposed companies in the Dow have a tendency to over or underreact to international news, adjusting for it in the four weeks following the news announcement.

In order to further study the issue of over and underreaction by the stocks of the least internationally exposed companies, I look at the signs of the CAARs for both the Top and Bottom Dow portfolios, classifying them as either positive or negative events and comparing the frequency to the 5% confidence level. I find that of the 9 significant Week 0 (during the announcement) events for the Top Dow portfolio, 6 of them had positive CAARs (13.95%) and 3

had negative CAARs (6.98%). Of the 5 significant Weeks +1 to +4 (post-announcement) events for the Bottom Dow portfolio, 4 of them had positive CAARs (9.30%) and only 1 of them had negative CAAR (2.33% - not significant). Also, of the 4 Week –4 to –1 (pre-announcement) events for the Top Dow, 3 of them had positive CAARs (6.98%) and only 1 had negative CAARs (2.33% - not significant). The fact that the Top Dow portfolio tends to react positively to international news and then has no significant post-event moves in either direction implies that the most internationally exposed companies in the Dow react positively to good international news, i.e., their stock prices go up during the weeks when the news is announced, and then they stay at those high levels during the weeks following those events. This implies an efficient reaction to international events by the most internationally exposed U.S. companies. The fact that the Bottom Dow portfolio tends to have no significant reaction to international news during the announcement week, but then has a significant positive move afterwards during Weeks +1 to +4 implies that the least internationally exposed companies in the Dow may underweigh the importance of good international news, i.e., their stock prices do not react to the news when they are announced, but after the investors observe a positive reaction by the most internationally exposed companies in the Dow, the stock prices of the Bottom Dow companies adjust accordingly by reacting positively in the weeks following the announcement. This suggests a pattern of underreaction to international news by the least internationally exposed companies in the Dow, although the evidence is not conclusive.

Part III: International Diversification for U.S. investors

Financial portfolio theory teaches us that international diversification can improve portfolio performance. Studies relating GNP and market capitalization in different countries have

revealed that “once a country equity market grows beyond infancy, a 1% increase in GNP is associated with about 1.1% increase in equity market capitalization” [4]. The theory then states that since the returns across countries are only imperfectly correlated, there are great opportunities for gains from diversification internationally. This is because according to the theory behind diversification, we know that adding to a portfolio assets that are not perfectly correlated will enhance the reward-to-volatility ratio. “There is a marked reduction in risk for a portfolio that includes foreign as well as U.S. stocks, so rational investors should invest across borders”, says the theory. “Adding international to national investments enhances the power of portfolio diversification” [4]. Various studies show that efficient frontiers generated from the full set of assets including foreign stocks and bonds offer the best possible risk-return pairs, - they are much superior to the risk-return profile of U.S. stocks alone.

The above theory is based on the correlations between U.S. and international equity markets during the 1980 – 1993 period. As a part of my study, I test whether these correlations still hold today and whether there have been any major changes in the last few years. I picked the major indices in three geographic regions: Americas, Europe and Asia & Pacific. In the Americas region, I picked the following indices: Argentina (Merval), Brazil (Bovespa), Canada (TS300) and Mexico (Mexbol). In Europe, I picked Austria (ATX), Denmark (KFX), France (CAC 40), Germany (DAX), Greece (ASE), Italy (MIBTEL), Ireland (ISEQ), Netherlands (AEX), Norway (OBX), Portugal (BVLX), Spain (IBEX), Sweden (OMX), Switzerland (SMI), Russia (CRTX) and United Kingdom (UKX). In Asia & Pacific, I picked Australia (All Ordinaries), China (China SE Shanghai), Hong Kong (Hang Seng), Japan (Nikkei 225), India (Mumbai Sensex 30), Singapore (STI Index), South Korea (South Korea Composite Index) and Taiwan (Taiwan Weighted Index). I base my decision on which countries and indices to pick

according to Bloomberg's rating (which is primarily based on their capitalization). After running the correlations for the twelve-year period from 1990 to 2001, I discovered the following:

1) The amount of trading done by the U.S. with a particular country does not really determine how correlated the U.S. markets are with that country. As seen from Table #6, the correlation between the countries' indices returns and S&P 500 returns does not change together with the amount of international trade that the U.S. has with that particular country. For example, the S&P 500 has only a 29.16% correlation between how correlated its returns are with each of the countries in the Americas region (excluding Canada) and how much trade it has with each of those countries. For the Asia & Pacific region, this correlation is –20.58%. The overall correlation (between how correlated the S&P500 index is to the index returns of a particular country and the amount of trade the U.S. does with that country) is only 25%. What this means is that the fact that the U.S. trades heavily with one particular country does not necessarily mean that the S&P 500 has a high correlation with that country's index.
2) Correlations of U.S. markets with international markets have gone up for virtually all foreign indices in the studied sample.
3) Correlations of virtually all major U.S. industries with international markets have gone up for all three geographic regions (Americas, Europe and Asia and Pacific).
4) Correlations of virtually all major U.S. industries with corresponding international industries have also gone up significantly in the last 5 years (1997-2001).

Michael R. Sesit of *The Wall Street Journal*, in his article "If you think you're spreading risks, you'd better take a second look" reports that Neil Williams, chief global strategist for

Goldman, Sachs & Co. in London has demonstrated in his research that the global markets are "increasingly marching in step with one another" [5]. "Industries are apparently becoming more global," says he, "and as they do, share-price performance across countries and regions is now linked to a far greater extent than ever before". "In other words," says the article, "if U.S. bank stocks are rising or falling, it's a good bet that banks in Europe, the U.K. and Japan are rising or falling along with them", because the correlation between industry sectors is growing. The article also mentions John Hickling, a partner at Liberty Square Asset Management in Boston, who says that "Correlations are clearly becoming greater". "Unfortunately", he says, "[sectors] have the highest correlation precisely at the moment that you need the diversification: periods of market distress", such as the 1997 Asian and late-1998 Russian financial crises. Of course, "there was a tendency for many industries to have synchronized performance", says Mr. Williams, "but it was usually quite weak and concentrated in the most global of industries," such as steel, pharmaceuticals, oil and paper and packaging [5]. Across the world, most other sectors had very little relationship to one another. On a scale of plus 1 (indicating that market returns are perfectly correlated) to minus 1 (implying perfect opposite movement), prior to 1997, banks for years bounced along between zero and 0.1, and for two decades, telecom sectors in Europe, the U.S., U.K. and Japan drifted around zero. Furthermore, U.S. industries had relatively small correlations with international markets in general. During the period between 1992 and 1996, all major U.S. industries had an average correlation with international markets between 0.076 (Coal) and 0.285 (Chemicals) for the Americas region, between 0.06 (Coal) and 0.270 (Chemicals) for Europe, and between -0.015 (Coal) to 0.123 (Automobiles, Chemicals) for Asia and Pacific region (please see enclosed Table #7). And finally, U.S. markets as a whole were relatively little correlated with international markets. As seen from the enclosed Table #8, correlations of the

Dow Jones Industrial Average returns with the returns of the country indices in the Americas region (excluding Canada) ranged between 0.10 (Argentina) and 0.27 (Brazil), with the average being 0.19. For the S&P500 Index, this range was between 0.08 (Argentina) and 0.37 (Brazil), with the average being 0.21. The range of correlations of the returns on the Dow with the returns on country indices in Europe ranged between 0.09 (Greece) and 0.44 (Netherlands, France, UK and Ireland), with the average being 0.33 and a correlation with the Broad S & P's European Index (EuropeSPEE) being 0.44. For the S&P500 Index, this range was between 0.06 (Greece and Italy) and 0.42 (UK), with the average being 0.29, and a correlation with the Broad S & P's European Index (EuropeSPEE) being 0.40 (Please see Table #9). For Asia and Pacific region country indices, the range of correlations in returns was between -0.28 (China) and 0.32 (Singapore and Japan) for the Dow and between -0.26 (China) and 0.29 (Singapore and Japan) for the S&P500 Index. The averages were 0.12 and 0.10, respectively (Please see Table #10). "Now though, many more industries are showing the same synchronization," says Mr. Williams. "Telecoms move together across the world, so do banks; utilities even do it." Banks right now are at 0.5. For Telecom sectors in Europe, the U.S., U.K. and Japan, correlation has shot up to 0.4. The average correlations between major U.S. industries and international markets as a whole has also gone up dramatically [5]. My study shows that during the 1997-2001 period, the range of correlations of the major U.S. industries with international markets has gone up to new levels of between 0.096 (Coal) and 0.463 (Leisure, Banks) for the Americas region, between 0.135 (Coal) and 0.458 (Leisure, Banks) for Europe, and between 0.064 (Food and Beverages) to 0.255 (Mining & Metals, Leisure, Banks) for Asia and Pacific region (please see enclosed Table #7). The average increase in correlations with the Americas region was 0.139, for Europe it was 0.135, and for Asia & Pacific 0.094 in absolute terms, which translates into an average percent

increase of 75.6% for the Americas, 83.8% for Europe and 200% for Asia and Pacific regions. In absolute terms, the largest average increase in correlations was experienced by such industries as Leisure, Banks and Automobiles, which went from being as low as 0.062 during 1992-1997 period to being as high as 0.458 during 1997-2001. In percent terms, the largest average increase in correlations was experienced by such industries as Coal, Food & Beverages, Leisure and Banks, with an average increase between 114% (Banks) and 302% (Coal) (please see enclosed Table #7). And finally, U.S. markets as a whole have also experienced dramatic increases in correlations of their returns with the returns of international country indices. For the Americas region (excluding Canada), the range of correlations has gone up to being between 0.40 (Argentina and Peru – a 0.30 increase) and 0.58 (Mexico – a 0.36 increase) for the Dow and between 0.35 (Argentina – a 0.28 increase) and 0.61 (Mexico – a 0.42 increase) for the S&P500. The average correlations have shot up to 0.46 and 0.45, an average increase of 0.29 and 0.27, respectively. For Europe, the range of correlations have gone up to being between 0.25 (Portugal) to 0.62 (Netherlands) for the Dow and between 0.27 (Greece) and 0.66 (France) for the S&P500. The largest increase was for Italy, whose correlations with the Dow and S&P500 went up by 0.35 and 0.45, respectively. The average correlations have shot up to 0.48 and 0.51, an average increase of 0.16 and 0.23, respectively. The correlations of the Dow and S&P500 returns with the EuropeSPEE Index have gone up by 0.22 and 0.29, respectively. And for the Asia and Pacific region, the range of correlations in returns went up to being between -0.06 (China – a 0.23 increase) and 0.43 (Hong Kong – a 0.21 increase) for the Dow and to being between -0.05 (China – a 0.21 increase) and 0.45 (Hong Kong – a 0.27) for the S&P500. Another notable increase was India, which increased its correlation with U.S. markets by 0.29 and 0.28,

respectively. The average correlations have shot up to 0.25 and 0.26, and average increase of 0.13 and 0.16, respectively. Please see enclosed Chart #1 through Chart #5 for a summary.

The reason for this dramatic increase in the correlations between U.S. and international markets is one simple yet very powerful word: globalization. Major companies in various U.S. industries are becoming more and more internationally exposed because their foreign sales, assets and employees are rising, both in absolute and relative terms. As seen from the enclosed Table #11 and Charts #6-10, companies in the Dow Jones Industrial Index, in the last six years have increased their ratio of foreign sales to total sales, by an average of 10%, and by as much as 26% (McDonald's), 17% (Phillip Morris) and 11% (General Electric); their ratio of foreign assets to total assets by an average of 8%, and by as much as 17% (General Electric), 15% (McDonald's) and 9% (Phillip Morris and Hewlett-Packard); and their ratio of foreign employees to total employees by an average of 15%, and by as much as 29% (McDonald's), 20% (Phillip Morris) and 17% (General Electric). Even the companies that had virtually no international exposure in 1990-1995 (AT&T, Home Depot, SBC Communications, Wal-Mart, and Disney), now have an average of almost 13% of their sales overseas. For Wal-Mart, the shares of its assets and employees located outside of U.S. have gone up dramatically from being almost zero in 1990 to around 60% and 22%, respectively, in 2001. Mr. Sesit's article also gives examples of increased international diversification by foreign companies: Argentina's fixed-link public telecommunications services and basic telephone services company Telefonica is now all over Latin America; Japan's mobile communications company NTT DoCoMo owns 15% of Holland's KPN Mobile; and a European telecommunications company Deutsche Telekom is trying to grab whatever it can in North America [5]. Also, an increasing portion of foreign assets, sales and employees of major U.S. companies today are in the emerging market countries.

Behind the increased correlation lies the boom in cross-border investment, global deregulation, increased competitive forces, industrial consolidation, and even the threat of merger-and-acquisition activity. Companies can now just as easily run their business in their own country, as well as in other countries and even other continents. “People are looking at industries globally now,” adds Mr. Hickling of Liberty Square. “And with the growth of ECNs [electronic communications networks] and electronic trading, we are gradually becoming one global, 24-hour market place” [5]. And what this means for the U.S. investor is that buying U.S. stocks also means buying a share of international markets. For example, investing in General Electric in 1990 meant buying a share in the U.S. company, which made goods mainly within the United States. Today, with over 30% of its sales, over 35% of its assets and over 45% of its employees located overseas, buying a share of General Electric essentially means buying a share of the world market. And generally, higher international exposure to a particular country means higher correlation with that country’s markets.

So, does international diversification still pay? Portfolio theory suggests that with correlations between U.S. and foreign markets being significantly higher, benefits of international diversification have decreased dramatically. Increased correlations suggest that the world economies are more tied together today, and that information is spreading more easily and quickly than before. But Ms. Hartnett-Devlin, who is the chairman of the global investment committee at Fiduciary Trust Co. International in New York, thinks that international diversification still pays. “But you have to focus now more on sector diversification than regions,” says she, such as using beverages to balance off steel [5]. “The world’s a smaller place; and if there’s a theme, it’s going to have an impact across all markets in all regions,” warns Mr.

Williams [5]. There are no safe market niches anymore, everything is interlinked across continents.

A paper by John M. Griffin and G. Andrew Karolyi titled "Another look at the role of the industrial structure of markets for international diversification strategies" re-examines the extent to which gains from international diversification are due to differences in industrial structures across countries. In other words, it attempts to answer the question of how important differences in industrial compositions in different countries are for explaining the variation in global stock returns. This issue was first addressed in 1974 by Lessard, and recently has been revived in papers in by Roll (1992) and Rouwenhorst (1994). However, their results are very controversial. Roll suggests that there are three persuasive forces that cause variation in a country's index portfolio returns. "First, the 'technical procedures of index construction' generate some country indices that are large and well diversified, while others are not" [6]. Second, some of the variation of the international indices can be explained by their industrial composition. And third, changes in both real and nominal exchange rates cause variations in common currency-denominated index returns. Roll, using the daily data for 24 international country indices from April 1988 through March 1991, finds that industry factors explain approximately 40% and exchange rates approximately 23% of the volatility in stock returns. However, Rounwenhorst, using monthly returns from stocks in seven industries in 12 European countries from 1978 to 1992, shows that less than 1% of the differences in volatility of national index returns can be explained by their industry composition. Griffin and Karolyi attempted to re-examine the role of country and industry-specific sources of variation in international asset returns for global portfolio diversification strategies. They analyzed the daily returns from January 1992 through April 1995 for the Dow Jones World Stock Index database, which includes stocks in 9 market

sectors, or 66 industries, in over 25 countries. Their analysis confirms Rouswenhorst's finding that on average little (less then 4%) of the variation in country indices can be explained by their industrial composition. Furthermore, they observed that for industries which do not produce a good which is traded internationally (also known as "non-traded goods industries"), such as factory equipment, media, heavy construction, plantations, conglomerates and real estate, "country factors explain a relatively larger proportion of the variation in index returns [6]." For industries which produce internationally-traded goods ("traded goods industries"), such as auto manufacturing, steel, textiles & apparel, computers, office equipment, pharmaceuticals and semi-conductors, it is the industry factors that explain a relatively larger proportion of variance [6].

Another paper, by Patrick F. Rowland and Linda L. Tesar, called "Multinationals and the Gains From International Diversification" explores the evidence of "home bias", suggesting that U.S. investors "have been reluctant to hold more than a fraction of their wealth in foreign assets" [7]. It states that while investors "have increased their holdings of foreign stocks in recent years, the fraction of the portfolio invested abroad remains far less than the share implied by standard models of optimal portfolio choice" [7]. The authors offer one possible explanation for the bias, which states that "investors obtain indirect international diversification benefits by investing in multinational firms". Previous to 1996 studies have generally concluded that "multinational firms do not provide diversification benefits", since multinational returns were found to have a tendency to covary most with a firm's home market". In their paper, P. Rowland and L. Tesar employ mean-variance spanning techniques to test whether the addition of multinationals and international equities to a broad-based portfolio of domestic stocks significantly shifts the portfolio frontier. They find that in some cases, "there are sizable utility gains from adding foreign markets to the set of domestic assets, though which market provides the largest benefits

changes depending on the investor's country of residence" [7]. But overall, they find that "the utility gains from international diversification for U.S. investors are surprisingly small, again helping rationalize home bias in U.S. investment portfolios" [7].

So what implication do the above findings about the increased correlations between U.S. and international markets have for the conclusions about the reaction of U.S. stocks to international events? One obvious conclusion is that international exposure does not matter as much today. During the 1990-1995 period, the correlations between the Dow, S&P500 and the international markets were relatively low, which means that the Dow and S&P500 were not picking up the effects of international news. This means that the (β_{stock} * R_{market}) did not pick up international events, but instead those international events were reflected in the AAR of the multinational firms. However, during the 1996-2001 period, much higher correlations between the U.S. and international markets suggest that the Dow and S&P500 now pick up the effects of international events. Thus, the (β_{stock} * R_{market}) today partially controls for international exposure, and the AARs now pick up a much smaller portion of the international news. Since the U.S. markets are picking up the international exposure today, and the β measures the return relative to the market, the βs of the most internationally exposed companies should be higher today than they were in 1990, and βs for the least internationally exposed companies should be lower today than what they were in 1990. However, there is no conclusive evidence of this hypothesis, since the results do not provide strong support for the above conclusions. The βs of the least internationally exposed companies did go down from an average level of 1.133 between 1990 and 1994 to an average level of 0.938 between 1995 and 2000 (a decline of 17.21%). However, the βs of the most internationally exposed companies also went down from an average level of 0.960 between 1990 and 1994 to an average level of 0.908 between 1995 and 2000 (a decline of

5.42%). The decline in the average βs of the most internationally exposed companies contradicts my earlier hypothesis. Furthermore, starting from 1997 up until 2000, the average β of the least internationally exposed companies portfolio steadily went up from 0.775 in 1997 to 0.834 in 1998, to 0.888 in 1999 and to 1.105 in 2000 (42.58% increase), while, the average β of the most internationally exposed companies went steadily down from 1.125 in 1997 to 0.851 in 1998, to 0.718 in 1999 and to 0.672 in 2000 (40.27% decline). It is interesting, and yet counter-intuitive, that the increase in the Bottom Dow average β is almost exactly the same as the decline in the Top Dow average β. Perhaps there is some kind of industry effect going on here. However, I have also calculated the correlations in abnormal returns of the Top and Bottom Dow portfolios, and have discovered that after 1995, the returns of the Top and Bottom Dow stocks have been increasingly correlated. Their correlation increased from just 23.31% in 1995 to 51.76% in 1996, to 62.96% in 1997, to 73.45% in 1998, to 80.26% in 1999 and to 93.45% in 2000. This means that the more international Dow stocks were more than three times more correlated with less international Dow stocks in 2000, than they were in 1995. Furthermore, the average correlation for Top and Bottom Dow portfolios was –72.76% during the 1990-1994 period (highly negatively correlated) and it was 89.35% during the 1995-2000 period (highly positively correlated). These findings support the hypothesis that today, a lot of international exposure is picked up by the S&P500, so there are no large divergences in returns of the Top and Bottom Dow stocks. In fact, a very high correlation of 93.45% in year 2000 suggests that the Top and Bottom Dow stocks almost move one-for-one today.

I also calculated the standard deviations of the returns of the Top and Bottom Dow portfolios during the 1990-2000 period. I discovered that the standard deviations for the Top and Bottom Dow portfolios to be almost identical over the years. For example, the 1990-1994

average σ for the Top Dow portfolio was 3.163%, and for the Bottom Dow it was 3.217%, the 1995-2000 average σ for the Top Dow portfolio was 4.286%, and for the Bottom Dow it was 4.412%. The 11-year averages were almost identical: 3.848% for Top Dow and 3.870% for Bottom Dow. As seen from the enclosed Graph, the σs for Top and Bottom Dow portfolios almost mirror each other over the years. We can conclude that the more internationally exposed U.S. stocks have the same risk as the less internationally exposed U.S. stocks. We could also say that international exposure increases neither market risk nor idiosyncratic risk of the stock. On one hand, it can be said that higher international exposure increases the risk for the company stock, since doing business in international markets is riskier than doing business in U.S. On the other hand, we can say that higher international exposure produces the effect of international diversification (assuming that the international markets do not move together with U.S. markets), thus reducing the risk of the stock. And since the risk for more internationally exposed companies in the Dow was in fact almost the same as the risk for less internationally exposed companies in the Dow, we can conclude that either neither of the two effects existed during the period from 1990 to 2000, or they exactly offset each other during those years.

Part IV: Conclusions

There are several important conclusions that I have found as part of my research. First of all, as seen from the paper by Klibanoff, Lamont and Wizman, in a typical week, in the absence of salient news (international news which are reported in *The New York Times* or *The Wall Street Journal*), U.S. investors underreact to significant international events (which are accompanied by large changes in the funds' Net Asset Values (NAVs)). However, in the presence of salient news, U.S. investors react much faster to international events. In other words, if significant international events which cause large shifts in country funds NAVs are not reported in major

U.S. news sources, then U.S. investors tend to underreact to those international events, no matter how significant they are. If, however, these significant international events are reported by U.S. newspapers, then U.S. investors react much faster.

In my study of major U.S. stocks' reaction to international news, I found that the most internationally exposed companies in the Dow tend to have an efficient reaction to good international events. This means that their stock prices tend to react positively to good international news during the weeks when the news is announced, and then their prices tend to stay at those high levels during the weeks following those events. At the same time, the least internationally exposed companies in the Dow tend to underreact to positive international news. This means that their stock prices tend to have no reaction to international news during the weeks when it is announced, but after observing a positive reaction by the most internationally exposed companies, they tend to adjust by reacting positively in the weeks following the announcement.

Finally, I discovered that today, U.S. markets are much more correlated with international markets than they were five years ago. One very important conclusion that follows from this observation is that the international exposure of U.S. companies does not matter as much today. Because of its high correlation with the foreign markets, the S&P500 index picks up most of the effects of international events today, so there are no large divergences in returns of the most and least internationally exposed U.S. companies. However, there is no conclusive evidence of this.

Part V: Questions for future research.

One other question that I also want to research when studying the correlations between international markets is the importance of industry and country effects today. Financial theory states that if the industry effect is important, then countries with similar industries structures should have high correlations in their index returns, and countries with different industries

structures should have low correlations in their index returns. On the other hand, if the country effect is important, the opposite is true: countries with similar industries structures but different economies should have low correlations, and countries with different industries structures but similar economies should have high correlations. Also, by studying the returns on different U.S. and international sectors, I want to try to find conclusive evidence to answer a question of whether international events are industry-specific or multinationally-specific. I leave these questions for future considerations.