Phase of the USA Business Cycle and the Investment Performance of Internationally Diversified Portfolios

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Abstract

The purpose of this paper is to explore the USA business cycle relative to business cycles in other countries and to see whether it influences portfolio performance. Hunt(1976,1987) provides the econometric work that serves as the basis for determining the phase of the cycle. The study uses the Standard & Poors, CRSP and Morgan Stanley Indexes, TSM Global database and Citibase (Fame) macroeconomic data to study this issue. The paper concludes that business cycles influence the performance of stock portfolios both within and outside the United States and has implications for international diversification.

I. Introduction

Ever since Grubel(1968) provided one of the first studies, international diversification has intrigued researchers as well as investors. The allure of higher returns and lower risk obtained from international diversification still motivates research. Recent articles such as Jorion and Roisenberg(1993) and Wahab and Khandwala(1993) demonstrate the benefits of international diversification.

The premise of this paper is that international diversification provides benefits because the general economic cycles of other countries are not synchronous to the economic cycle in the United States.

The relationship between economic activity and cyclical behavior in the money and capital markets has not received a great deal of attention in the finance literature, whether on a national or international level. Arnott and Copeland(1985) show that the business cycle has a significant effect on security returns. Chen, Roll and Ross(1986) similarly determine that certain macroeconomic variables (industrial production, changes in the yield curve, and expected inflation) are significant indicators of changes in stock returns. Finally, Moore(1983) explores the relationship between inflation and business cycles.

In addition, Peters(1991,1994) using rescaled range (R/S) analysis finds evidence of long term nonperiodic cycles in stock returns that average approximately 48 months in duration. Nawrocki(1995) confirms this result but finds that the cycle is dependent on changes in the money supply and industrial production.

Other academic studies focus on the effect that the economic cycle has on the microstructure of the market. (e.g., Abraham and Ikenberry(1994), Liano(1992), Liano and Gup(1989), and Liano, Huang and

Gup(1993). Recently Bauman and Miller(1995) demonstrate that the evaluation of portfolio performance should take place through a complete stock market cycle because of differences in performance during the market cycle. Macedo(1995) demonstrates that switching between relative strength and relative value strategies can increase returns in an international portfolio which indicates the existence of an international equity cycle.

These recent studies indicate a need to take a closer look at the phases of the market or business cycle, rather than looking at a complete economic cycle. Few studies focus their attention on the phases of the business cycle.

Fortunately, Hunt(1976) stresses the econometric relationship between Federal Funds rates, capital market yields, business credit demands, unemployment claims, non-farm payroll, inflation, and monetary and reserve aggregates and the turning points in business cycles.

In a book targeted at a general audience, Hunt(1987) uses the econometric relationships to describe five phases of the economic cycle: easeoff, plunge, early revival 1, late revival 2 and accelerate. Table 1 provides a general description of these phases.

This study uses Hunt(1976,1987) as its foundation. As a result, the focus is on the business cycle rather than the peaks and troughs of a stock market index. In addition, the study identifies separate phases in the economic cycle rather than studying the performance through a half cycle or a complete cycle as in previous work (Liano and Gup[1989], Liano[1992], Bauman and Miller[1995]).).

This study utilizes the econometric relationship in Table 2 to define the phases of the economic cycle. The econometric model derives from Hunt's work. After the determination of the phases, the study of market performance for each phase for each country uses the Morgan Stanley Indexes.

The results indicate that there is a strong correspondence between the economic phases and asset performance.

The next section of the paper will address the methodology used in the study. Afterwards, there will be the presentation of the empirical results. Finally, the summary section will conclude the paper.

II. Methodology

The first priority in a study of this type is the theory of market operation that is implicit in the methodology. The market theory assumed in this paper is that international stock markets are segmented markets and that Markowitz(1991) portfolio theory and utility maximization are the appropriate normative models. Segmented markets imply a dynamic disequilibrium market process that complicates statistical methodology. The main problem is nonstationary means and variances. Nonstationary variances are quite common, hence the proliferation of ARCH and GARCH techniques in recent literature. However, articles such as Aydogan and Booth(1988), Cheung and Lai(1993) and Nawrocki(1995) demonstrate that mean returns are also nonstationary. In addition, modeling mean returns as a mean jump process appears in papers by Jorion(1988), Tucker(1992) and Vlaar and Palm(1993). By adjusting the methodology to these concerns, the study can adapt to both stationary and nonstationary processes.

The determination of the Hunt(1987) phases of the US economy uses the econometric relationships presented in Table 2. Table 3 describes the data sources and data availability.

Table 4 demonstrates the problem of nonstationarity through the business cycle and over numerous business cycles and its potential effect on investment decisions.

First, the table provides the annualized returns from the calculated monthly geometric mean returns for 8 asset classes for the period January 1970 to June 1994. Using this 25 year history, investors would invest in gold during the easeoff and accelerate phases of the business cycle. Small and mid cap stocks dominate the other three phases. However, the utilization of data from January 1980, to June 1994, presents a different picture. First, an investor would not invest in gold. Gold has lower (and negative) returns than the stock market in every phase of the economic cycle and has higher standard deviations in every phase except the accelerate phase.

The recent data indicates that investors should invest in long term government bonds during the easeoff phase (stocks and intermediate bonds are also good performers). Stocks and bonds have the

highest returns during the plunge phase. Stocks are the best performers during the early revival 1 and the late revival 2. Finally, 90 day treasury bills are best during the accelerate phase. Note that the standard deviations do not remain stable over the business cycle and that all of the mean returns are nonstationary over the cycle. These results are still changing. Asset class returns in the US since 1988 indicate that large cap stocks provide the highest returns during the easeoff phase while the bond returns are lower but still healthy. The reader should note the healthy stock returns and the strong bond rally that are occurring in the summer of 1995 in an easeoff period that started in January 1995.

As a result of the evidence of nonstationarity in Table 4, this study focuses on business cycles since 1980. It calculates the statistical performance measures for various stock market indexes for each phase of the economic cycle. The markets include the G7 countries (United States, Canada, Japan, United Kingdom, France, Germany and Italy).

Performance statistics include annualized geometric mean returns, standard deviations, semideviations, t-tests on one period lag serial correlations, skewness and kurtosis, and reward to semivariability ratios.

III. Empirical Results

The Effect of the October 1987 Stock Market Crash on the US Market

The 1980 to 1994 period includes one period of severe disruption in the stock market, i.e., the 1987 stock market crash. Table 5 attempts to discern the "statistical signature" of the crash. Weekly return data for the S&P 500 index generates the results presented in Table 5. The skewness and kurtosis measures dramatically catch the effect of the crash. From March 1988 to February 1995, the skewness measure is insignificant and the kurtosis is close to 3.0 (3.61). When the data period extends to August 1984, the skewness measure changes to a significant -1.22 and the kurtosis measure increases to 8.00. The crash changes a symmetric distribution to a highly leptokurtic, significantly negatively skewed distribution.

International Market Performance Based on US Business Cycle

Table 6 provides the individual phase (US business cycle) performance statistics for nine Morgan Stanley (MSCI) indexes plus the four country stock market indexes from CITIBASE. All returns are US dollar returns.

The Easeoff phase is a period of generally poor returns. The exceptions are US large cap, Japan small cap, and Italy. The returns are generally negative and the semideviations and standard deviations are higher than complete period averages.

The plunge period enjoys increased returns with US large cap, UK small cap, UK large cap, Europe W/O UK, and Germany exhibiting the best risk/return performance. All of these indexes have higher returns and lower risk measures than the total period averages.

The early revival 1 period enjoys the best investment performance, consistently providing the highest R/SV ratios of any period. Not only are the returns high but the semideviations are at their lowest value during the business cycle. The investments include US small cap, US large cap, UK small cap, Japan large cap, EAFE, Pacific Rim w/o Japan, and Canada. Other indexes enjoyed good performance except Italy which is a major market disaster. The early revival has the shortest duration of all the phases (17 months out of 177 months in the total sample).

The late revival 2 period also enjoys good performance with low risk measures. However, market returns are lower. The best investments remain US small cap, US large cap, UK small cap, EAFE and Pacific Rim w/o Japan. This phase lasts longer than the previous phase (47 months). Overall, the two revival phases provide the best combination of high returns and low risk in the business cycle.

The accelerate phase is the nightmare phase in the US (witness portfolio performances in 1994). Not only are the returns in the US low or negative but they have the highest semideviations of the five phases. During this phase, US investors belong in Japan small caps along with Japan large caps, UK small caps, UK large caps, and EAFE. The 1987 market crash that occurred during this phase of the US economy appears in the large negative skewness and highly leptokurtic distributions in every country except Japan,

France and Italy. The nonstationarity of returns and risk occurs throughout the five phases. In addition, while only three indexes show significant autocorrelation for the entire period, eight indexes exhibit significant autocorrelation during the easeoff phase with three new indexes exhibiting significant autocorrelation during the plunge phase. The fact that all thirteen indexes have significant autocorrelation at some time during the five phases is indicative of nonstationary market conditions.

The Business Cycles of the Individual Countries

Next, the industrial production, unemployment claims, consumer prices, money supply and short term interest rates help determine the individual business cycles for each of the G7 countries. The data are available from the TSM Global database. Table 7 presents the performance statistics for the individual phases for the different stock market indexes with all returns in US dollars. Table 8 provides the same results only in native currencies. The stock price index for each country is available from the Citibase (Fame) database.

All countries experience different performance characteristics during the different phases. Some phases have high return-low risk, while others exhibit low return-high risk as well as high return-high risk performances. Again the risk and return results are not stationary. None of the countries demonstrate the US pattern of positive returns during the first four phases and negative returns during the accelerate phases.

The International Effect of the October 1987 Stock Market Crash

Using the October 1987 stock market crash as a point of reference, the economies of the G7 countries are in similar phases of their economic cycle. Four of the countries were in the accelerate phase while the other three had recently transition to the easeoff phase (Canada in July 1987, France in May 1987, and Italy in September 1987). Using the native currency results in Table 8, the negative skewness-leptokurtic "statistical signature" of the crash appears in the US, UK, Canada and Germany. France and Italy exhibit leptokurtic distributions but no significant skewness. Japan's distribution is symmetric and platykurtic during the accelerate phase. These results mirror the accelerate results in Table 6 that derive from only

the US business cycle and US dollar denominated returns. During the October 1987 crash, the economies of the G7 countries were in similar phases of their business cycle.

The Effect of Foreign Exchange Translations on the Empirical Results

In general, exposure to foreign exchange risk increases the overall standard deviations and semideviations of the individual country returns after translation into the US dollar. Foreign exchange variations increased returns to US investors for Japanese, British, and German stocks. Italy, France and Canada had lower returns after translation to US dollar returns. The biggest gain due to exchange rate translation is an investment in Japanese stocks. The biggest loss of return due to exchange rate translations is an investment in Italian stocks. Note, however, that an investment in Italy after foreign exchange translation does provide a higher return than investing in the US market.

A Test of a Market Rotation Strategy to Enhance Portfolio Performance

The evidence to this point indicates that a market rotation strategy using international investments potentially could improve the performance of US based portfolios. Tables 9 and 10 provide the results of a market rotation schedule based on a Markowitz(1991) full variance-covariance optimization. The market rotation strategy revises Markowitz optimal portfolios every six months from January 1983 to September 1994. The first 36 months (January 1980 to December 1982) estimate the original statistical inputs into the Markowitz model and initiate the simulated backtest.

The comparison test consists of three portfolio strategies:

- An equal allocation in all 13 market indexes.
- Optimized portfolios using all 13 market indexes
- Optimized portfolios restricting the indexes to those market indexes that performed well during the current phase of the US business cycle.

Table 9 provides a list of the countries that performed best during each phase of the US economic cycle. The Markowitz(1991) optimizer generates 10 portfolios from highest asset return-highest variance

to lowest asset return-lowest variance. The optimizer stops when the efficient frontier reaches the minimum variance point and the variance of the portfolios starts to increase.

The first set of performance statistics in Table 10 results from allowing all thirteen indexes into the covariance optimization. Only six portfolios appear before the algorithm approaches the minimum variance portfolio. The portfolios were re-optimized and revised every six months and a 1% commission cost charged to the portfolio. There were no short-selling, stop loss orders or other portfolio insurance schemes employed. The optimized portfolios exhibited higher returns, lower semideviations, and higher risk/reward ratios than a naive strategy of allocating an equal amount in each of 13 indexes. In addition, the optimized portfolios outperformed the USA large cap index.

The second set of performance statistics results from restricting the assets in the optimization to only the countries that provided high R/SV performance during each of the phases. Depending on the current phase of the US economic cycle, only the indexes listed in Table 9 are in the optimization. The optimizer provides 9 portfolios given these indexes. There is a large increase in portfolio returns with small increases in semideviation. The R/SV (and R/V) ratios demonstrate higher performance when implementing the strategy of rotating into different countries based on the phase of the economic cycle. All of the internationally diversified portfolio strategies provide lower semideviations and higher returns than an investment in US stocks. This indicates a reduction in the portfolio risk that derives solely from the general economic cycle of the United States.

Remember that the returns in Table 10 are (ex post) returns based on a six month revision strategy. That is why the return is not decreasing as the portfolios move down the efficient frontier. It is interesting that the realized standard deviations are decreasing as the portfolios move down the frontier, which means that the optimizer is a good predictor of future variability. The same pattern holds true for the semideviation for the second set of results.

The rotation strategy has two significant problems with its implementation. First, there is a problem with the placement of heavy weights (30-60% of the portfolio) in one country (asset). Most portfolio managers are hesitant to do this because of client reactions. This problem is significant to a US based

investor. From January 1987, to June 1989, the portfolios were completely out of the US markets with 50-60% allocations in Japanese small cap stocks. Second, the approach does not explicitly deal with currency exchange rates between the various countries. Exchange rate behavior during different phases probably is not stationary and there was no forecasting of exchange rates.

IV. Summary and Conclusions

Investing internationally is an important part of an investment manager's strategy since the international markets typically follow an economic cycle that is different from the US economic cycle. International diversification helps to reduce the risk due to the general economic cycle in the United States.

There is strong evidence of nonstationarity over time, with the 1970-1994 period providing different statistical results than the 1980-1994 period. The performance of each phase changes over time and the portfolio manager has to use Hunt's(1976,1987) methodology of studying macroeconomic variables to track the differences and to keep up to date with market changes. For instance, the phase 5 in 1987 (which includes the 1987 market crash) is different statistically from the phase 5 in 1994. Even so, the general characteristic of low returns-high risk is evident in both periods.

During the stock market crash of October 1987, the various G7 countries are in similar phases of their economic cycle. This similarity may account for the international nature of the crash. During the phase 5 accelerate phase in the US, the best alternative investment is 90 day treasury bills. With international diversification, US investors can generally find high risk-return performance in Japanese small cap stocks, in Japanese large cap stocks, in UK small and large cap stocks and in the EAFE index.

In conclusion, studying the macroeconomic business cycles in other countries and diversifying internationally can help the US investor to avoid risks due to the US business cycle. The usual caveats of international investing still apply. They include poor information, high transaction costs foreign exchange risk, and poor liquidity. However, Jorion and Roisenberg(1993) and Wahab and Khandwala(1993) find that foreign stock market futures and ADRs can control these costs.

Further research in this area will have to concentrate on the study of macroeconomic data with and without currency translation for each country in order to understand its economic cycle. The preliminary evidence presented in this paper indicates that each country has a unique stock market cycle that is unlike the market cycle in the United States.

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Table 1 - Hunt's Phases of the General Economic Cycle

Phase 1 (EASEOFF) - Economy reaches a peak as defined by the NBER and real GNP starts to decline. Macroeconomic variables that lead this phase include: hours worked, industrial production, non-farm payroll employment, initial unemployment claims, consumer durables, housing, M1 money supply and monetary base.

Phase 2 (PLUNGE) Real GNP declines as interest rates peak. Macroeconomic variables that lead this phase include: discount rate, fed funds rate, monetary base, inflation, capital spending, and inventory investment.

Phase 3 (REVIVAL 1 or Early Revival) - Economy reaches a trough as defined by the NBER and real GNP starts to increase. Macroeconomic variables that lead this phase include: consumer durables, government spending, housing, hours worked, and initial unemployment claims.

Phase 4 (REVIVAL 2 or Late Revival) - Real GNP recovers from the recession, while inflation starts to increase. Macroeconomic variables that lead this phase include: capital spending, government spending, inventory investment, inflation, discount rate and federal funds rate.

Phase 5 (ACCELERATE) - Economy starts to grow at a high rate prompting the Federal Reserve to tighten credit, resulting in decreased consumer spending while business investment continues to increase. Macroeconomic variables that lead this phase include: federal funds rate, monetary base, inflation, and housing.

Source: Hunt[1976]

Table 2 - Geometrically Linked Annualized Returns and Monthly SemiDeviations for 26 Years (1969-1994) for Various Asset Classes

Asset Classes	1969 to 1994 Total Period	1969 to 1973 Vietnam	1974 to 1982 Oil Crisis	1983 to 1994 Recovery
S&P 500 Stocks	10.17	-2.36	13.73	14.41
	(3.00)	(3.68)	(2.73)	(2.81)
Mid-Cap Stocks	11.73	-6.56	22.18	14.67
	(3.55)	(4.65)	(3.18)	(3.15)
Small-Cap Stocks	11.53	-10.50	28.29	12.71
	(4.13)	(5.29)	(3.77)	(3.70)
LB LT Govt.	7.65	0.04	7.72	11.62
	(1.78)	(0.98)	(2.24)	(1.73)
LB G/C Intermediate	7.71	1.18	9.52	9.83
	(0.78)	(0.68)	(1.12)	(0.56)
Gold	9.15	25.03	14.08	-1.16
	(3.37)	(2.75)	(4.18)	(3.00)
90 Day T-Bill	7.28	6.22	9.04	6.57
	(0.07)	(0.11)	(0.14)	(0.02)
CPI - Consumer Prices	5.77	6.49	8.25	3.69
	(0.22)	(0.21)	(0.26)	(0.15)
CPI - New Cars	3.88	3.02	6.05	2.84
	(0.61)	(0.99)	(0.62)	(0.35)
CPI - Food & Beverages	5.46	7.80	6.82	3.44
	(0.33)	(0.36)	(0.45)	(0.23)
CPI - Fuel	6.41	8.98	13.82	0.81
	(0.87)	(0.30)	(0.45)	(1.13)
Median House Prices	6.79	7.46	8.37	5.41
	(2.42)	(2.53)	(2.00)	(2.59)

Data sources include Lehman Brothers bond indexes, CRSP stock datasets, and CITIBASE/Fame economic database.

Table 2 - Dates of the Business Cycles, Percentage Changes and Correlation Coefficients for Macroeconomic Variables During Different Phases of Business Cycle. (Monthly Data from January 1982 to June 1995)

	Easeoff (1)	Plunge (2)	Revival (3)	Revival2 (4)	Accelerate (5)
Dates	1/82-9/82	10/82-4/83	5/83-10/83	11/83-4/84	
	4/84-10/84	11/84-8/86	9/86-2/87	3/87-12/88	
	1/89-11/89	12/89-5/91	6/91-11/91	12/91-1/94	2/94-11/94
	12/94-6/95				
Annualized Returns					
S&P	24.69	13.33	25.99	14.29	-1.54
IP	0.37	-1.15	3.88	6.05	6.19
FYFF	6.38	-25.44	-26.82	-14.38	33.06
FMBASE	.29	4.18	6.24	6.41	3.05
FM1DQ	-2.71	4.65	8.95	8.72	-0.09
LUINC	21.44	9.63	-28.46	-11.42	-9.27
LPNAG	2.50	0.46	0.21	2.35	3.46
CPI	4.00	3.89	2.63	3.36	3.99

Correlations

	S&P	IP	S&P	IP	S&P	IP	S&P	IP	S&P	IP
S&P	1.00	-.20	1.00	-.12	1.00	-.19	1.00	.06	1.00	.03
IP	-.20	1.00	-.12	1.00	-.19	1.00	.06	1.00	.03	1.00
FYFF	.11	.54*	-.12	.31*	-.07	.49*	-.19	.24*	.08	-.05
FYFF(-12)	.32*	.01	-.14	.22*	-.29	-.13	-.12	.13	-.18	.01
FMBASE	-.31*	.23	.32*	-.14	.07	-.36	-.13	-.16	-.27*	-.03
FMFBA	-.11	.24	.40*	-.23*	.11	-.43*	-.05	-.30*	-.38*	.16
FM1DQ	-.42*	.09	.42*	-.17	.49*	.57*	-.08	-.19	-.09	.15
LUINC	-.24	-.37*	.21	-.43*	.06	.21	-.19	-.37*	-.11	-.05
LPNAG	-.40*	.44*	-.02	.51*	-.10	.71*	.16	.39*	-.26*	.23*
CPI	-.05	-.16	-.44*	.09	.15	.43*	.09	.21	.14	.13
df	23		50		12		39		39	

* indicates significance at 10%

Citibase/Fame access codes are used to describe variables. All time series are monthly and seasonally adjusted with the exception of S&P. All time series are percentage changes and are nominal amounts except where noted.

S&P	S&P 500 Composite Stock Index
IP	Industrial Production
FYFF	Federal Funds Rate
FYFF(-12)	Federal Funds Rate 12 month rate of change
FMBASE	Real Monetary Base (St. Louis Federal Reserve)
FMFBA	Real Monetary Base (Federal Reserve Bank)
FM1DQ	Real M1 Money Supply
LUINC	Initial Unemployment Claims
LPNAG	Number Employed on Non-Farm Payrolls
CPI	Consumer Price Index

Table 2 - Dates of the US Business Cycle, Percentage Changes and Correlation Coefficients for Macroeconomic Variables During Different Phases of Business Cycle. (Monthly Data - January 1970 to December 1986.

	Easeoff(1)	Plunge(2)	Revival1(3)	Revival2(4)	Accelerate(5)
Dates	1/70-4/70	5/70-12/70	1/71-5/71	6/71-10/72	11/72-3/73
	4/73-9/74	10/74-5/75	6/75-12/75	1/76-2/77	3/77-3/79
	4/79-4/80	5/80-7/80	8/80-12/80	1/81-8/81	
	9/81-10/81	11/81-10/82	11/82-4/83	5/83-10/83	11/83-4/84
	5/84-10/84	11/84-8/86		9/86-12/86	
Annualized Percent Changes					
S&P	-14.59	24.74	22.33	6.34	-0.99
IP	-0.92	-5.20	8.96	8.82	7.26
FYFF	22.49	-47.77	35.32	2.69	46.71
FYFF(-12)	44.68	-21.72	-36.61	-7.69	28.12
FMBASE	-3.28	3.50	3.62	2.33	1.78
FMBASE(-6)	-6.08	5.17	9.42	8.21	6.47
FMFBA	-2.47	2.81	3.41	2.08	1.73
FM1DQ	-4.95	4.54	2.91	3.18	0.14
LPNAG	1.85	-0.75	2.23	3.05	5.06
LUINC	60.37	7.27	-36.15	-6.05	-12.65
CPI	10.51	4.28	5.54	5.14	6.85
CPI-Energy	23.68	-2.12	4.21	5.77	7.12

Correlations

	S&P	IP	S&P	IP	S&P	IP	S&P	IP	S&P	IP
S&P	1.00	.07	1.00	-.03	1.00	-.15	1.00	.34*	1.00	.20
IP	.07	1.00	-.03	1.00	-.15	1.00	.34*	1.00	.20	1.00
FYFF	-.07	.34*	-.22*	.42*	-.14	.28*	-.19*	-.13	-.20	.01
FYFF(-12)	-.03	.08	-.15	-.04	.01	.19	-.25*	-.11	-.05	-.07
FMBASE	.07	.22*	-.05	.24*	.24	-.41*	.11	.36*	-.23*	-.17
FMBASE(-6)	.06	.38*	-.12	.50*	.22	-.23	.02	.23*	-.19	.03
FMFBA	.17	.07	.06	.31*	.25	-.41*	.26*	.36*	.01	-.06
FM1DQ	.24*	.02	.16	.18*	.30	-.18	.20*	.05	.16	-.07
LPNAG	.10	.51*	.06	.76*	-.43*	.51*	.46*	.43*	.03	.66*
LUINC	-.30*	-.63*	.23*	-.46*	-.22	.31*	-.32*	-.34*	-.13	-.20
CPI	-.08	-.03	-.03	-.33*	-.05	.56*	-.25*	-.31*	.14	.03
CPI-Energy	.11	-.10	.03	-.15	-.21	.05	-.04	-.17	.03	-.03
df	43		53		23		49		35	

* indicates significance at 10%

Citibase/Fame access codes are used to represent macroeconomic variables. All time series are monthly and seasonally adjusted with the exception of the S&P. All time series are percentage changes and are nominal amounts except where noted.

S&P	S&P 500 Composite Index
IP	Industrial Production
FYFF	Federal Funds Rate of Change
FYFF(-12)	Federal Funds 12 Month Rate of Change
FMBASE	Real Monetary Base (St.Louis Federal Reserve)
FMBASE(-6)	Real Monetary Base -- 6 Month Rate of Change
FMFBA	Real Monetary base (Federal Reserve)
FM1DQ	Real M1 Money Supply
LPNAG	Number Employed on Non-Farm Payrolls (Rate of Change)
LUINC	Initial Unemployment Claims (Rate of Change)
CPI	Consumer Price Index
CPI-Energy	Consumer Energy Price Index

Table 3 - Sources of Data Used in Study

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1. Morgan-Stanley Indexes - Monthly Total Return in U.S. Dollars
   (January 1970 to January 1995)
   - USA - Small Companies
   - USA - Large Companies
   - UK - Small Companies
   - UK - Large Companies
   - Japan-Small Companies
   - Japan-Large Companies
   - EAFE Index
   - Europe without UK
   - Pacific Rim without Japan

2. Citibase - Monthly Price Returns Adjusted to U.S. Dollar
   (January 1970 to September 1994)
   - Canada Stock Index
   - France Stock Index
   - Germany Stock Index
   - Italy Stock Index

3. Citibase - Economic Data (January 1970 to June 1995)
   - Gold
   - Consumer Price Index
   - 90 Day Treasury Bill
   - Federal Funds Rate
   - Monetary Base (St.Louis Federal Reserve and Federal Reserve)
   - Real M1 Money Supply
   - Initial Unemployment Claims
   - Employment on Non-Farm Payrolls
   - Industrial Production

4. Standard and Poors COMPUSTAT - Monthly Total Returns
   (January 1970 to January 1995)
   - S&P 500 Index

5. Shearson Lehman Brothers
   - LB Long Government Bond Index (January 1970 to June 1994)
   - LB G/C Intermediate Bond Index (January 1973 to June 1994)

5. CRSP Data Series - Total Monthly Returns
   (January 1970 to January 1995)
   - Mid-Cap CRSP Index
   - Small-Cap CRSP Index

Table 3 - Asset Class Performance from 1/1970 to 6/1994

Annualized Returns from Monthly Geometric Mean Returns
Monthly Semideviation in Parenthesis

Asset Name	Phase 1 Easeoff	Phase2 Plunge	Phase 3 Revival1	Phase 4 Revival2	Phase 5 Accelerate
S&P500 Index	6.05	24.69	24.05	10.30	0.78
	(3.52)	(2.48)	(2.15)	(1.79)	(3.77)
Mid Cap CRSP Index	6.91	30.61	30.34	12.13	-0.82
	(4.38)	(2.82)	(1.94)	(2.01)	(4.43)
Small Cap CRSP Index	4.33	31.59	33.50	11.62	1.50
	(5.06)	(3.38)	(1.96)	(2.50)	(5.14)
LB Long Govt. Bond	13.95	15.68	9.84	2.35	0.15
	(2.20)	(1.70)	(1.23)	(1.60)	(1.61)
LB G/C Intermediate	12.88	11.61	9.82	5.06	3.86
	(1.10)	(0.63)	(0.33)	(0.56)	(0.56)
90 Day Treasury Bill	9.64	7.72	7.31	6.58	7.13
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Consumer Price Index	9.29	4.54	5.35	5.00	6.33
	(0.04)	(0.15)	(0.14)	(0.07)	(0.06)
Gold	33.37	7.90	-9.65	4.42	14.73
	(4.03)	(3.10)	(4.39)	(3.03)	(2.46)

Table 4 - Asset Class Performance from 1/1980 to 6/1994

Annualized Returns from Monthly Geometric Mean Returns
Monthly Semideviation in Parenthesis

Asset Name	Phase 1 Easeoff	Phase2 Plunge	Phase 3 Revival1	Phase 4 Revival2	Phase 5 Accelerate
S&P500 Index	25.83	18.44	31.47	7.71	3.20
	(2.21)	(2.73)	(1.81)	(1.98)	(4.30)
Mid Cap CRSP Index	23.47	19.81	37.03	11.88	2.83
	(3.36)	(3.07)	(1.39)	(2.07)	(4.66)
Small Cap CRSP Index	20.00	19.10	43.09	11.56	3.46
	(4.18)	(3.60)	(1.46)	(2.64)	(5.30)
LB Long Govt. Bond	31.97	23.48	12.47	2.75	-.97
	(2.21)	(1.62)	(0.38)	(1.99)	(2.01)
LB G/C Intermediate	22.74	15.92	12.50	7.30	4.37
	(1.06)	(0.41)	(1.55)	(0.67)	(0.67)
90 Day Treasury Bill	10.45	8.01	8.85	7.88	7.73
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Consumer Price Index	6.90	3.90	5.03	5.87	5.41
	(0.06)	(0.17)	(0.18)	(0.06)	(0.08)
Gold	5.88	4.81	-7.02	-6.91	-.63
	(4.46)	(3.44)	(4.67)	(3.74)	(2.93

All monthly total returns were computed for the period January 1, 1970 to June 30, 1994 except for the LB Intermediate Bond Index which started in January 1973.

Table 5 - S&P 500 Index Performance With and Without the 1987 October Crash
During Accelerate Phase 5 - Weekly Returns

Actual Market Performance for Phase 5 from 3/4/88 to 2/10/95

AnnRet	StdDev	SemiDev	R/V	R/SV	Skew	Kurt	SerCor T-Test
3.38	1.69	1.18	.0376	.0540	-0.08	3.61	-1.73*

Actual Market Performance for Phase 5 from 8/3/84 to 2/10/95

AnnRet	StdDev	SemiDev	R/V	R/SV	Skew	Kurt	SerCor T-Test
-0.62	2.38	1.85	-.0049	-.0062	-1.22*	8.00	0.97

Table 6 - Country Returns During USA Phases of Business Cycle

Phase 1 - Easeoff
From January 1980 to September 1994 - 23 Monthly Observations

	Annual Return	StdDev	SemiDev	R/SV	TSerCor	Skew	Kurt
USA - Small Companies	0.07	6.28	4.75	.00136	-1.91877*	-.82666*	4.18398
USA - Large Companies	17.46	4.96	2.81	.48146*	-1.77128*	-.17040	2.91104
UK - Small Companies	-10.62	8.21	6.45	-.14432	-2.65234*	-.46733	2.85332
UK - Large Companies	-0.96	9.14	6.53	-.01224	-2.75825*	-.36184	2.82962
Japan-Small Companies	17.26	5.48	2.49	.53642*	-1.88033*	.54778	2.24921
Japan-Large Companies	-5.86	6.13	4.28	-.11722	-2.33597*	.30134	2.61387
EAFE Index	-3.88	6.15	4.31	-.07627	-2.74746*	.16511	2.44378
Europe W/O UK	4.08	5.77	3.86	.08641	-1.99121*	-.27282	3.52635
Pacific Rim W/O Japan	-5.12	7.91	5.81	-.07521	-1.23040	-.22267	2.64575
Canada Stock Index	1.29	7.07	5.02	.02121	-.78759	-.49796	4.10883
France Stock Index	-5.82	5.37	4.28	-.11633	-.36830	-.70117*	3.66984
Germany Stock Index	-3.59	3.74	3.06	-.09933	-.17378	-.98151*	3.83258
Italy Stock Index	20.88	6.48	2.70	.58969*	.62497	.85098*	2.73975

Phase 2 - Plunge
From January 1980 to September 1994 - 55 Monthly Observations

	Annual Return	StdDev	SemiDev	R/SV	TSerCor	Skew	Kurt
USA - Small Companies	15.27	5.47	3.11	.38322	3.23199*	.18577	3.43407
USA - Large Companies	22.77	4.59	2.24	.76845*	.60798	.08223	2.71146
UK - Small Companies	24.94	5.71	2.79	.67208*	-.17162	.34088	3.18034
UK - Large Companies	32.24	6.33	2.96	.79472*	1.09727	.32286	2.65695
Japan-Small Companies	17.79	9.17	5.14	.26740	1.15026	.56906*	4.54277
Japan-Large Companies	14.12	8.12	4.90	.22611	.24118	.25386	3.79859
EAFE Index	21.08	6.17	3.50	.45927	.76316	-.04069	2.91240
Europe W/O UK	29.73	5.94	3.31	.66283*	1.30725*	-.41041	3.14079
Pacific Rim W/O Japan	9.17	5.97	3.50	.20966	1.46491*	.28933	2.45127
Canada Stock Index	5.41	5.44	3.47	.12698	1.65316*	.22117	3.58183
France Stock Index	22.17	8.03	5.00	.33692	.12140	-.32848	5.22952
Germany Stock Index	25.47	5.61	2.67	.71489*	2.95783*	.39034	3.28253
Italy Stock Index	21.63	8.70	5.42	.30369	-.80364	-.24024	9.42502

Phase 3 - Revival 1
From January 1980 to September 1994 - 17 Monthly Observations

	Annual Return	StdDev	SemiDev	R/SV	TSerCor	Skew	Kurt
USA - Small Companies	52.27	4.31	1.55	2.29948*	-1.22243	-.37999	2.18943
USA - Large Companies	28.60	3.78	1.59	1.33647*	-1.90044*	.17050	2.94323
UK - Small Companies	26.87	4.57	2.07	.96631*	-1.72257*	.12790	3.12996
UK - Large Companies	18.04	5.61	2.81	.49604	-1.58217*	.43317	2.71046
Japan-Small Companies	32.13	7.50	4.15	.56621	.16263	-.21308	2.27049
Japan-Large Companies	36.95	6.51	3.00	.88638*	.34757	.22268	2.58471
EAFE Index	26.72	4.30	2.22	.89673*	-.97467	-.52474	2.41119
Europe W/O UK	20.17	4.22	2.25	.68697	.28465	-.34894	2.85641
Pacific Rim W/O Japan	41.58	4.75	1.01	2.91687*	-1.19458	.65824	2.10747
Canada Stock Index	20.19	3.74	1.85	.83538*	-1.15536	-.24254	2.28364
France Stock Index	15.32	4.68	2.76	.43305	.61081	-.27512	2.17937
Germany Stock Index	12.90	5.05	2.38	.42737	1.34494*	.63520	2.34085
Italy Stock Index	-16.18	5.50	4.39	-.33276	.52503	.47245	2.75891

Phase 4 - Revival 2
From January 1980 to September 1994 - 47 Monthly Observations

	Annual Return	StdDev	SemiDev	R/SV	TSerCor	Skew	Kurt
USA - Small Companies	16.28	4.76	2.41	.52526*	1.15728	.42582	2.90402
USA - Large Companies	9.99	3.66	1.90	.41834*	-.74668	.86489*	5.61792
UK - Small Companies	14.19	5.87	3.15	.35307*	2.34409*	.30011	2.48693
UK - Large Companies	10.84	5.15	2.82	.30566	1.60137*	.40580	2.76789
Japan-Small Companies	2.33	8.21	5.19	.03705	1.40630*	.39826	3.05840
Japan-Large Companies	15.25	7.40	4.27	.27895	1.00803	.30274	3.35146
EAFE Index	12.79	4.50	2.48	.40693*	.58995	.14356	2.45270
Europe W/O UK	5.42	3.75	2.31	.19092	.22661	.18988	3.01360
Pacific Rim W/O Japan	26.84	5.82	2.32	.86297*	.03009	1.08079*	4.63606
Canada Stock Index	5.36	3.72	2.16	.20249	.68523	.50480*	3.08094
France Stock Index	2.07	5.76	4.51	.03801	1.59367*	-1.44500*	7.07255
Germany Stock Index	-0.37	3.61	2.65	-.01160	1.62202*	-.28814	2.72639
Italy Stock Index	12.91	7.65	4.13	.24635	1.54856*	.64810*	3.63336

Phase 5 - Accelerate
From January 1980 to September 1994 - 35 Monthly Observations

	Annual Return	StdDev	SemiDev	R/SV	TSerCor	Skew	Kurt
USA - Small Companies	-7.76	5.85	5.22	-.12858	1.18119	-2.95583*	15.28614
USA - Large Companies	0.78	5.03	4.14	.01576	1.33681*	-2.24413*	10.78878
UK - Small Companies	14.33	5.88	3.92	.28597*	.99729	-.80935*	4.03282
UK - Large Companies	11.63	5.88	4.26	.21623*	-.01174	-1.47864*	7.60499
Japan-Small Companies	44.16	4.85	1.74	1.78086*	.87693	.06279	2.19800
Japan-Large Companies	15.25	7.40	4.27	.27895*	1.00803	.30274	3.35146
EAFE Index	20.46	4.95	2.92	.53611*	.51679	-.59665*	4.10094
Europe W/O UK	7.33	4.89	3.48	.17016	.54461	-1.01852*	6.45170
Pacific Rim W/O Japan	9.93	9.05	7.72	.10262	-.33345	-3.37105*	17.16905
Canada Stock Index	1.04	5.80	4.34	.01977	-.09993	-1.32701*	7.18404
France Stock Index	10.91	6.30	4.16	.20843	1.11834	-.32066	3.43007
Germany Stock Index	6.05	4.80	3.65	.13456	1.79125*	-1.61548*	7.48658
Italy Stock Index	10.09	7.57	4.36	.18467	-.19917	.38059	2.97714

Summary Statistics for Complete Period
From January 1980 to September 1994 - 177 Monthly Observations

	Annual Return	StdDev	SemiDev	R/SV	TSerCor	Skew	Kurt
USA - Small Companies	10.16	5.44	3.62	.25168	4.09466*	-.85142*	7.64817
USA - Large Companies	14.53	4.44	2.68	.42438	.35739	-.52084*	6.52522
UK - Small Companies	14.93	6.06	3.73	.31271	.86229	-.25921*	3.77305
UK - Large Companies	16.25	6.31	3.84	.32914	-1.29357	-.24406*	4.32351
Japan-Small Companies	19.34	7.60	4.29	.34589	.06557	.35169*	4.35548
Japan-Large Companies	16.71	7.20	4.12	.31436	.51520	.31675*	3.63071
EAFE Index	15.70	5.34	3.16	.38653	.37948	-.10401	3.14732
Europe W/O UK	14.08	5.06	3.10	.35575	.83753	-.32313*	4.11707
Pacific Rim W/O Japan	14.53	6.80	4.64	.24527	.46827	-1.42346*	12.70198
Canada Stock Index	5.30	5.18	3.51	.12286	1.23436	-.45677*	5.71837
France Stock Index	9.86	6.51	4.44	.17735	1.15464	-.46418*	5.80246
Germany Stock Index	9.21	4.73	2.91	.25308	3.78282*	.03658	4.79660
Italy Stock Index	12.72	7.65	4.49	.22324	2.01848*	.27331*	6.60195

Explanation of Asterisks
TSerCor - indicates significant serial correlation (t-test).
Skew - indicates significant skewness.

Table 7 - Monthly Returns for Different Countries During Their Phases of Economic Cycle From January 1980 to June 1994

USA - Large Companies

Phase	AnnRet	StdDev	SemiDev	R/SV	TSerCor	Skew	Kurt	# Obs
1	17.46	4.96	2.81	.48146	-1.77128*	-.17040	2.91104	23
2	22.77	4.59	2.24	.76845	.60798	.08223	2.71146	55
3	28.60	3.78	1.59	1.33647	-1.90044*	.17050	2.94323	17
4	9.99	3.66	1.91	.41834	-.74668	.86489*	5.61792	47
*5	-1.06	5.17	4.31	-.02068	1.36930*	-2.20198*	10.33293	32
Total	14.39	4.46	2.70	.41783	.40432	-.51532*	6.49957	174

UK Large Companies

Phase	AnnRet	StdDev	SemiDev	R/SV	TSerCor	Skew	Kurt	# Obs
*1	27.42	6.34	3.74	.54498	-.52008	-.66736*	4.52194	66
2	4.29	6.11	4.25	.08268	-.71936	-.28615	2.42474	29
3	10.05	5.85	3.11	.25754	-.49063	.69903*	2.98091	41
4	14.31	8.14	5.20	.21564	-1.00854	-.35911	4.95404	24
5	12.80	4.88	2.47	.40819	-.65227	.36672	2.08238	14
Total	16.14	6.33	3.85	.32592	-1.27149	-.23938	4.33031	174

Japan - Large Companies

Phase	AnnRet	StdDev	SemiDev	R/SV	TSerCor	Skew	Kurt	# Obs
1	8.99	7.55	4.94	.01462	-1.41837*	.42851*	4.14104	72
2	24.43	7.58	3.78	.48563	1.26623	.47609	2.58762	33
3	50.48	7.69	3.68	.94036	.76859	-.07215	3.19874	37
*4	14.51	5.23	3.02	.37682	-.55503	.03577	2.48666	24
5	25.49	4.66	2.16	.88512	.97072	-.13180	1.56748	8
Total	17.47	7.25	4.14	.32608	.52788	.29616*	3.59335	174

Canada Stock Index

Phase	AnnRet	StdDev	SemiDev	R/SV	TSerCor	Skew	Kurt	# Obs
1	-1.13	4.58	3.00	-.03160	.23329	.42849	3.93756	41
2	-6.00	6.17	4.66	-.11027	-.20257	-.33945	3.86080	37
3	16.43	4.90	2.62	.48747	1.03213	.31516	4.96245	46
*4	5.08	6.05	4.62	.08963	.46442	-1.81244*	8.73996	25
5	8.63	4.21	2.52	.27513	-1.36941*	-.02316	1.90851	25
Tot	4.43	5.20	3.54	.10243	1.22709	-.42891*	5.70663	174

France Stock Index

Phase	AnnRet	StdDev	SemiDev	R/SV	TSerCor	Skew	Kurt	# Obs
1	1.40	5.93	4.33	.02682	-.79274	-.50730	3.48778	39
2	10.10	5.06	3.37	.23914	.83507	-.57078*	4.12732	38
*3	-7.84	6.77	5.60	-.12117	2.13412*	-1.11009*	5.18955	30
4	13.93	6.24	3.85	.28351	.25877	-.08301	3.59207	44
5	45.99	9.26	5.57	.57508	-.56752	-.69259*	6.06435	23
Tot	9.75	6.55	4.47	.17433	1.20931	-.45977*	5.76843	174

Germany Stock Index

Phase	AnnRet	StdDev	SemiDev	R/SV	TSerCor	Skew	Kurt	# Obs
1	17.00	5.95	3.08	.42742	1.81093*	.48872*	3.26849	49
2	-2.74	3.41	2.67	-.08668	1.52002*	-.56342*	2.93816	31
3	17.60	3.85	1.81	.75328	2.10361*	.45712	3.38847	36
*4	-10.13	4.83	4.12	-.21494	.12265	-.97337*	5.36916	40
5	42.02	3.31	0.97	3.04798	1.11264	-.21253	2.26367	18
Total	8.82	4.76	2.94	.24089	3.83816*	.05074	4.77428	174

Italy Stock Index

Phase	AnnRet	StdDev	SemiDev	R/SV	TSerCor	Skew	Kurt	# Obs
1	21.74	6.84	3.38	.48967	.11192	.42883	2.16097	27
2	13.15	8.92	5.87	.17638	-1.39585*	-.20424	10.87787	42
*3	11.15	7.35	3.78	.23422	3.67741*	.86263*	3.55485	61
4	18.69	7.81	4.40	.32705	.74141	.11278	2.64679	37
5	-32.23	5.02	5.53	-.57699	-1.97267*	-1.07776*	2.88920	7
Total	12.55	7.68	4.52	.21902	2.04112*	.27674*	6.58847	174

Explanation of Asterisks
Phase - indicates the current economic phase when the 1987 October Crash occurred.
TSerCor - indicates significant serial correlation (t-test).
Skew - indicates significant skewness.

Table 8 - Countries with the best performance during each phase of the US economy

Phase 1 -	Easeoff
	USA - Large Companies
	Japan - Small Companies
	Italy
Phase 2 -	Plunge
	USA - Large Companies
	UK - Large Companies
	UK - Small Companies
	Europe w/o UK
	Germany
Phase 3 -	Revival 1
	USA - Large Companies
	USA - Small Companies
	UK - Small Companies
	Japan - Large Companies
	EAFE Index
	Pacific Rim w/o Japan
	Canada
Phase 4 -	Revival 2
	USA - Large Companies
	USA - Small Companies
	UK - Small Companies
	EAFE Index
	Pacific Rim w/o Japan
Phase 5 -	Accelerate
	UK - Small Companies
	UK - Large Companies
	Japan - Small Companies
	Japan - Large Companies
	EAFE Index

Table 9 - Performance of Variance-Covariance Optimized Portfolios With and Without Countries in With Phase of US Economy Using with 6 Month Rebalancing and 1% Commission Costs - January 1983 to September 1994

Summary Performance Statistics for Indexes Versus Six Optimized Portfolios Using All Assets in the Sample

	AnnRet	Std.Dev.	R/V Ratio	SemiDev.	R/SV	Term Wealth
USA Large	14.29	4.27	.234461	2.72	.367900	4.8046
Equal	13.65	3.79	.251513	2.43	.393290	4.4973
Portfolio						
1	16.50	3.99	.291530	2.07	.562203	6.0141
2	15.59	3.81	.287979	2.06	.532786	5.4871
3	15.17	3.79	.281108	2.21	.482402	5.2559
4	14.93	3.77	.278355	2.29	.458266	5.1283
5	15.88	3.63	.308289	2.23	.501030	5.6535
6	14.91	3.54	.295360	2.13	.492169	5.1187

Summary Performance Statistics for Indexes Versus Eight Optimized Portfolios Using Only Countries Beneficial During US Economic Phase

	AnnRet	Std.Dev.	R/V Ratio	SemiDev.	R/SV	Term Wealth
S&P500	14.29	4.27	.234461	2.72	.367900	4.8046
Equal	13.65	3.79	.251513	2.43	.393290	4.4973
Portfolio						
1	18.23	4.46	.288491	2.58	.498595	7.1563
2	20.86	4.43	.332548	2.43	.607283	9.2624
3	20.63	4.29	.339566	2.33	.626147	9.0597
4	21.19	4.15	.360267	2.22	.674975	9.5640
5	21.93	4.07	.380334	2.14	.725028	10.2749
6	22.03	4.01	.387455	2.09	.744315	10.3744
7	22.54	4.01	.396993	2.06	.770889	10.8949
8	22.60	3.89	.409663	1.91	.836622	10.9542