Active Investment in Developed and Emerging Markets

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Active Investment
0. The Plan

- Reasons for investing in international markets
- FX risk in portfolio strategies
- Predictability
- Emerging markets
### Active Investment

#### 0. The Plan

- Bull and bear markets for international investors
- Managing in high and low inflation
- Business cycle impact on world returns
- Inflation
- Do world markets still serve as a hedge?
- What about Mexico?

### Active Investment

#### 1. Why invest internationally?

For many years, the U.S. market was effectively the world market -- commanding 75% of world market capitalization.

U.S. now represents less than 40%.

Does it make any sense to ignore the other 60%?
Active Investment
1. Why invest internationally?

World Market Equity Capitalizations - Developed Markets

Source: MSCI (3/31/95)
Active Investment
1. Why invest internationally?

Just because these markets exist is not a sufficient reason to invest.

Some have underperformed the U.S.
Active Investment
1. Why invest internationally?

In addition, volatility of these markets could be higher than U.S. investments.

Average Volatility - MSCI Developed Markets

From Inclusion Date to December 1993
Active Investment
1. Why invest internationally?


Active Investment

1. Why invest internationally?

Key is how these securities move together.

Less than perfect correlation implies gains from diversification.
Active Investment

1. Why invest internationally?

Example:

Stock X and Stock Y are available for investment.

- Each has expected return of 15%.
- Each has volatility of 25%.
- The correlation between the two is 0%.

Do you have a preference for one, the other or both?

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1. Why invest internationally?

Let's solve for the variance of the portfolio of X and Y where equal investment is placed in each security.

\[
\text{ar(portfolio)} = \text{weight}_x^2 \sigma_x^2 + \text{weight}_y^2 \sigma_y^2 + 2\text{weight}_x \text{weight}_y \sigma_x \sigma_y \text{Corr}_{x,y}
\]
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1. Why invest internationally?

Though these securities look similar, by investing in both, our portfolio volatility is cut in half.

Portfolio variance will be reduced if correlation is less than one.

Correlation is a very important.

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Active Investment

1. Why invest internationally?

Correlation with MSCI U.S. Equity Returns (Unhedged) MSCI Countries

Sample Ends September 1994
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1. Why invest internationally?

What does low correlation mean for the investor?

The ability to obtain an offsetting cash flow (hedge).

When the U.S. market is down, how often are international markets up?
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1. Why invest internationally?

A more difficult hurdle:

When the U.S. return is negative, how often does the international return more than offset the U.S. loss?
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1. Why invest internationally?

Quantitative asset management programs simultaneously maximize performance and minimize risk (volatility).

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Active Investment
1. Why invest internationally?

Expected Return/Risk Profile

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Performance

Risk

World

U.S.
Active Investment

1. Why invest internationally?

Diversified international portfolio offers

- higher expected return and
- lower risk

compared to just holding U.S. assets.

Implication:

You can beat the S&P 500, on average, by holding a diversified global portfolio.

Explains why many fund managers are aggressively moving into international markets.
Active Investment
2. FX Risk

With international equity investments, you:

- invest in the local market
- invest in the FX rate vs. the U.S. dollar

Consider the example of investing in a German equity portfolio which includes the DAX stocks.

Active Investment
2. FX Risk

1. To initiate purchase, change dollars to DM.
2. Liquidate German position after one month.
3. Record a profit in DM.
4. Sell your DM for dollars.
Active Investment

2. FX Risk

Your final return (in U.S. dollars) is composed of:

\[ \% \text{change in DAX} + \% \text{change in $/DM rate}. \]

The FX component could be a very important part of the return on the German investment.

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Active Investment

2. FX Risk

Example:

Suppose the spot exchange rate is $0.50=1DM. You invest $1 million in the DAX. Over the year, the DAX rises 20%.

- What is your return if the FX rate goes to $0.60=1DM?
- What is your return if the FX rate goes to $0.40=1DM?
## Active Investment

### 2. FX Risk

**Scenario 1:** Rate to $0.60 [dollar depreciates]

Investment of DM2 million rises to DM2.4 million.

Translate DM2.4 million back to dollars (x $0.60).

Receive $1.44 million.

Return = 44%.

### Note

44% = 1.20 x 1.20 - 1

Total return is the product of the:
- local equity return (20%)
- times
- the currency change (20%).
### Active Investment

2. FX Risk

**Scenario 1:** Rate to $0.60 [dollar depreciates]

Intuition --
when dollar depreciates, the DM appreciates.

Since you are invested in DM, you benefit from the
currency appreciation.

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### Active Investment

2. FX Risk

**Scenario 2:** Rate to $0.40 [dollar appreciates]

Investment of DM2 million rises to DM2.4 million.

Translate DM2.4 million back to dollars (x $0.40).

Receive $0.96 million.

Return = -4%.

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### Active Investment

#### 2. FX Risk

**Scenario 2:** Rate to $0.40 [dollar appreciates]

Note: 

\[-4\% = 1.20 \times 0.80 \times -1\]

Total return is the product of the:
- local equity return (20%)
- times
- the currency change (-20%).


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### Active Investment

#### 2. FX Risk

**Scenario 2:** Rate to $0.40 [dollar appreciates]

Intuition --
- when dollar appreciates, the DM depreciates.

Since you are invested in DM, you lose from the currency depreciation.
### Active Investment

2. FX Risk

**Protection:**

Many investors would like to participate in overseas markets but they do not want to bear the currency risk.

However, the currency risk can be hedged.

- [ ]

### Active Investment

2. FX Risk

**Protection:**

- Sell DM2 million forward when DAX bought
- Purchase put options on DM2 million
- Buy special product (let your investment banker take care of the hedging).

- [ ]
### Active Investment

2. FX Risk

**Protection in action:**

Suppose you purchased put, agreeing to sell DM2 million at $0.50 at the end of the month.

Dollar appreciates/DM depreciates to $0.40=1DM (scenario 2).

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### Active Investment

2. FX Risk

**Protection in action:**

You have DM2.4 million.
- Sell DM2 million at $0.50, collect $1 million (exercising your put option).
- Sell DM0.4 million, in spot market, at $0.40, collect $0.16 million.

Total value $1.16 million. Return 16%.
Active Investment

2. FX Risk

**Lessons:**

Did not completely lock in local return because:

- We only hedged the principal portion (DM2 million); it is difficult to know what the return is going to be.

- We have ignored the cost of initiating the option protection.

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**Other Insights:**

1. Treat your FX position as an asset. That is, the change in the currency value plus the rate of return on a local CD, makes currencies assets.

2. Could use quantitative portfolio selection methods to determine the best mix of equities & currencies.
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3. Predictability

For many years, stock prices were assumed to follow a random walk.

- A random walk implies that the best forecast of next period's price is today's price.

- Implication is that stock returns are unpredictable.

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3. Predictability

However, recent evidence that stock returns are predictable.

- International -- Harvey 1991 (J. Finance)
- Emerging Markets -- Harvey 1995 (Rev. Fin. Studies)
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3. Predictability

Variables that help predict returns:

1. Interest rates
2. Term structure
3. Default premiums
4. Dividend yields
5. Lagged returns

These variables have information about the future health of the economy.

Stock returns are very sensitive to the business cycle.

Risk premiums are high in recessions and low during expansions.
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3. Predictability

Information variables that predict the business cycle, will likely predict equity returns.

Predictability forms the backbone of active strategies.

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3. Predictability

Implementing predictability:

Start with simple linear regression models.

Forecast stock returns (say the S&P 500).

If out-of-sample forecasted return is above the Treasury bill rate, invest in equity (if below invest in cash).
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3. Predictability

Implementing predictability:

Historically, this strategy has produced greater returns and lower volatility than a buy and hold position in the S&P 500.

- Not unusual to get hit rates (correct direction rate) of greater than 65% (monthly) with R-squares < 10%.
- Expand model to international equity markets.

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3. Predictability

Return Prediction: MSCI Developed Markets

- World Instruments
- Local Instruments

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R-square
Active Investment
3. Predictability

**Implications:**

- Allocate to high expected returns markets.
- Downweight low expected returns markets.

Optimized strategies should exceed the passive S&P 500 strategy and deliver lower volatility.

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3. Predictability

**On the Horizon:**
Current prediction methods:
- Neural Nets
- Genetic Algorithms
- Nonparametric density estimators

Future prediction methods:
- Entropy-based coding
- Vector quantization
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4. Emerging Markets

There are three features which make emerging markets attractive:

- High average returns
- Low correlations with developed markets
- Large degree of predictability.

Best to view emerging countries as start-ups

- High returns accompanied with high risk

Critical to consider emerging markets within the context of diversified portfolio.

- You don't invest in a single market just as you don't invest in a single start-up company.
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4. Emerging Markets

Facts:

1. Equity capitalization of emerging markets is smaller than their contribution to world GDP.
2. Equity markets grow as economy develops.
3. Markets are small but often active.

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Active Investment
4. Emerging Markets

<table>
<thead>
<tr>
<th>Market Capitalization</th>
<th>Gross Domestic Product</th>
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</thead>
<tbody>
<tr>
<td>Emerging Countries</td>
<td>Developed Countries</td>
</tr>
<tr>
<td>93.2%</td>
<td>86.6%</td>
</tr>
<tr>
<td>6.8%</td>
<td>13.4%</td>
</tr>
</tbody>
</table>

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Active Investment
4. Emerging Markets

Share of World Population

Emerging Markets 85.0%
Developed Markets 15.0%

Based on 1992 data.

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4. Emerging Markets

Equity Market Development and GDP

Equity Capitalization to GDP vs. GDP per capita
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4. Emerging Markets

World Market Equity Capitalizations

Source: MSCI (3/31/95)
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4. Emerging Markets

Value of Trading/Market Capitalization: Turnover

Facts:

1. Average returns are much higher than developed market returns.

2. Volatility is also much higher.

3. Correlations with developed markets are small.
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4. Emerging Markets

Average Annual Returns: Emerging Markets

Average Annual Returns: Developed and Emerging Markets
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4. Emerging Markets

Average Volatility: Emerging Markets

From Inclusion Date

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4. Emerging Markets

Average Volatility: Developed and Emerging Markets

From Inclusion Date
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4. Emerging Markets

Average Cross-Correlations: Emerging and Developed Markets

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4. Emerging Markets

Average Cross-Correlations: Emerging and Emerging

...
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4. Emerging Markets

Why is volatility different in emerging markets?

- Number of firms in index
- Asset concentration
- Volatility of index stocks
- Development of market
- Country credit risk
- Size of the trade sector

![Graph showing relationship between volatility and log number of firms in index]
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4. Emerging Markets

Volatility and Asset Concentration

Volatility and Market Cap to GDP

[Graphs showing data points and trend lines related to volatility and market capitalization in emerging markets]
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Volatility and Country Credit Rating

Volatility and Volatility of Index Stocks

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4. Emerging Markets

Volatility and Trade to GDP

Liberalizations affect volatility.

Evidence in Bekaert and Harvey (1995).
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4. Emerging Markets

Volatility Before and After Liberalizations

Most above line meaning volatility lower after liberalization

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4. Emerging Markets

Great opportunities in emerging markets - but one must be aware of the risks.

Main benefit is diversification.

Adding these markets to a diversified world portfolio can reduce portfolio volatility.
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4. Emerging Markets

Effect of adding emerging equities.

<table>
<thead>
<tr>
<th>Performance</th>
<th>Strategy 1 All Countries</th>
<th>Strategy 2 Developed</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Profit</td>
<td>17.4%</td>
<td>16.6%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Annual Vol</td>
<td>11.4%</td>
<td>15.8%</td>
<td>4.4%</td>
</tr>
</tbody>
</table>

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4. Emerging Markets

Traditional measures of risk, like beta, are remarkably small.
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4. Emerging Markets

Sharp evidence of predictability in emerging markets.

Harvey (1995) shows that much of the predictability is driven by local (country-specific) information.
Local information:

- Lagged returns (persistence)
- Lagged exchange rate changes (FX)
- Size of the trade sector (Ex+Im)/GDP
## Active Investment

4. Emerging Markets

Dynamic (active) strategies must capture this predictability.

**Example:** Mexico

Strategy based on predictability was flat December-March (when buy and hold in Mexico lost 80%!!).
<table>
<thead>
<tr>
<th>Active Investment</th>
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</thead>
<tbody>
<tr>
<td>5. Managing in Bull and Bear Markets</td>
</tr>
</tbody>
</table>

Much evidence that returns' distributions are different in bull and bear markets.

Volatility is not symmetric because of the leverage effect.

When the market goes down, equities become riskier because the debt-to-equity ratio has increased.

<table>
<thead>
<tr>
<th>Active Investment</th>
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<tbody>
<tr>
<td>5. Managing in Bull and Bear Markets</td>
</tr>
</tbody>
</table>

Correlation is also affected by market performance.

A number of papers noted that international equity correlations increased after the October 1987 crash.

However, is increased correlation due to the crash or is it a more general phenomenon?
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5. Managing in Bull and Bear Markets

When U.S. returns are negative, almost all developed markets are also negative on average.
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5. Managing in Bull and Bear Markets

When U.S. returns are negative, volatility is higher in international markets.
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5. Managing in Bull and Bear Markets

When U.S. returns are negative, both correlation and covariance is higher.
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5. Managing in Bull and Bear Markets

Unfortunately, for U.S. investors, asymmetry works against them.

With negative U.S. returns, one would hope for offsetting foreign returns.

If correlation is not symmetric, portfolio performance will deviate from expectations.
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5. Managing in Bull and Bear Markets

This effect is not due to currency fluctuations.

Up-down asymmetry evident in both hedged and unhedged returns.

Hedged Returns Correlations from 1979

- [Bar chart showing correlations between countries and the US return]

- [Legend: □ US RETURN ▶ US RETURN<0]
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5. Managing in Bull and Bear Markets

Important lesson for the active manager:

- Portfolio strategy must take the asymmetries into account.

- Cannot allocate on the basis of average returns (average mixes positives and negatives)
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6. Managing in Low and High Volatility Markets

The direction and the dispersion of U.S. returns impacts foreign returns.

- Portfolio strategy must take the asymmetries of high and low volatility states into account.

- Allocation based on average volatility is problematic.

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6. Managing in Low and High Volatility Markets

Methodology. Subset returns based on whether U.S. equity return is 1.6 standard deviations from the U.S. mean return.

- U.S. equity volatility affects returns in other countries.
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6. Managing in Low and High Volatility Markets

Country Equity Returns US Low and High Volatility

Results are not sensitive to the October 1987 observation.
6. Managing in Low and High Volatility Markets

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U.S. volatility impacts the volatility of other markets.
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6. Managing in Low and High Volatility Markets

Markets move more closely (higher correlation) when the U.S. market is more volatile.
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6. Managing in Low and High Volatility Markets

Country Equity Correlation US Low and High Volatility

Country Equity Covariance US Low and High Volatility

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6. Managing in Low and High Volatility Markets

Cannot even escape the impact of U.S. volatility with emerging markets.

High U.S. volatility is associated with larger correlations.

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6. Managing in Low and High Volatility Markets

Country Equity Correlation US Low and High Volatility

- US Volatility
- Low US Volatility
- High US Volatility

- US Volatility Low
- US Volatility High

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6. Managing in Low and High Volatility Markets

Correlation effect is not diminished by currency hedging.

Correlation of currency hedged returns is higher during high U.S. volatility months.
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6. Portfolio Strategy and the Business Cycle

Harvey (1991, JFI) shows that the U.S. business cycle is 80% correlated with a value-weighted world business cycle.

Some evidence [Schwert (1989)] that volatility is different during different phases of the business cycle.

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Active Investment
6. Portfolio Strategy and the Business Cycle

Erb, Harvey and Viskanta (1994) show that all the inputs into the portfolio problem depend on the stage of the business cycle.
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6. Portfolio Strategy and the Business Cycle

Method:

Divide data by NBER definitions of turning points.

Divide data by CIBC business cycle definitions for each country.

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6. Portfolio Strategy and the Business Cycle

International returns are affected by the stage of the U.S. business cycle.
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6. Portfolio Strategy and the Business Cycle

Country Equity Returns Based On U.S. Economic State

International volatility is less affected by the stage of the U.S. business cycle (although higher during U.S. recessions).
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6. Portfolio Strategy and the Business Cycle

Country Volatility Based On U.S. Economic State

Correlations are much higher during U.S. recessions.
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6. Portfolio Strategy and the Business Cycle

Country Correlation With U.S. Equity Returns Based On U.S. Economic State

Higher correlations and higher volatilities imply that covariances must be sharply higher during U.S. recessions.
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6. Portfolio Strategy and the Business Cycle

Similar results obtained when recessions are matched across countries.

- In joint U.S.-German expansions, the equity correlation is 4%.
- In joint U.S.-German recessions, the equity correlation is 50%.
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6. Portfolio Strategy and the Business Cycle

If asset returns move with the business cycle, this implies some degree of predictability.

- To some degree the business cycle is predictable.
- To a large extent, we know the phase of the cycle that we are currently in.

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6. Portfolio Strategy and the Business Cycle

Doesn't make any sense to use historical average of returns, volatility or correlation if we are finishing a recession and entering a recovery.
### Active Investment

7. Inflation and World Equity Returns

Inflation is another important variable which impacts international asset returns.

Much is known about the interaction between inflation and asset returns in the U.S.

Relatively little is known about inflation in other countries.

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### Active Investment

7. Inflation and World Equity Returns

Obviously, inflation is radically different in emerging and developed markets.
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7. Inflation and World Equity Returns

As with previous analysis, Erb, Harvey and Viskanta (1995) split inflation into two regimes: high inflation and low inflation.
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7. Inflation and World Equity Returns

Annual Inflation-High and Low Inflation States: Developed Markets

Annual Inflation-High and Low Inflation States: Emerging Markets
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7. Inflation and World Equity Returns

Performance is greater in the low inflation states.

Especially the case in developed market returns.
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7. Inflation and World Equity Returns

Average Annual Returns-High and Low Inflation States: Developed Markets

Average Annual Returns-High and Low Inflation States: Emerging Markets
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7. Inflation and World Equity Returns

Inflation also affects other asset management inputs:

- Volatility
- Correlation
- Covariance
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7. Inflation and World Equity Returns

Annualized Volatility High and Low Inflation States: Developed Markets

From Inclusion Date

Annualized Volatility High and Low Inflation States: Emerging Markets

From Inclusion Date
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7. Inflation and World Equity Returns

US Correlation Under Different Inflation States

US Covariance Under Different Inflation States
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7. Inflation and World Equity Returns

Is inflation a risk attribute?

$$R_{it} = a_i + b_i \text{INF}_{it} + e_{it}$$

where 'b' is the inflation beta.
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7. Inflation and World Equity Returns

Local Currency Return Exposure to (Negative) Local Inflation

TWO YEAR
ONE YEAR
SIX MONTH
ONE MONTH

Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Singapore, Spain, Switzerland, United Kingdom, United States, Argentina, Brazil, Chile, Colombia, Greece, India, Indonesia, Jordan, Korea, Mexico, Malaysia, Nigeria, Pakistan, Philippines, Portugal, Taiwan, Thailand, Turkey, Venezuela, Zimbabwe
7. Inflation and World Equity Returns

US Dollar Return Exposure to (Negative) Local Inflation
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7. Inflation and World Equity Returns

US Dollar Return Exposure to (Negative) OECD Inflation

TWO YEAR
ONE YEAR
SIX MONTHS
ONE MONTH
Active Investment
7. Inflation and World Equity Returns

Does the correlation of local and OECD inflation rates tell us something about equity correlations?

Yes.

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7. Inflation and World Equity Returns

Inflation Rate Correlation with OECD Inflation and Equity Correlation

Return Correlation vs. MSCI World

Inflation Correlation vs. OECD CPI
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7. Inflation and World Equity Returns

What is the cross-sectional relation between inflation, expected returns and expected volatility?

That is, can different inflation environments predict which countries will do better (or worse)?
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7. Inflation and World Equity Returns

U.S. $ Returns and Inflation

Volatility and Inflation
Active Investment

7. Inflation and World Equity Returns

Inflation data is notoriously poor in a number of countries.

Need alternative proxies for expected inflation.

Country credit risk is a good proxy.
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7. Inflation and World Equity Returns

Portfolio simulations in Erb, Harvey and Viskanta show that inflation can discriminate between high and low expected return countries.

However, credit risk does a better job.
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7. Inflation and World Equity Returns

Country Selection Strategies Based On Country Credit: All Countries, 79-93

Quartiles 1 and 4 are the lowest and highest country credit countries.
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8. Do World Markets Still Serve as a Hedge?

Generally believed that world markets have become more integrated.

Integration does not necessarily imply higher correlation.

- Two markets can be perfectly integrated - but have zero correlation.

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8. Do World Markets Still Serve as a Hedge?

Correlation is a function of:

- The industrial portfolio of each country
- How the industrial mix is affected by both the state of the market, the local and world business cycles and economic policies within the country.
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8. Do World Markets Still Serve as a Hedge?

Popularly believed that correlations have increased over time.

This is not necessarily the case.
Active Investment
8. Do World Markets Still Serve as a Hedge?

Argentina

Brazil

Chile

Greece

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Active Investment
8. Do World Markets Still Serve as a Hedge?

India

Korea

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8. Do World Markets Still Serve as a Hedge?

Thailand
Active Investment
8. Do World Markets Still Serve as a Hedge?

No evidence that correlations have systematically increased over the past five years.
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8. Do World Markets Still Serve as a Hedge?

Correlation with MSCI U.S. Equity Returns: Unhedged Returns: Emerging

<table>
<thead>
<tr>
<th>Country</th>
<th>0.8</th>
<th>0.6</th>
<th>0.4</th>
<th>0.2</th>
<th>0.0</th>
<th>-0.2</th>
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</tbody>
</table>

Sample Ends September 1994

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Active Investment

8. Do World Markets Still Serve as a Hedge?

Lesson -- Correlation not just a function of the perceptions of market integration.

Must take other factors into account.
Active Investment
9. What About Mexico?

Illustrates two dangers:

- Consequences of having an undiversified portfolio
- Pitfalls in not using active prediction models for asset management.

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9. What About Mexico?

Observation #1

December 1994, January 1995 not the outliers that people would have you believe
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9. What About Mexico?

IFC Mexico Monthly Equity Returns: January 1976 - April 1995

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9. What About Mexico?

Observation #2

Mexico is not the wildest emerging markets.
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9. What About Mexico?

Observation #3

Long-term investor has done well in Mexico (even if long-term is defined as five years).

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Active Investment
9. What About Mexico?

US and Mexico Equity Performance

![Graph showing US and Mexico Equity Performance](Image)

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Active Investment
9. What About Mexico?

Observation #4

Apparent drop in correlation is stark example of the problems in using naive correlation forecasts.
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9. What About Mexico?

Observation #5

Mexican inflation was increasing as the market was decreasing.

![Graph showing inflation and equity returns in Mexico]

Assumes 42% Annual Inflation Jan/Feb 1995
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9. What About Mexico?

Observation #6

Prediction models such as Harvey (1993) did not call December 1994 correctly.

However, January 1995-April 1995 were correctly forecast (direction).

Result: Active Mexican model profitable.

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Active Investment

10. Summary

Outstanding investment opportunities exist in both developed and emerging markets.

However, it is important to quantify the risks.

Traditional asset management, which concentrates on past averages, is in most cases inappropriate.
Active Investment
10. Summary

Have featured many of these risks:

- FX risk
- Country risk
- Over-weighting
- Up-down asymmetries
- Business cycle risk
- Inflation risk

For many of these factors, derivative instruments can help reduce the risk.