

Seeing the Big Picture: Financial Markets, Conflict and Corruption

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Key Parts of the Presentation

- We will explore the relationship between financial market returns and a proprietary measure of geopolitical conflict over the interval from 1900 to 2010, which we assert should be of interest to long term investors such as sovereign wealth funds.
- We will update the pioneering work of Shleifer and Vishny (1993) in terms of the linkage between valuation of financial markets and perceived levels of corruption a large samples of countries from 2002 to 2012
- We will consider the possibility that it would be in the *financial self interest* of large asset owners to pro-actively try to reduce market volatility by making targeted donations or “impact investments” to international non-government organizations.

Financial Markets and the Real World

- A lot of research on financial markets (see Schiller) has argued that financial markets are more volatile than is economically justified by real world events.
- This overreaction is often ascribed to human influences such as “fear”, “greed” and “cognitive biases”. While it is debatable whether investors do or do not overreact to actual events, *no one ever argued that investors are ignorant of real world events.*
- All large investors around the world expend enormous resources on obtaining and analyzing information on business and economic developments as they occur.
- The analyses of current events that investors carry out set their expectations for future outcomes. What makes financial markets operate is when investors are motivated to buy or sell financial assets as a consequence of their analysis of the news and information they have received.

Asset Pricing with News

- The academic literature has deeply explored how investors respond as information is revealed about real world developments. It is assumed that investors formulate expectations about receiving returns on a future investment (i.e. cash flow) and then arithmetically discount the expected future cash flows to present value.
- There are two parts to the exercise. The first is to formulate expectations of future cash flows. For some assets like Treasury bonds, the expected cash flows are essentially certain, while for another investment such as a “start-up” technology company the future cash flows (earnings) our expectation would be that earnings will grow in the future, but that expectation will be highly uncertain. Financial theory says that investors demand a higher return from risky investments so they use a higher discount rate in making their determination of present value.

Are Investors Are Self Aware?

- A somewhat more sophisticated view of asset pricing is that in setting discount rates investors actually consider three components.
 - The first is what rate of return they could get without risk.
 - The second is that they demand an additional return (an increase in the discount rate) which is proportional to the risk of the investment. It should be noted that while there is only one true risk (uncertainty of future outcomes) for an investment, investors may disagree as to their perception of the degree of that risk, so different investors will have different discount rates and come to different conclusions about asset value even when there is no disagreement regarding future cash flows.
 - Brown, Harlow, Tinic (1988) argues for third component to discount rates

The Role of News in Asset Pricing

- B,H,T argues that investors set higher discount rates for investments they believe they understand poorly and set lower discount rates for investments they believe are well understood. *This component plays a critical role in how investors respond to the news of real world events.*
- Let's consider a hypothetical company for which news is released that product sales exceed previous expectations. Most investors would see this a good news, and increase their projections of future corporate earnings and cash flows. On the other hand, **investors must now consider that they were surprised** (sales beat expectations). If investors were surprised, their confidence in how well they understand the company must be reduced so their discount rate must go up at the same time cash flow expectations are going up. These two effects taken together partially cancel, so any positive change in the value of the firm's shares is moderated.

Bad News is Really Bad

- On the other hand, what if the news regarding sales had been bad? If sales results were below expectations investors would reduce their projections of future earnings. At the same time, the fact that investors were taken by surprise would reduce their confidence and increase the discount rate. These two effects would reinforce each other and contribute to a sharp decline in the valuation of company shares.
- **Put simply, for investors the old adage “No News Is Good News” has a rational economic basis,** as the value of financial assets can be expected to rise in periods of relative quiet, even without any expectation of increased economic growth or future general prosperity. *This effect is particularly strong for debt markets where there is a high a priori expectation of repayment. There is very little upside to a change in conditions.*

News of Events and Volatility

- There are also numerous research papers that show strong and consistently positive linkages between the flow of news and volatility of financial assets.
 - One such paper is Kyle, Obizhaeva, Sinha and Tuzun (2012) that shows that a theoretically predicted relationship between the frequency of news articles on companies, and the volatility of their stocks was fit almost perfectly by the empirical data over hundreds of companies and many years.
 - Another paper is diBartolomeo, Mitra and Mitra (QF, 2009) which showed that the volatility of major company shares in the US and Europe was more effectively predicted by mathematical summarization of news articles than by the standard method of implying volatility of the market prices of traded stock options.

How About Really Big Events?

- Another thread of relevant finance literature is impact of “great anomalies”.
 - Much of the empirical research literature on financial markets does not include rare but extreme events such as the collapses of Russian financial markets at the time of the Russian revolution, the German financial markets in the 1930s and the total expropriation of private enterprises at the Communist takeover in China in 1949.
 - While rare, such total market collapses have a very meaningful impact on how investors should view returns from various financial markets (Dimson, Marsh, Staunton, 2014).
 - Other studies such as Barro (NBER, 2005) attribute investor preferences among financial assets as predicated on their expectations of such extreme events.

Market Returns and Geopolitical Conflict

- We perceive geopolitical conflicts such as wars to be the strongest “news” events. Based on the foregoing discussion we form two hypotheses:
 - H1: Long term financial market returns will be negatively correlated with geopolitical conflict
 - H2: The effect of this relationship will be even stronger for debt markets. Wars are expensive, driving up yields, losers in war can't pay and there is no “upside” for lenders even if their borrower wins a war.

Data Set

- For financial market returns we take global value-weighted index values for equities and bonds calculated in US\$
 - From Dimson, Marsh, Staunton (2012) dataset. They include all countries with traded markets between 1900 and 2010. The data is not survivorship biased. Countries that went to zero are included appropriately. Available from CS and Morningstar.
- For the measure of global geopolitical conflict, we created a proprietary data set.
 - Metric is “deaths by conflict” globally year by year as percentage of world population (32 major events)
 - Included high/low and median estimates for each event
 - Included all wars, civil war, genocide and famine (deprivation of food aid) even in countries where there were no markets

Data Observations

- For conflict events lasting longer than one year (e.g. World War II), we allocated linearly across the conflict years, so 20% of deaths would appear in each year for a five year event.
- As we are concerned with long term investment results in a presumably noisy relationship, we aggregated the annual data into eleven decade long observations (1900 to 1910, 1910 to 1920, etc.)
- All statistics reported have been corrected for small sample bias.

Basic Statistics and Results

- We use a simple OLS regression model where market returns are the dependent variable and our “death” metric is the independent variable
 - Depending on whether you use the “high”, “median” or “low” estimate for conflict, the correlation of equity market is between negative 30% and negative 38%. This result is not statistically significant with only 11 data points
 - For global bond markets, the simple correlation ranges from negative 63 to 71%, **which is highly statistically significant with just eleven data points**
 - For a 60/40 typical institutional portfolio, the correlation averaged around negative 45% which is significant at the 95% confidence interval
 - No statistically significant lead/lag relationships

A Bit More on Exploration

- If we restate the independent variable as the log (base 10) of the conflict measure, the correlations rise to over negative 80%
 - The “best fit” is between bond market returns and the “maximum” conflict time series with a correlation of negative 86% (r-squared = .74). Statistically significant at a greater than 99.9% level
 - We chose not to control for other effects (inflation, changes in rate of GDP growth) as they may also be outcomes of the real world events, not independent effects
 - Relationship of stocks to the log of the conflict measure were slightly lower as compared to the simple measure
 - Relationship of a 60/40 portfolio to the conflict measure was approximately unchanged.

Conclusions on Conflict

- For Hypothesis 1, we can reject the null for both fixed income markets and the 60/40 portfolio. For equities alone, the result has the correct sign but is not significant on eleven observations.
- For Hypothesis 2, we can reject the null hypothesis. Bond markets are nearly linearly negatively related to the conflict measure and are substantially more negatively related to geopolitical conflict than equity markets.
- We are making no formal claims about causality, but I think its more intuitive to think of conflict impacting financial markets than financial market outcomes causing wars
 - Paul Krugman on Ukraine aside

Let's Talk About Corruption

- We wish to explore the relationship between financial markets and the perception of corruption across countries.
- The seminal study is Shleifer and Vishny (1993)
 - They found GDP growth is slower in countries perceived to be corrupt
 - They found the value of traded equity markets as a fraction of GDP to be smaller in corrupt countries
- We will update their analysis to 2012, using the years 2002, 2007 and 2012 as representatives.

Effect of Corruption

- H3: We believe that the ratio of equity market valuation divided by GDP will be lower for countries with a high perceived degree of corruption.
 - Our intuition is that in countries with low corruption, investors are willing to participate in “arms length” transactions over a stock exchange, confident that legal and regulatory oversight will protect their interests.
 - In countries with high corruption, investor confidence is lacking, and financial transactions are biased toward a culture “face to face” private transactions.

Data for Corruption Study

- Country level GDP and total market value of equity markets is reported as year-end values obtained from the World Bank online database.
- Corruption levels are measured by the Transparency International Corruption Perceptions Index
 - Compiled by an annual survey of business and government officials
 - Data collected on essentially every country on earth
 - Annual data begins in 1995

Corruption Basic Outcomes

- We calculated equity market cap to GDP ratio for a sample of about 100 countries in 2012
 - The correlation of market cap/GDP to the corruption index is negative 45% (r-squared = .21) which is highly statistically significant ($T > 5$)
- In 2002, the number of countries with functional equity markets was only 82, but the correlation of the market cap/GDP ratio was even higher at 48% (r-squared = .23) which is also highly significant ($T > 5$)
- We can clearly reject the null and confirm H3 for all years tested.

Changes in Corruption Levels

- We also tested the % changes in the market cap/GDP ratio against changes in the corruption index from 2002 to 2007 and 2007 to 2012
 - Relationship between the changes occurring between 2002 and 2007 were not statistically significant . Relationship between the changes occurring between 2007 and 2012 were of the expected sign and significant (t = 3.2, r-squared = .11)
 - The pooled sample is of the correct sign and weakly significant.
 - *This is not a direct measure of the market returns and changes in corruption as the ratio of market cap / GDP may decline because the denominator has increased*
 - Dimson, Marsh, Staunton (2012) shows a strong association between equity market returns, and contemporaneous/future GDP growth

The Magic of Compounding

- Consider a hypothetical investor who invests \$1 at 8% fixed return for 50 years
 - The 8% assumption is close to the median actuarial assumption for US public pension plans
- Over the 50 years, the \$1 will grow to be \$46.90
 - \$1 is the original capital
 - \$4 is 50 years of 8% returns on the original \$1
 - \$41.90 is the result of compounding of returns over time

Variance Drain

- Now lets consider an investor who earns 8% in an average year but with a standard deviation of 20%
- In this case \$1 invested for 50 years accumulates to only \$18.42
 - This is equivalent only a 6% fixed return
 - The accumulation due to compounding of return is only \$13.42, less than a third of the prior result.
- The “variance drain” or loss of compounding is linearly related to the variance or volatility squared
 - See Messmore (1995)

The Arithmetic of Enlightened Self Interest

- Assume investors set aside $X\%$ of their assets for “impact” investments designed to make world a less conflicted place (or equivalent contributions to NGOs)
 - We expect a typical investment portfolio produce an average annual return of $R\%$ with a standard deviation of $S\%$, so the variance is S^2 .
 - The expectation of the % compound rate of return G is $R - S^2/200$
 - The “impact” investments should produce an incrementally lower return (if they had higher returns we would already be doing them), say $R-D$.
 - But the impact investments should also produce a decrement in volatility S , so we have $S-M$
 - So our revised expectation for the compound rate of return would be:

$$G = ((100-X)/100) * R + (X/100) * (R-D) - ((S-M)^2)/200$$

A Plausible Win-Win?

- So our question is how big must M (volatility reduction) be to **fully financially offset a given amount of targeted subsidy** from asset owners to NGOs (e.g. UNICEF, Red Crescent, Doctors Without Borders, etc.)
 - Let's assume investors are willing to take market return minus 3% on 1% of their portfolio (or contribute 3 BP of their return)
 - The current market value of all traded financial markets is roughly \$110 Trillion (depends on whether you count money market instruments) so the annual subsidy would be \$33 billion
 - Assume the global portfolio has volatility 12%, variance 144
 - If we are giving away 3 BPs, we must reduce variance by 6 units, from 144 to 138.

Give Peace a Chance?

- If the R-squared of our conflict measure is 23%, it explains 33 units of our assumed 144 units of variance.
 - By reducing conflict in the world, we hope to reduce the variance explainable by conflict from 33 to 27 (reduced by 6)
 - Assuming the relationship holds we need to reduce the amount of conflict by about 9.5% ($1-(27/33)^5$)
 - But \$33 Billion goes a long way: the entire GDP of Gaza is \$10 billion and our best estimate of the annual aggregate budget of all known terrorist groups is less than \$3 Billion
- We can repeat the exercise for fixed income markets only with qualitatively similar results
 - Variance of fixed income return is much smaller but is offset by the much higher R-squared

A Tangential Example?

- One example of the impact of social aid programs on civil unrest and violence is the experience of US, France and India with “affirmative action” programs
 - AA programs provide legal biases giving preference to previously discriminated social groups in education and hiring
 - At least one study (Tedeschi) found that in all three countries, violent civil unrest dropped markedly in the decade subsequent to enactment of such legislation.
 - Some have argued against AA programs suggesting they are actually “appeasement” programs designed to dilute efforts by social minorities to obtain a greater level of participation in economic and political affairs.

Conclusions

- For sovereign wealth funds and other large, long term asset owners (DB pensions and endowments), the real risk of disaster comes from geopolitical conflicts that can disturb the functioning of nations.
- Using time series data from 1900 to 2010 we show there is a strong negative relationship between returns to financial markets and our metric of geopolitical conflict. We are able to confirm the hypotheses that while conflict is bad for financial market outcomes, it is much worse for bond markets where there little upside for investors.
- We are also able to show that previously published results on the relationships between equity market, GDP and levels of national corruption are highly significant in a large cross-section of countries
- We illustrate that it may be plausible that asset owners may be able to pro-actively reduce market risks sufficiently to offset related costs