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Quest for the Holy Grail: The Fair Value of the Equity Market

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The Holy Grail: A legendary relic described in various traditions as a sacred vessel with miraculous powers that provides happiness, eternal youth, and infinite abundance.

Forecasting the "fair" value of the US equity market can be likened to the legendary quest for the Holy Grail by the medieval knights of King Arthur. Valorous investors, accompanied by knowledgeable guides and equipped with various weapons such as stock market valuation metrics, routinely allocate their investment capital across markets. These allocation decisions are based on return expectations, which reflect investors' beliefs about an asset's fair valuation.

Key Points

1. *Macroeconomic volatility is a useful tool in investors' quest for the fair value of the stock market.*

2. *This volatility is associated with the equity risk premium: investors are willing to pay a higher price for stocks when there is lower aggregate uncertainty.*

3. *Macroeconomic volatility has been at historically low levels in recent years, driven largely by technological innovation, greater market integration, and improvements in monetary policy implementation.*

4. *Whereas lower volatility justifies a higher fair value than the historical average, the current price of the stock market still appears expensive.*

> ## *"Macro volatility offers a useful tool in the quest for fair value."*

Contrarian investors, who profit from prices reverting to longer-term averages, are likely confounded by the continually increasing normalized value of the US equity market. Normalized prices, adjusted for changes in earnings or dividends, have remained above their long-term averages over the last quarter-century, causing a simple contrarian strategy in US equities to fail to outperform a buy-and-hold strategy over the same time period. We ask why stock valuations have been steadily increasing, will they continue to rise, and should we expect this trend to reverse itself?

We offer an economic explanation, showing that aggregate macroeconomic volatility can provide useful real-time information about the expected path of the US stock market. The falling macroeconomic volatility of major economies has led, as it should, to lower expected returns for equities, supporting the contrarian view that rising US equity valuations will eventually revert toward the mean. We show how investors can incorporate information about the changing macroeconomic environment in the construction of a contrarian strategy. Macroeconomic volatility, although not a map to the Holy Grail, offers a useful tool for investors in their quest for fair value.

The Recent Struggles of Contrarian Investors

Academics have suggested various reasons for sustained higher equity valuations, from the microstructure benefits of improved participation and lower transaction costs to the macroeconomic benefits of larger profit shares. We examine the explanation put forward by Lettau, Ludvigson, and Wachter (2008) that rising valuations are propelled by the large reduction of macroeconomic risk in the US economy. Their intuition is simple—investors require lower returns from equity markets when the aggregate volatility of the economy is lower. It should come as no surprise

that investors are glad to pay a higher price, and accept a lower return for investing in a stock market that delivers less uncertainty.

Today's economy is drastically different from just a few decades ago, and radically different from a century ago. Judging from the volatility of two major macroeconomic variables—real output growth and inflation—it has changed for the better. From the days before the US Federal Reserve Bank until today, the annual volatility of the economy has tumbled about 80%.

When we plot the measure of macro volatility with the inverse of a very popular valuation metric, Robert Shiller's cyclically adjusted price/earnings ratio (CAPE), we find an intriguing and significant positive correlation between expected real equity returns and the aggregate volatility of the economy. Under the restrictive assumption that prices are fair and an appropriate return on retained profits, we assert that earnings yields are an appropriate proxy for an equity market's future real return. For clarity we name the inverse of the CAPE, an earnings yield, the cyclically adjusted earnings yield (CAEY).

The majority of the macro volatility reduction occurred during the mid-1980s at the start of the Great Moderation. Among the various explanations for this reduction in economic risk suggested by the academic research is technological innovation, greater market integration, and superior policy.

Policy planning and implementation, such as implicit or explicit inflation targeting, is likely among the more important drivers of the improved state of economic affairs. The Great Financial Recession of 2008–2009 proved that the pursuit of lower economic risk is not without its limits, although our risk measure indicates the associated rise in volatility was a minor blip on the radar screen compared to the historical record in the years preceding Paul Volcker's appointment to the Federal Reserve in 1979.

Asness, Ilmanen, and Maloney (hereafter, AIM) (2015) argue that "secular changes can be poison to contrarian strategies, which by definition need an anchor to define

A significant positive correlation is observed between the equity earnings yield
(a proxy for future real return) and macro volatility.
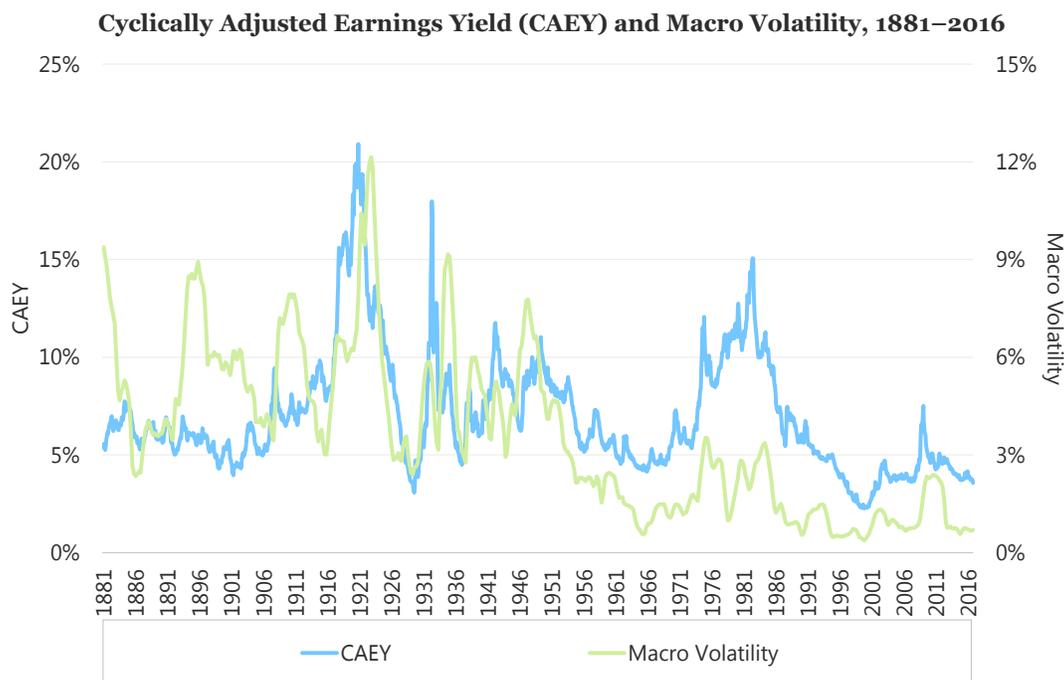
Cyclically Adjusted Earnings Yield (CAEY) and Macro Volatility, 1881–2016

Source: Research Affiliates, LLC, using data from FRED from the Federal Reserve Bank of St. Louis, Robert Shiller's Online Data, and Ray C. Fair's quarterly historical GDP Data (https://fairmodel.econ.yale.edu/rayfair/pdf/2002dtbl.htm). For quarterly real GDP growth, we use FRED data from 1947 to present, backfilled with data from Ray Fair's website. Macro volatility is defined as the arithmetic average of the rolling three-year volatility of real GDP growth and the rolling three-year volatility of inflation.

where we overweight, underweight and stick close to buy-and-hold." We would argue that simple contrarian strategies have recently underperformed a buy-and-hold strategy, precisely because they have not adapted to changes in the macroeconomic environment.

Influence of Macro Volatility on Equity Valuations

To investigate the influence of macroeconomic volatility on stocks, we propose two predictive models of CAEY. Model One incorporates a replication of the historical valuation measure (CAEY) from the work of AIM, using its 60-year trailing median value. This predictor allows secular changes in the stock market to be very gradually incorporated and avoid undesired short-term trend chasing. We call this predictor *Historical CAEY*.

Model Two incorporates information contained in our simple measure of the macroeconomic environment. We call this predictor *Equilibrium CAEY*. The modeling process for Equilibrium CAEY is as follows:

1. We estimate a linear relationship relating CAEY to macro volatility using the earliest 45 years of available historical data, 1881–1926.

2. Beginning in 1927, we re-estimate our model each quarter with the latest quarter's observation of real GDP growth and inflation.

3. Each month, given the macroeconomic risk of the prior month, we identify the implied fair value of CAEY.

In Model One, future (one-year ahead) valuation changes are conditioned on the difference between the market's CAEY and Historical CAEY, and in Model Two the market CAEY and Equilibrium CAEY (see endnote). Our estimates show a relatively small increase in the explanatory power of the predictive regression when using Equilibrium CAEY versus Historical CAEY. On average, the model predicts that 20% of the Historical CAEY difference disappears in the subsequent year. In contrast, 25% of the Equilibrium CAEY difference evaporates annually. Thus, Equilibrium CAEY predicts a 5% faster mean reversion over the next year, which suggests macroeconomic information is useful as a way to more precisely identify the mean-reverting component of the stock market.

> **"Macro volatility provides useful real-time information about the expected path of the US stock market."**

Higher precision in predicting the mean-reversion component of equities should translate into more profitable opportunities for contrarian investors. Equipped with Equilibrium CAEY, investors should be able to successfully apply their contrarian beliefs, even in a trending market. We investigate this premise next.

Macro Vol and Contrarian Investing

In this section, we run a simple portfolio test to quantify the impact of using our macroeconomic data to improve a contrarian strategy. We continue to build off the benchmark presented by AIM, whose research explores the out-of-sample efficacy of a contrarian market-timing strategy between the S&P 500 Index and cash. Their hypothetical contrarian investor is overweight equities when the CAEY is above historical median values and underweight equities otherwise. Hence, this simple contrarian approach can be thought of as a mean-reversion strategy with the historical median as the fair value.

Specifically, we compare the performance of two contrarian strategies whose only difference is the fair valuation used to form the portfolio:

- Historical Contrarian: Overweight equities when CAEY is above its historical median CAEY.

- Macro-Vol Contrarian: Overweight equities when CAEY is above Equilibrium CAEY.

By building off AIM's benchmark we are setting the bar relatively high for contrarian investing. First, we rebalance monthly, which tends to skew the performance toward strategies such as momentum rather than value. Second, the investment decision used in our portfolio test ignores the actual yield on cash, the other investment opportunity. Indeed, on several past occasions, stocks, even though expensive, still provided a more attractive expected return than cash, whose return is controlled by the Federal Reserve. We believe, however, that by setting a high bar for our portfolio test, we can offer more transparent and compelling evidence.

The equity allocations that result for both historical contrarian and macro-vol contrarian strategies are nearly identical in the early years of our analysis. After the early 1950s, however, as the level of macroeconomic volatility starts to fall, the holdings of the macro-vol contrarian strategy begin to deviate from those of the historical contrarian strategy. We observe that significant changes in macroeconomic volatility are reflected in the allocations of the risk-conditional strategy as it gradually reacts to the changing environment, resulting in larger relative allocations to equities.

We compare the out-of-sample performance of the two contrarian strategies relative to a buy-and-hold portfolio, which is fully invested in equities (i.e., no cash). For the period 1927–2016, we observe that the macro-vol contrarian strategy outperforms the historical contrarian strategy in years after major changes occur in the macroeconomic

When macroeconomic volatility informs equity allocations in a contrarian strategy, allocations are higher relative to those of a historical contrarian strategy.

Equity Allocations for Contrarian Strategies, 1927–2016
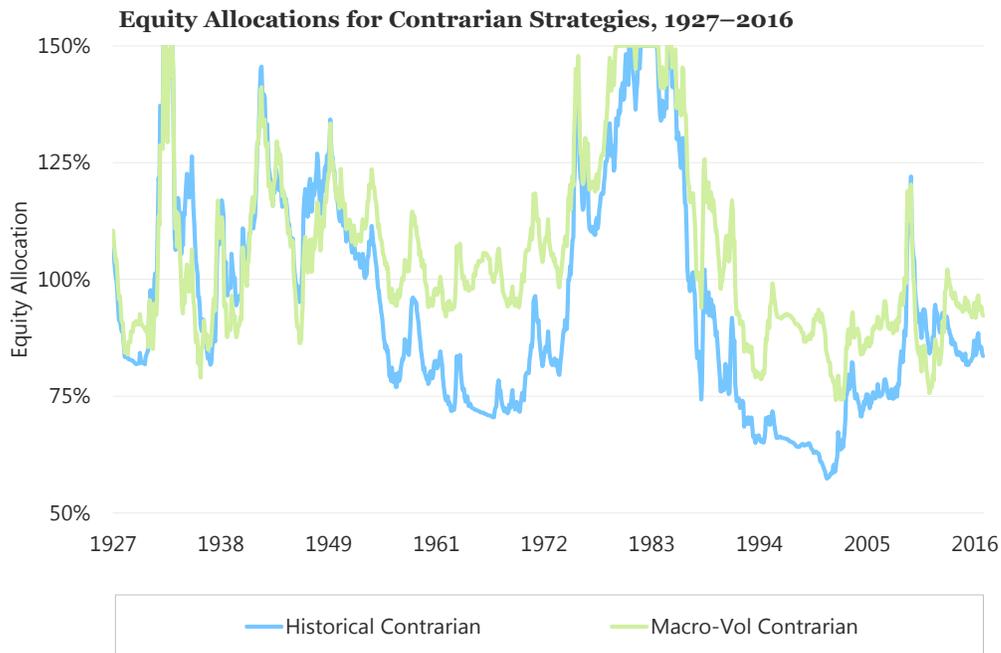
Note: Following Asness, Illmanen, and Maloney (2015), the contrarian market-timing strategies' equity allocations are constrained to between 50% and 150% each month.
Source: Research Affiliates, LLC, using data from FRED from the Federal Reserve Bank of St. Louis, Robert Shiller's Online Data, and Ray C.

The macro-vol contrarian insight results in observed outperformance compared to the historical contrarian strategy.
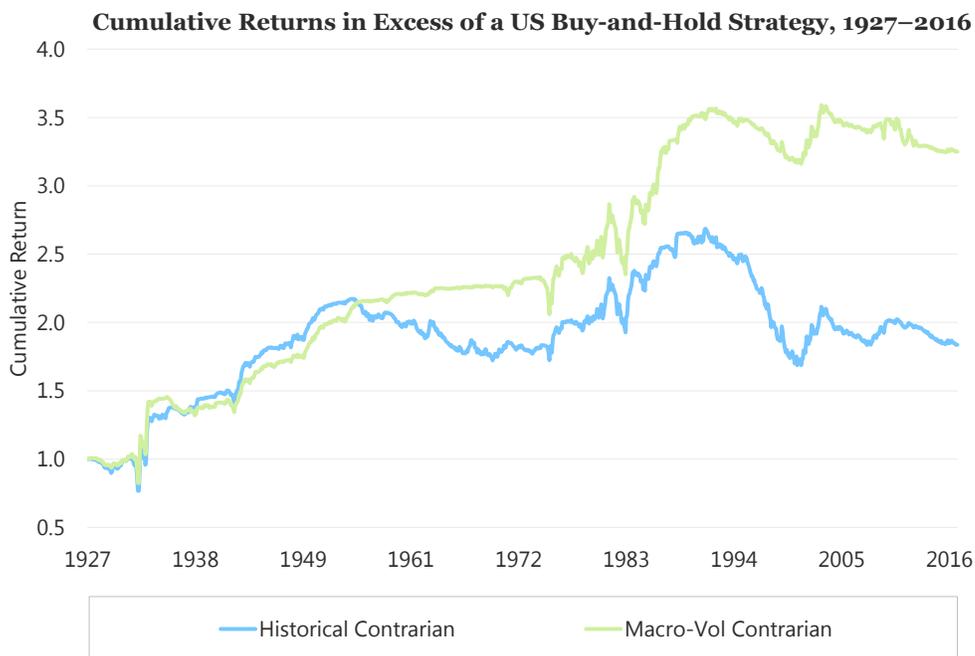
Cumulative Returns in Excess of a US Buy-and-Hold Strategy, 1927–2016

Source: Research Affiliates, LLC, using data from FRED from the Federal Reserve Bank of St. Louis, Robert Shiller's Online Data, and Ray C. Fair's quarterly historical GDP Data (https://fairmodel.econ.yale.edu/rayfair/pdf/2002dtbl.htm).

> *"Earnings yields are an appropriate proxy for an equity market's future real return."*

environment. The explanation for the performance difference is that the anchor for the historical contrarian strategy is backward looking and suffers from the "poison" of secular changes. At the same time, because the macro-vol contrarian strategy is responsive to macroeconomic conditions, it is better able to adapt to a changing macro risk environment.

Over the full period, conditioning on macroeconomic volatility is indeed valuable; the insight provides an average 50 basis points (bps) more a year compared to the historical contrarian strategy. Consistent with the path of macro-vol, the additional return relative to the historical contrarian strategy is not evenly distributed over time, but is additive in recent years. For example, since the start of the Great Moderation in 1985, the macro-vol contrarian strategy has outperformed a buy-and-hold strategy by 60 bps a year, while the historical contrarian strategy underperformed the same by 30 bps a year.

If we apply the allocation rules of the historical contrarian and macro-vol contrarian strategies based on year-end 2016 market prices and macroeconomic risk conditions, we observe that stocks are currently overvalued but not as

Out-of-Sample Performance of Different Contrarian Strategies, 1927–2016

	Full Period 1927-2016	Turbulent Times 1927-1949	Post-War Boom 1950-1984	Great Moderation 1985-2016
Buy and Hold	6.6%	5.6%	6.4%	7.4%
Historical Contrarian	7.1%	7.5%	6.8%	7.1%
Macro-Vol Contrarian	7.6%	7.3%	7.4%	8.0%

Source: Research Affiliates, LLC, using data from FRED from the Federal Reserve Bank of St. Louis, Robert Shiller's Online Data, and Ray C. Fair's quarterly historical GDP Data (https://fairmodel.econ.yale.edu/rayfair/pdf/2002dtbl.htm).

Implied Fair Value and Contrarian Market-Timing Allocations

	CAEY	CAPE	Allocation to Equities
Current (12/31/2016)	3.6%	28.0	
Historical Contrarian Fair Value	5.1%	19.7	84%
Macro-Vol Contrarian Fair Value	4.4%	23.0	92%

Source: Research Affiliates, LLC, using data from FRED from the Federal Reserve Bank of St. Louis, Robert Shiller's Online Data, and Ray C. Fair's quarterly historical GDP Data (https://fairmodel.econ.yale.edu/rayfair/pdf/2002dtbl.htm).

much as suggested by the historical averages. The current low level of macro volatility implies lower expected returns (and higher current prices). As of December 2016, a macro-vol contrarian investor would allocate a full 8% more to equities than a historical contrarian investor (92% vs. 84%).

Conclusion

Over the last two decades, US equity market price increases have pushed yields to remarkably low levels, leading investors to wonder, what is fair value? Our analysis suggests that macroeconomic volatility can provide meaningful guidance to investors in recognizing fair value. Currently, we find that US equity market prices are still higher than their implied value, which is based on recent low levels of macroeconomic volatility. We believe the trend toward lower macro-vol and the higher valuations it justifies is waning. Therefore, long-term investors can benefit by considering the future trajectory of economic management, both in the US and abroad, and successfully advance their progress in the quest for the Holy Grail of fair value.

Endnote

Out-of-Sample Forecasting of Changes in CAEY, 1926–2015

	One-Year Ahead Change in CAEY	One-Year Ahead Change in CAEY
CAEY – Historical CAEY	-0.20*** (0.06)	
CAEY – Equilibrium CAEY		-0.25*** (0.09)
Constant	0.00 (0.00)	0.00 (0.00)
Adjusted R^2	9%	11%

Newey-West-corrected standard errors; lag set to 18 months.
Standard errors in parentheses.
*p < 0.1, ** < 0.05; *** < 0.01

Source: Research Affiliates, LLC, using data from FRED from the Federal Reserve Bank of St. Louis, Robert Shiller's Online Data, and Ray C. Fair's quarterly historical GDP Data (https://fairmodel.econ.yale.edu/rayfair/pdf/2002dtbl.htm).

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