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Quant Macro Series – Asset Allocation & Inflation

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www.drobny.com **Nick Latinovic** nick@drobny.com 202-210-4456

- **Recent global developments continue to point to a more inflationary macro backdrop.**
- **In today's note, we consider the implications of rising inflation over both structural and cyclical time frames for the performance of a traditional equity-bond portfolio.**
- **Consistent with our previous work, we find that risk-adjusted returns of an equity-bond portfolio tend to be lowest during inflationary periods and highest during disinflationary periods. As importantly, the addition of commodities appears to significantly increase the robustness of a traditional equity-bond portfolio to inflation shocks.**
- **Furthermore, risk-adjusted returns of an equity-bond portfolio tend to be highest around business cycle troughs and fall as we approach business cycle peaks. Underperformance around business cycle peaks can largely be attributed to central bank rate hikes in response to rising inflation pressures due to capacity constraints.**
- **We conclude that investors with large exposure to both equities and bonds should either reduce risk allocations or add slack-sensitive commodity exposure (e.g. crude oil) to their portfolios.**

Recent global developments continue to point to a more inflationary macro backdrop. They include increasing risk of trade protectionism and de-globalization, central banks which are more asymmetric in their response to inflation outcomes due to the lower bound in nominal rates (i.e. risk management) and the reduction in labor market slack in most developed economies. Some of these factors, such as de-globalization and a potential decline in global wage rate arbitrage, are structural in nature and have been raised by our colleague Andres Drobny today. Others like the decline in labor market slack are cyclical.

In today's note, we consider the implications of a more inflationary macro backdrop on asset allocation decisions, in particular the performance of a traditional equity-bond portfolio. Our findings are consistent with our previous work (see *Risk Parity in Europe*, November 19th 2015) and suggest that risk-adjusted returns in equity-bond portfolios are likely to decline going forward due to either structural and/or cyclical factors. We conclude that investors with large exposure to both equities and bonds should either reduce risk allocations or add slack-sensitive commodity exposure to their portfolios.

We begin by reviewing the performance of portfolios across inflation regimes.

Structural Inflation & Portfolio Performance:

Table 1 presents the risk-adjusted returns for portfolios of U.S. equities (S&P 500), bonds (U.S. 10Y Treasury) and commodities (CRB Index) across different inflation regimes.

Table 1: Portfolio Sharpe Ratio vs. Inflation Regimes

	Equity-Bond 60/40	Equity-Bond Inv. Vol	Equity-Bond-Comdty Inv. vol
Full Sample (1962-2015)	0.73	0.95	1.02
Inflationary Regime (1962-1981)	0.39	0.49	1.03
Disinflationary Regime (1981-2000)	1.30	1.46	1.03
Deflationary Regime (2000-2015)	0.45	0.89	1.02

As we noted in our previous work, risk-adjusted returns of an equity-bond portfolio tend to be lowest during inflationary periods and highest during disinflationary periods. As importantly, the addition of commodities (or assets with large positive betas to the inflation risk factor) appears to significantly increase the robustness of a traditional equity-bond portfolio to inflation shocks.

However, for most of our members with active management mandates, holding a structural portfolio may not be feasible. Hence, developing a strategic or tactical asset allocation strategy is necessary.

Next, we consider the performance of a traditional equity-bond portfolio over the course of the business cycle.

Cyclical Inflation & Portfolio Performance: the Theory

As we explained in *Risk Parity in Europe* (November 19th 2015), "economic theory suggests that the equity and bond risk premium are both time-varying and counter-cyclical. To understand this, we need to think through the behavior of macro risk factors over the business cycle. Generally, the key macro risk factors driving expected returns in equities and bonds are growth and inflation. Equity returns tend to be most sensitive to the growth risk factor whereas bonds are most sensitive to the inflation risk factor. Consider what happens to expected risk-adjusted returns in equities when the economy is supply constrained and

central banks are tightening monetary policy to lower nominal growth. Typically, this is also the more inflationary phase of the business cycle when unit labor costs and equity multiples are rising/high providing headwinds for equity markets on a forward looking basis. On the other hand, one would expect the reverse to be true when the economy is operating below potential and central banks are easing monetary policy to increase nominal growth. This phase of the cycle is generally more disinflationary with unit labor costs and valuations falling/low thus providing tailwinds for equity markets. The expected risk-adjusted return in bonds also tends to be counter-cyclical. Specifically, as mentioned above, central banks are more likely to hike policy rates when capacity has been absorbed and inflation pressures emerge."

As importantly, the risk-adjusted returns of the portfolio will also depend on the correlation/comovement of the assets over the course of the cycle (i.e. diversification effect). As we explained, "economic theory suggests that both equity and bond prices should reflect the present value of future cash flows. Since inflation determines the discount rate for both equities and bonds, it tends to drive both assets in the same direction. This implies a positive equity-bond correlation when inflation shocks dominate. Alternatively, growth shocks affect equities more than they do bonds which leads to a negative equity-bond correlation when growth shocks dominate."

In other words, a strategic asset allocation framework should for the most part condition equity and bond exposure on the phases of business cycle.

These relationships are shown in figure 1 and table 2.

Figure 1: The Stylized Business Cycle

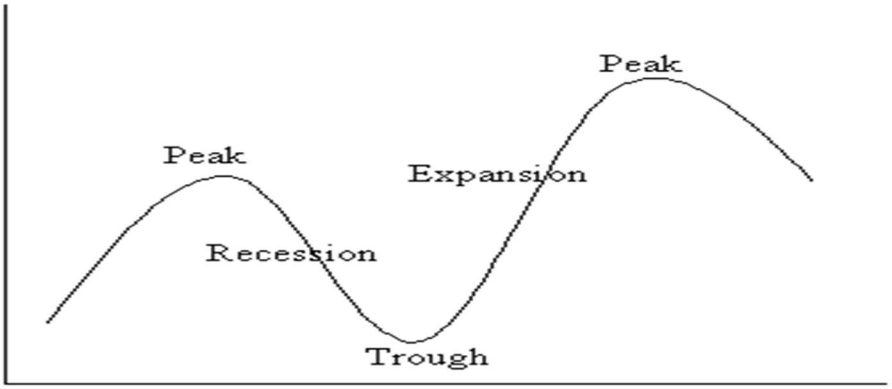


Table 2: Business Cycle & Equity-Bond Portfolio Performance

	Trough	Expansion	Peak	Recession
Equities	+	+	-	-
Bonds	+	-	-	+
Correlation	--	-	+	-
Equity-Bond Portfolio	++	+	--	+

Cyclical Inflation & Portfolio Performance: the Empirics

So how does this theory hold up to empirical testing?

Figure 2 shows risk-adjusted returns of a DM equity-bond portfolio (MSCI and JPM global bond index) with inverse volatility weights plotted against the G10 unemployment gap (equal weighted average).

Figure 2: 1y DM Equity-Bond Portfolio SR vs. G10 UE Gap (lagged 1y)

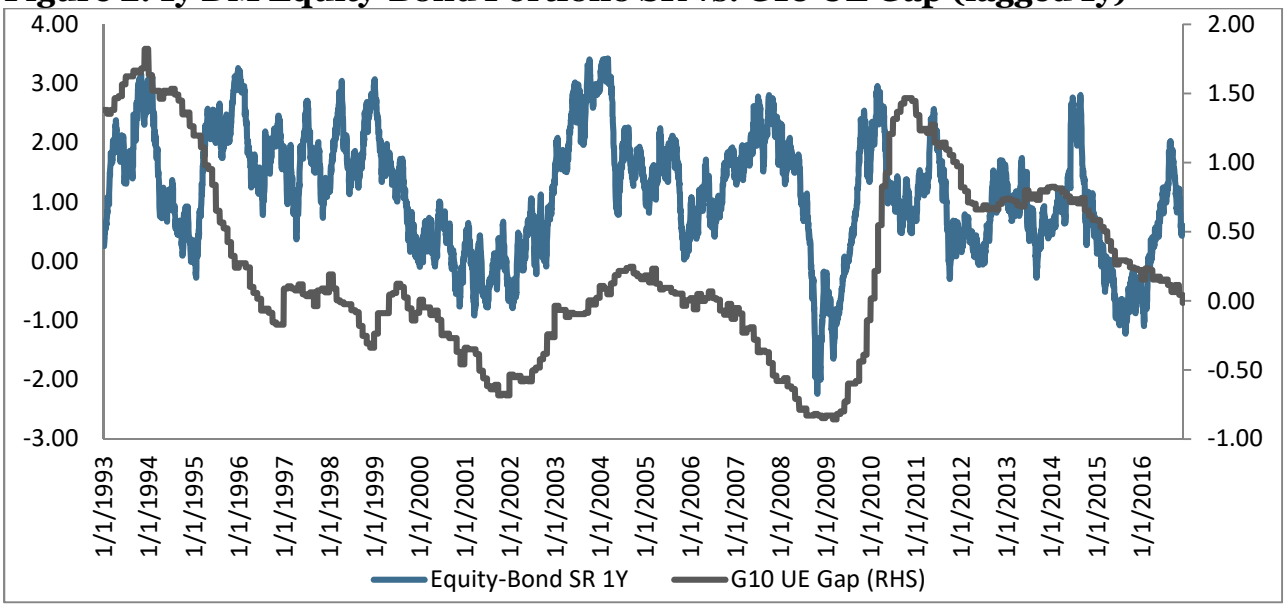


Figure 3 and 4 break down the portfolio Sharpe ratios across phases of the business cycle as measured by the unemployment gap which we found does a good job of summarizing the behavior of most DM central banks. We separate our sample period beginning in 1990 into two subsamples which allows us to interpret the robustness of these results across time.

Figure 3: SRs - DM Equity-Bond Portfolio vs. G10 UE Gap (1990-2002)

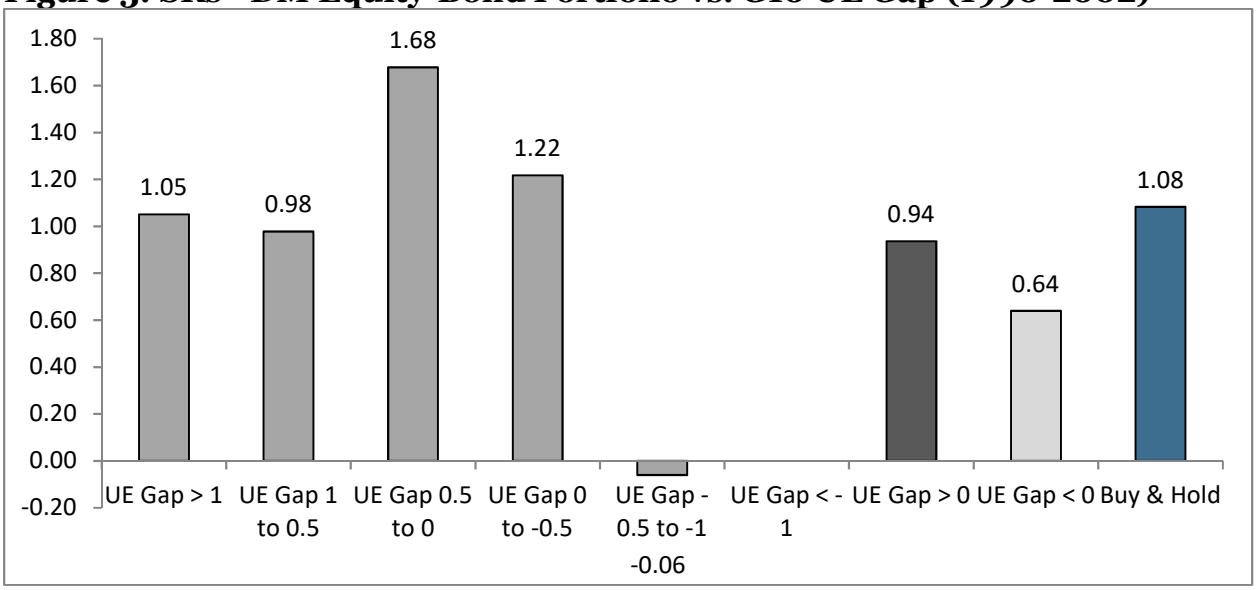
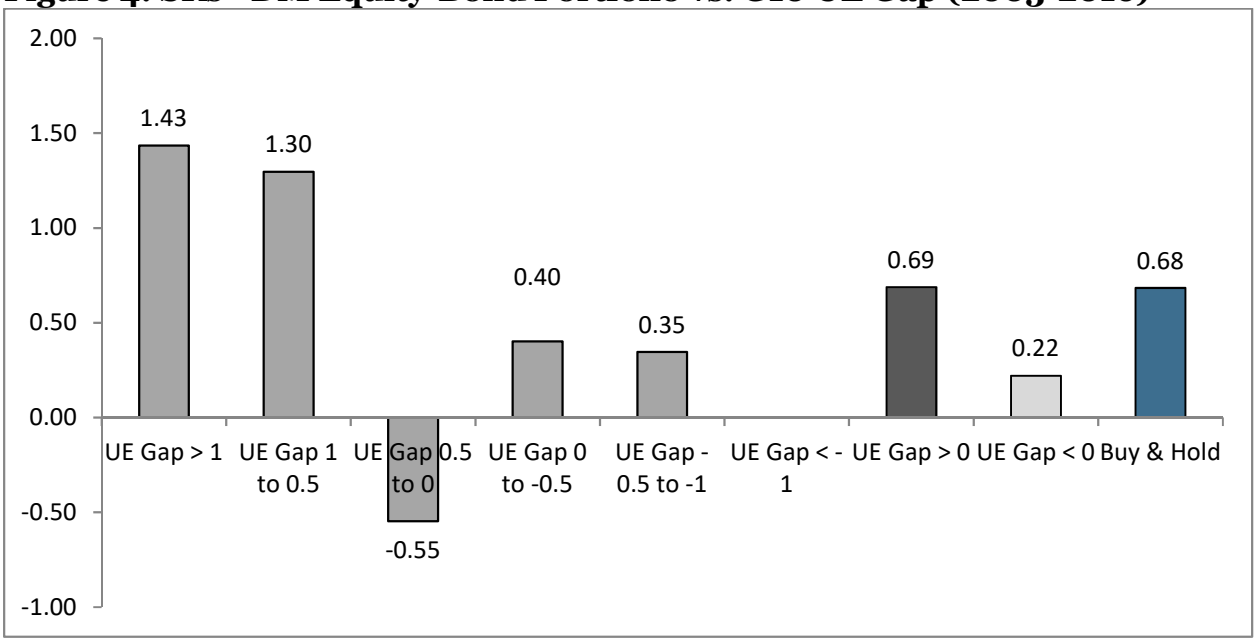


Figure 4: SRs - DM Equity-Bond Portfolio vs. G10 UE Gap (2003-2016)

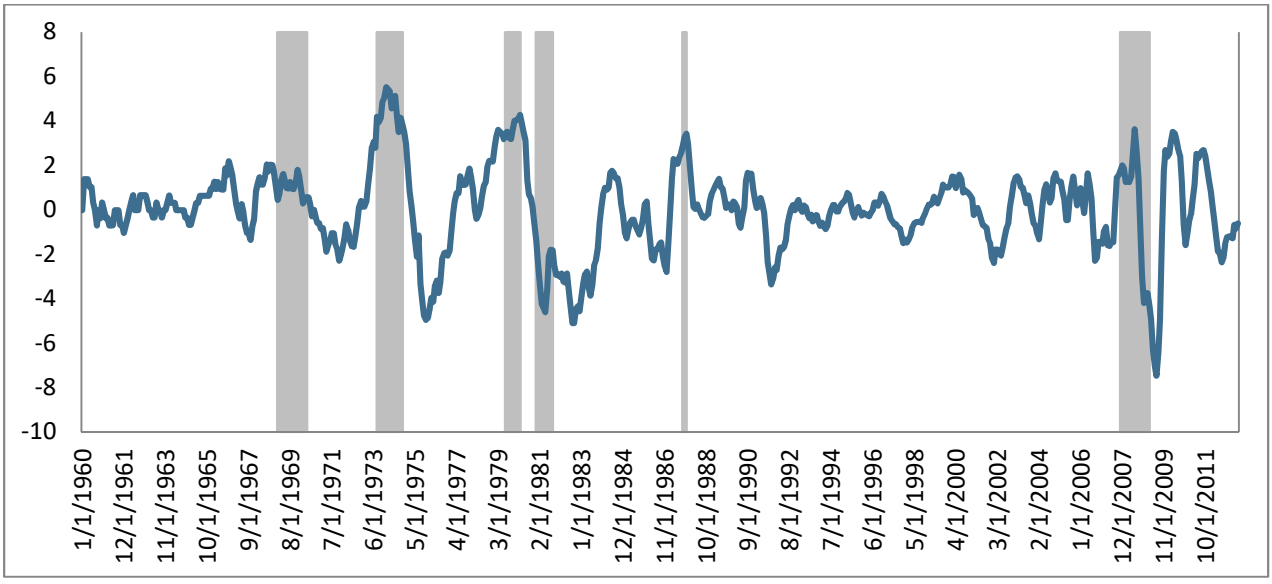


We find that the empirical evidence is mostly consistent with economic theory; risk-adjusted returns of an equity-bond portfolio tend to be highest around business cycle troughs and fall as we approach business cycle peaks.

Underperformance around business cycle peaks can largely be attributed to central bank rate hikes in response to rising inflation pressures due to capacity constraints.

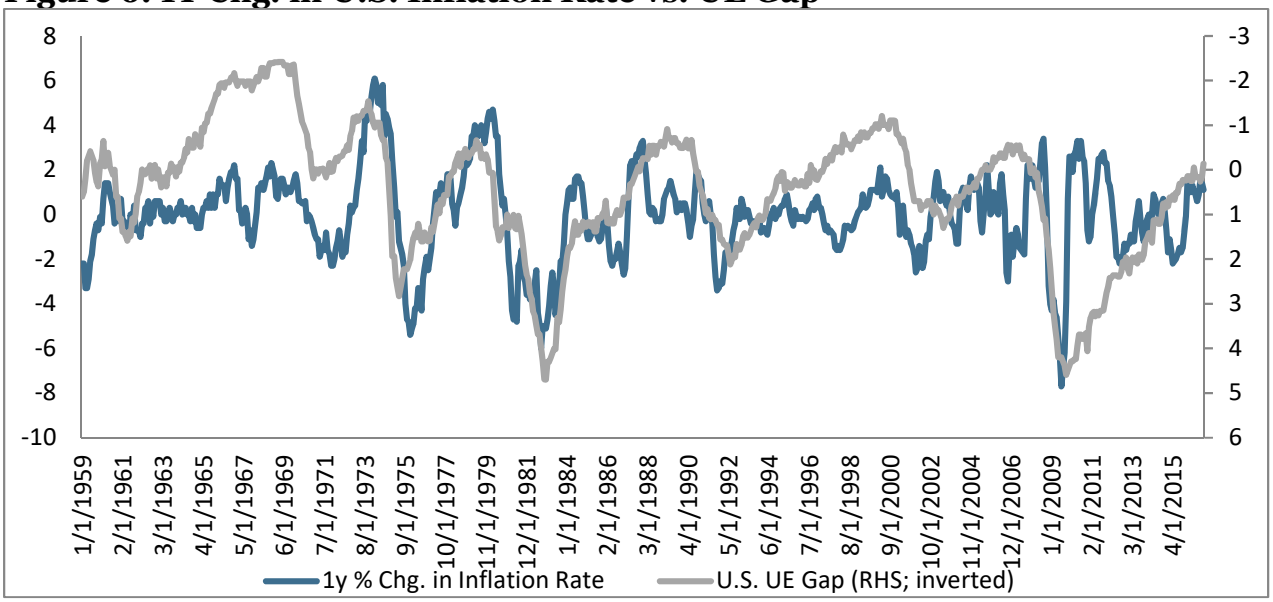
This can be seen in figure 5 and 6 which shows how portfolio drawdowns tend to occur at the later stages of the business cycle when inflation pressures are rising and inflation shocks are most likely.

Figure 5: 1Y Chg. in U.S. Inflation Rate vs. 10% + Drawdowns in S&P/UST Portfolio*



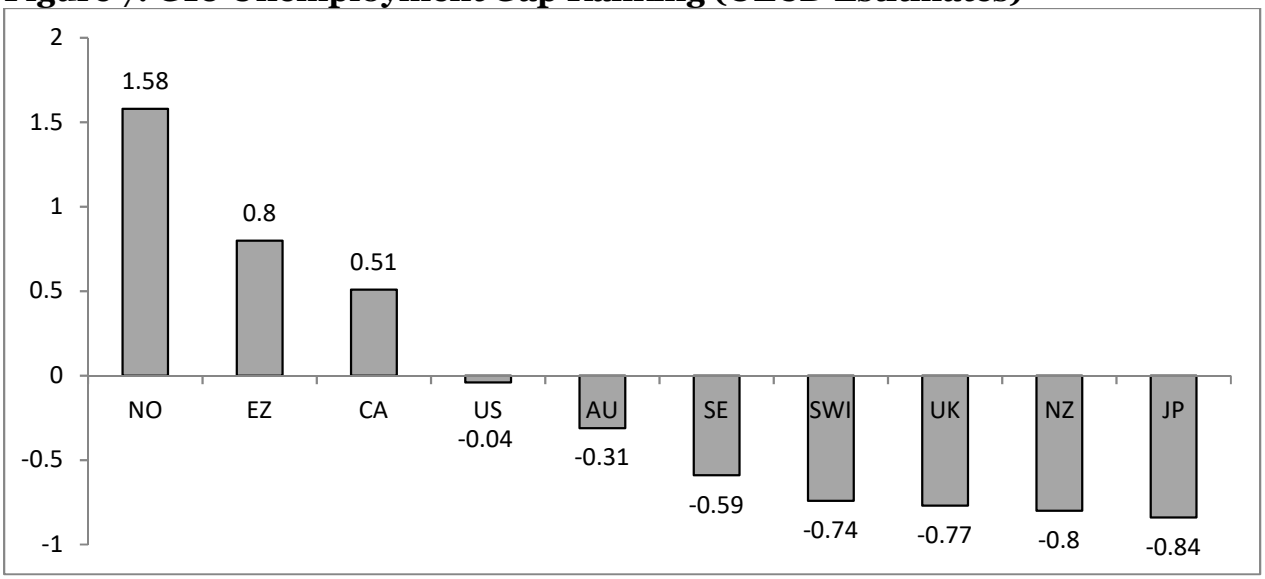
*Inverse vol. weights

Figure 6: 1Y Chg. in U.S. Inflation Rate vs. UE Gap



Lastly, most countries are now facing negative unemployment gaps with a mean of - 0.21 for the G10 as a whole. This has important implications for inflation pressures, monetary policy and as a result equity-bond portfolio returns going forward.

Figure 7: G10 Unemployment Gap Ranking (OECD Estitmates)



Add some Inflation Beta:

So what is the best way to address the prospect of lower risk-adjusted returns in equity-bond portfolios going forward?

Investors have two options: 1) cut exposure to both equities and bonds or 2) add exposure to assets or strategies with positive betas to rising inflation pressures.

Figure 8 and 9 show risk-adjusted returns for various inflation sensitive assets in our subsamples.

We find that contrary to conventional wisdowm, inflation breakevens perform worse in the later stages of the business cycle than in the earlier stages. As importantly, broad commodity exposure, or energy in particular, is the most slack-sensitive assets and performs best late in the cycle.

Figure 8: Sharpe Ratios (1990-2002) - Commodities vs. G10 UE Gap

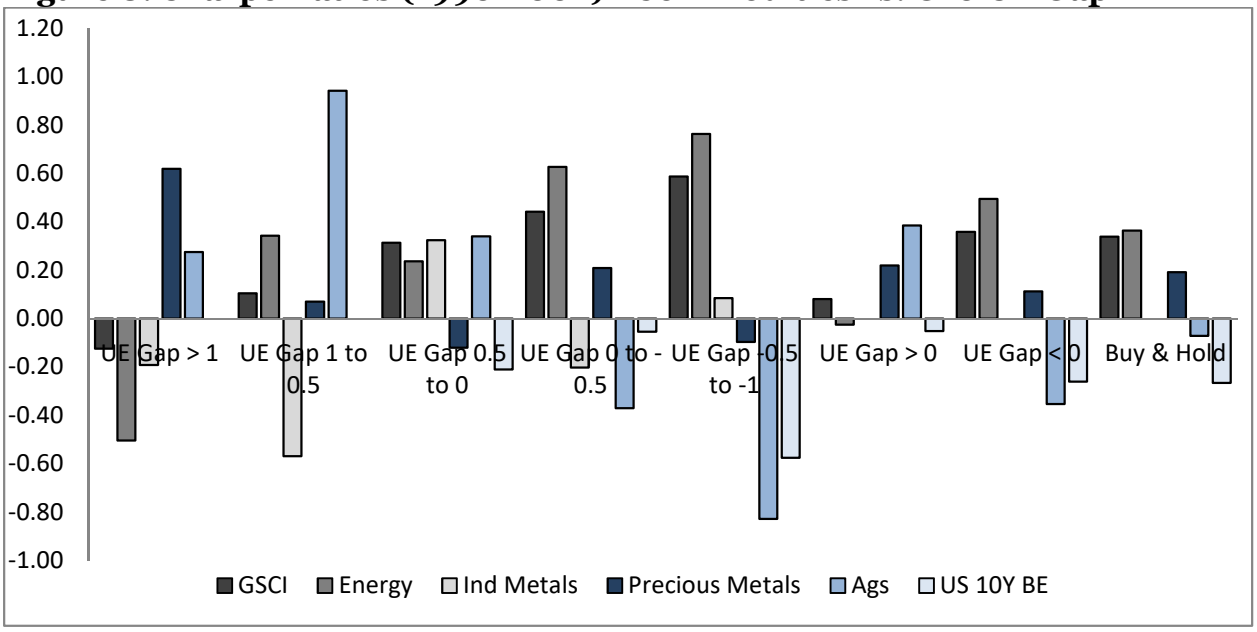
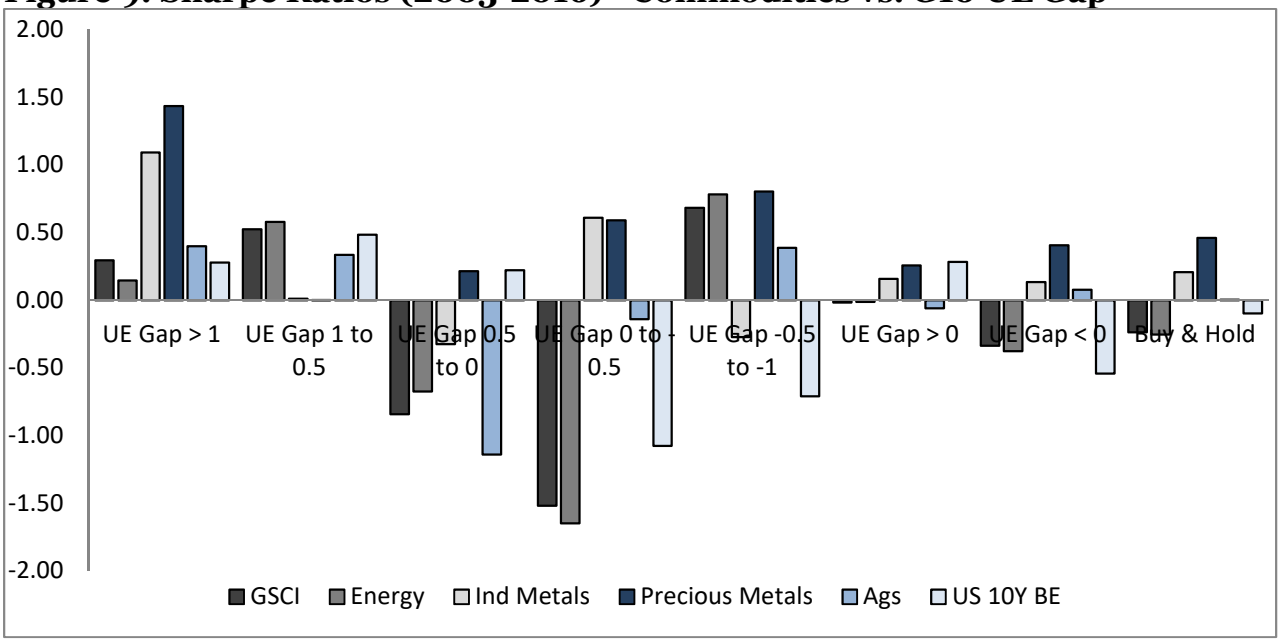


Figure 9: Sharpe Ratios (2003-2016) - Commodities vs. G10 UE Gap



Buy & Hold vs. Timing Rule:

Lastly, we compare the performance of 4 market portfolios: 1) a DM equity-bond portfolio, 2) a DM equity-bond-crude oil portfolio, 3) a DM equity-bond portfolio which goes flat when the G10 unemployment gap falls below -0.5 and 4) a DM equity-bond portfolio which adds crude oil to the portfolio when the G10 unemployment gap falls below -0.5. All portfolios use inverse volatility weighting. Table 3 shows portfolio performance since 1990.

Table 3: Buy & Hold vs. Timing Rule (1990-2016)

B&H Eq-Bond	B&H Eq-Bond-Cmdty	Timing Eq-Bond	Timing Eq-Bond-Cmdty
9.84%	7.22%	9.65%	10.30%
10.64%	9.52%	10.01%	10.49%
0.93	0.76	0.96	0.98
0.24	0.04	0.34	0.24
6.87	8.36	8.97	7.31

We conclude that adding exposure to crude oil in the later stages of the business cycle improves risk-adjusted returns relative to alternative portfolios.

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