**Overview**
My three indicators are change in GDP, change in monetary supply (MS), and change in foreign exchange rates (FX). I have yet to build out FX, but I have done reasonable exploration for GDP and MS.

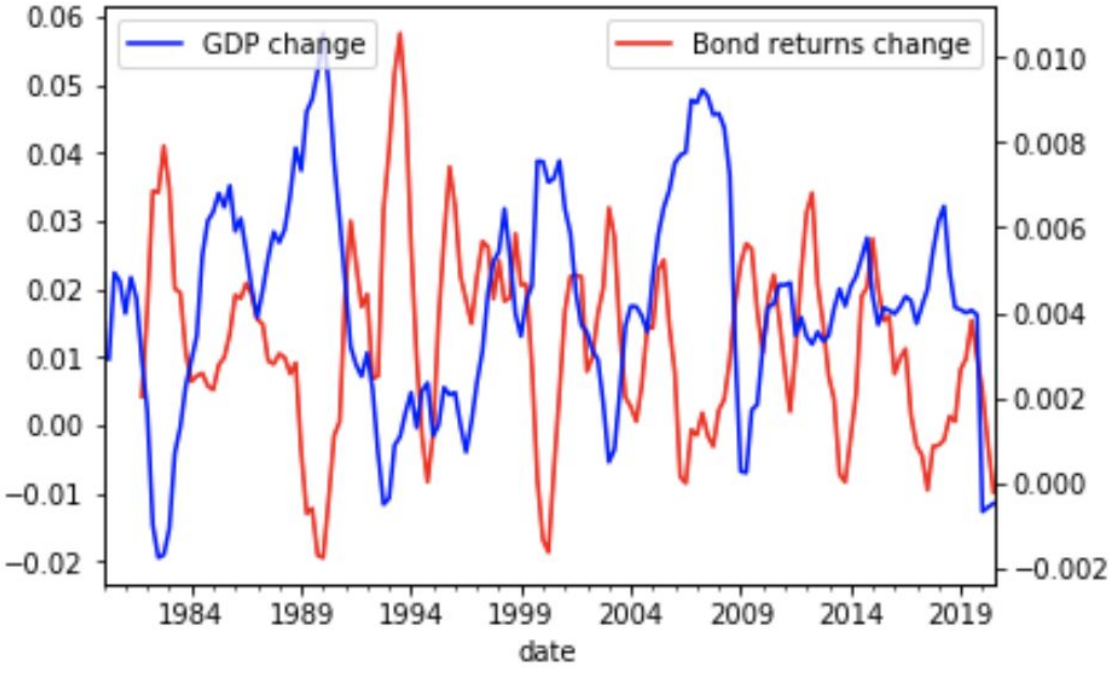
My approach to building indicators is:

- develop an intuition for why an indicator might be related to bond returns
- explore this in the data
- generate a z-score that is directionally aligned with what you expect the effect on returns to be.
- test this to see cumulative returns

I have also developed a small module that takes a signal and tests it on returns, for simplicity's sake.

**GDP indicator**
What might we expect the relationship between GDP and returns to be? As GDP growth continues, central banks tighten the economy, forcing rates up. So we might expect changes in short rates to follow changes in GDP, perhaps with some lag. Since returns are inversely correlated with short rates, we might expect GDP change to mirror returns (i.e. negative correlation).

For Switzerland, this correlation is reasonably apparent. Notice how upward spikes in blue correspond with downward spikes in red, and vice versa.




I am still working on refining the relationship between GDP change and returns - I am experimenting with introducing lag, trying various smoothing schemes, and various other methods to improve my results.

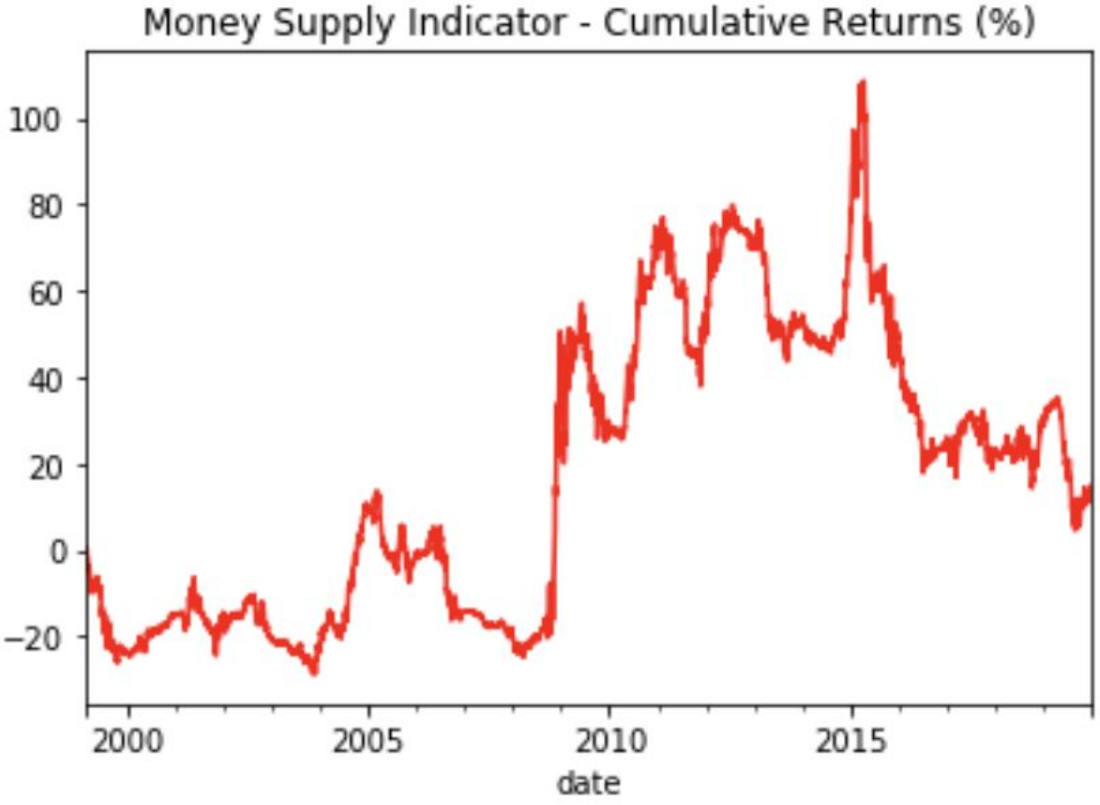
**MS indicator work**

Following Michael Huntress' exploration of monetary supply (I similarly reached the same conclusion in my own Bond Prospectus questions), we can use a weighted average of M1-change and M3-change for M2-change (for Australia, since it's missing M2 data).

The correlation between changes in money supply and bond returns has been considerably more difficult to tease out. For money supply, I am calculating the difference between a 3 and a 12 month rolling average, and then smoothing this with an exponentially weighted mean for a smoother curve.

Unlike my first intuition, money supply as a proxy for economic growth does not really hold up. In fact, it might indicate the opposite of growth. Because of this, money supply might be a good complement to GDP because they indicate related but non-identical things.

As the graph below indicates, my return stream for this indicator is wildly unpredictable. I need to refine the logic that I am using to create it. Right now, it is pretty rudimentary: generate a z-score, normalize it, negate it, and trade on it.




**Next steps**

This weekend I will:

- Manipulate FX data into a format that I would like to work with.
    - Build an FX indicator
    - Generate a returns stream
- Conceptualize what MS and GDP should be doing, and how I can improve their behaviour.
- Begin to tackle how I will combine indicators