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12/31/2022

Studies in Disinflation: The Bigger they are, the Harder they fall

My last post covered an article from Research Affiliates examining the duration of inflation as it surpassed a series of regularly spaced thresholds above 4%. While it was an excellent study on how long we can expect the present crisis to last, it revealed relatively little about what would happen once inflation peaks and begins to fall. The former question is central in most conversations about inflation as its answer is relevant to everyone over the long term: investors, policymakers, businesses, and consumers. However, for sophisticated investors seeking to navigate the tumultuous weekly and monthly changes in inflation to protect and maximise their returns, understanding the latter question on disinflation is equally essential.

Is there a relationship between the volatility and magnitude of short-to-medium-term disinflation after an inflationary peak and the level at which it peaked? In other words, how evenly and far can we expect inflation to decline once it has peaked? To answer these questions, I examined 147 inflationary peaks from 1970 to 2021 across 12 OECD countries[1]. I conclude that there is a positive relationship between the level at which inflation peaks and the volatility and magnitude of disinflation over the subsequent 6 months.

I begin by defining inflationary peaks as months when the CPI was above 4% and greater or equal to the monthly CPIs of both its preceding and succeeding 6-month periods. Following the previously covered Research Affiliates study, peaks are then categorised through floor functions into various thresholds at 2 percentage points ("pp") intervals. For example, a peak month with 7.6% inflation is grouped into the 6% threshold. There are two dependent metrics (although they produce similar conclusions): the standard deviation of the monthly YoY CPI over the next 6 months and the range between the maximum and minimum monthly YoY CPI of the same duration. There are three ways to analyse each of these two metrics: first through linear regression and then through examining their median and mean values at each threshold.

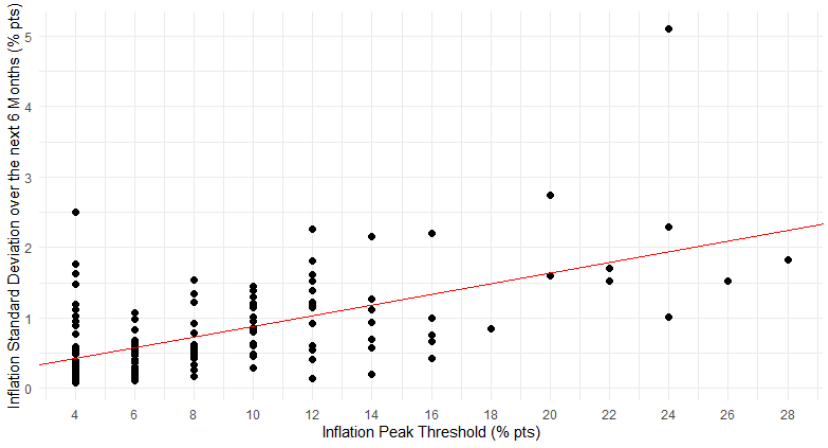

Figure 1: Dot plot of inflationary peaks and standard deviations of subsequent 6-months periods' inflation. The red line is the linear regression estimate.

Figure 1 shows inflationary peaks graphed against the standard deviation of their monthly YoY inflation rates in the subsequent 6 months. With a cursory glance, we can already tell that the centre of occurrences shifts up towards wider standard deviations as the peak threshold increases

[1] The countries examined are Canada, France, Germany, Italy, Japan, Netherlands, Norway, Spain, Sweden, Switzerland, the UK, and the US. These countries were chosen because of their appearance in the previously mentioned Research Affiliates study and because they can all be reasonably considered as economically developed throughout the researched duration.

(although there are fewer occurrences of inflation peaking at higher thresholds). A single-factor linear regression model confirms this relationship: a 1 pp rise in the inflationary peak threshold will increase the standard deviation of the next 6 months' inflation figure by an average of 0.07 pp. This result is statistically significant, with a p-value extremely close to 0.

Suppose standard deviation can be used as a substitute for volatility. In that case, we can similarly proxy the extent of a decrease in the inflation rate by using the range it has covered. While there is certainly an overlap of information (that brings about similar results), the benefit of measuring the range is that it lends more weight to extreme disinflation. This is useful in building subsequent models with punitive assumptions of where disinflation could lead. Figure 2 shows a similar dot plot, with the range as the dependent factor used to fit the linear regression model against inflationary peak thresholds.

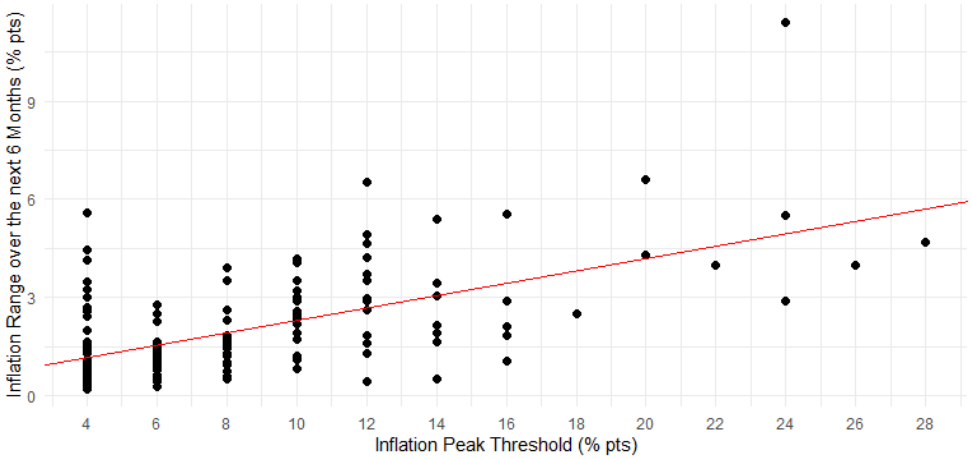

Figure 2: Dot plot of inflationary peaks and ranges of subsequent 6-months periods' inflation. The red line is the linear regression estimate.

Again, the relationship is positive, with a 1 pp increase in the inflationary peak threshold projected to increase the maximum drop in inflation over the next 6 months by an average of 0.19 pp. This result is also statistically significant with a negligible p-value[2].

A more graphically intuitive way to understand the relationship between inflationary peaks and the volatility or magnitude of subsequent short-to-medium-term disinflation is by looking at averages.

[2] Running both linear regressions with inflationary peak data that was not floored down to a threshold achieves similar results with similar p-values.

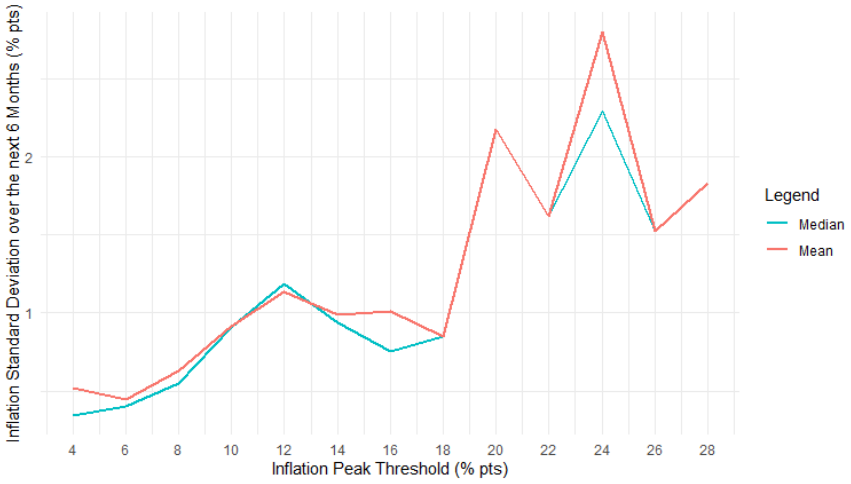

Figure 3: Line graph of inflationary peak thresholds and their median and mean inflation standard deviations over the subsequent 6 months.

As shown in Figure 3, the median and mean standard deviation of monthly YoY inflation for the 6 months following its peak closely resemble each other. As the level at which inflation peaks increases, so does the volatility of the subsequent disinflation period. We observe the same positive correlation in the median and mean range covered by disinflation, as presented in Figure 4. There, the magnitude at which inflation can be expected to drop throughout the disinflation period rises alongside the increase of the inflationary peak threshold.

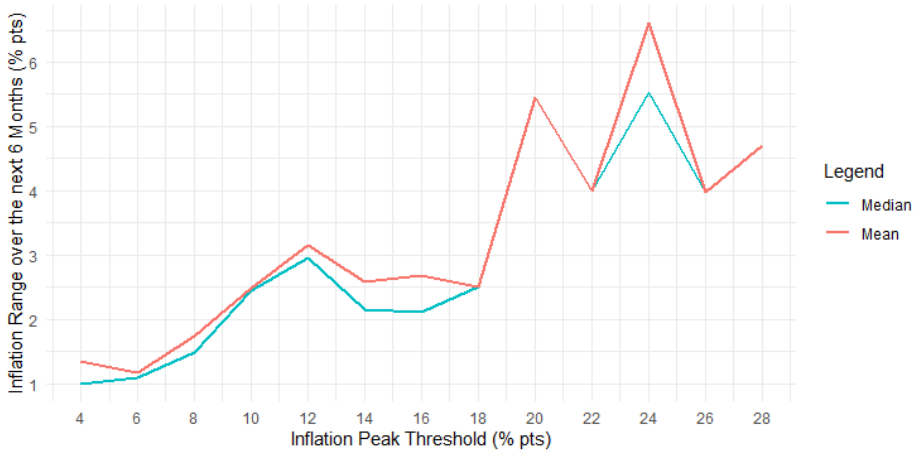

Figure 4: Line graph of inflationary peak thresholds and their median and mean inflation ranges over the subsequent 6 months.

Noting that inflation in Canada peaked in June of this year at 8.1%, we can use these results to set expectations for this current period of disinflation. Our regression model would expect inflation to drop by a maximum range of 1.94 pp to approximately 6.16% in December. Given that the November inflation rate was at 6.8%, this is an unlikely outcome for our present scenario[3]. Still, the model would have helped set realistic boundaries if we had applied it in June. The median average for the 8% threshold comes closer to our empirical results, with an expected 1.49 pp reduction in inflation, compared to our observed 1.3 pp drop by November, while the mean average strays further away at a 1.73 pp decrease.

[3] It should be noted that the regression estimations of the intercept failed to achieve a level of statistical significance and greatly influenced this final prediction.

The regression model for volatility similarly leans punitively, predicting a standard deviation of 0.67 pp to be experienced throughout these 6 months. However, there is currently an empirical standard deviation of only 0.52 pp up to November. Again, the median standard deviation for an 8% peak threshold comes closer at 0.54 pp, while the mean average is slightly further away at 0.62 pp.

I conclude that as the level at which inflation peaks increases, one can expect the subsequent disinflationary period over the next 6 months to experience greater volatility or fall further. While this general relationship is clear, precisely predicting disinflation proves to be a more difficult challenge. Using the median average has proven to be a more precise predictor of disinflation for the second half of 2022, as extremities less influence it. That being said, the causes of inflation and disinflation will vary each time and one of the other predictors may be better suited for future cases. However, at the very least, we can take refuge in that age-old adage from John Keynes: "It is better to be roughly right than precisely wrong".

There are limitations to what we can accomplish with this method. From a theoretical perspective, the rate at which disinflation occurs can be attributed to many reasons. The R^2 values of the regression models are around 0.35, indicating that there is much more needed than just inflationary peak levels to explain the variability of disinflation rates. As a matter of practical usage, this methodology also leaves much to be desired. The biggest problem is still determining when an inflationary peak will occur: too often, it will have long passed by the time we have the clairvoyance to apply this model and generate meaningful predictions that we can use.

Regardless of these shortcomings, we walk away with a greater understanding of inflationary peaks and disinflation in the short-to-medium-term, and this exercise temporarily feeds our curiosities. Like last time, I welcome any comments or follow-ups anyone may have. Happy new year!

All data was gathered from the OECD website. Data analysis and graphs were generated through R. For reproducibility purposes, the data sources and code are hosted on my GitHub at https://github.com/LeuvenSimpson/finance_research_pieces/tree/main/inflation_peaks_and_disinflation.