Where is the FED heading to?

C. Wenzel for PragmaOne.com, September 2022.

To fight against inflation, which has proven less transitory than expected and reached record levels, the FED has entered into a hiking cycle of its rates since the spring of 2022. The FED was initially late to react but has been raising its Fed funds rate aggressively by 300 basis points since March, including several 'jumbo' 75 bp hikes. They are expected to continue this cycle until the first quarter of 2023. But where will they stop?

To get an idea of a possible target for Fed funds rates, we will take a new peek at the Taylor rule, a tool that the Governors don't advertise much but that they use as guidance, with some changes from the initial version. The Federal bank of Atlanta even maintains a Taylor Rule Utility, proposing simulations (the link is available in the reference section).

Initial Rule

In 1993, John B. Taylor, a Stanford economist, proposed a rule, an equation relating the level where the Fed funds rate should be, based on the output gap and level of inflation:

$$\text{FFR}_t = (r_t^* + \pi_t) + 0.5(\pi_t - \pi_t^*) + \beta(G_t - G_t^*)/G_t^* \qquad \textbf{(1)}$$

Which can also be rewritten as:

$$\text{FFR}_t = (r_t^* + \pi_t^*) + 1.5(\pi_t - \pi_t^*) + \beta(G_t - G_t^*)/G_t^* \qquad \textbf{(2)}$$

Where:

- r^* is the real neutral rate, a rate at which level growth is at its potential and price increases are at target,
- G represents the real GDP, and G^* the potential real GDP: their relative difference forms the real output gap,
- π is the core inflation, and π^* is the target inflation, defined at 2% by the FOMC: their difference is the excess inflation beyond the target.
- β is the coefficient multiplying the output gap.

At the time, he determined that the potential real GDP growth rate, g^*, was to be set at 2.2% based on historical values, and that the output gap should be multiplied by $\beta=0.5$. Mr. Taylor also proposed the value for r^* to be 2%, slightly lower than the potential real GDP growth.

Despite its apparent simplicity, the Taylor rule brings several questions: how do we measure the different inputs, and are the proposed coefficients representative of the economic reality?

The Output Gap

The output gap is defined as the relative difference between the real GDP and the potential GDP. The potential real GDP is the real GDP that prevails when capital and labor are utilized at a high level while still producing at a sustainable and constant inflation rate. This concept is theoretical, and its value lies in estimates obtained from economic modeling. The Congressional Budget Office (CBO) publishes yearly and quarterly estimates for the potential real GDP and the output gap.
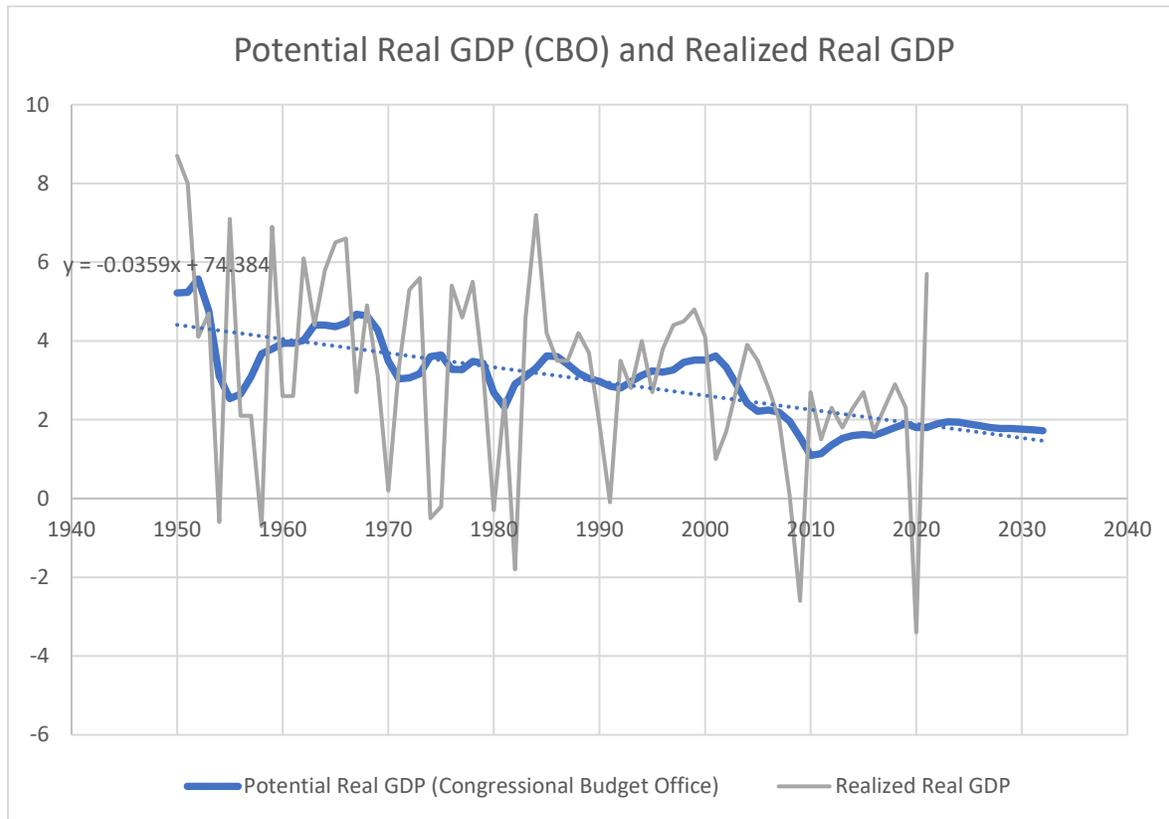

Their estimate fluctuated with a decreasing trend since the 1950s and now hovers around 2%. John Taylor suggests using 2.2%. For reference, the average real GDP observed between 1990 and 2019 is worth 2.5%, even 3%, if we filter out recession years.

Some variations suggest using the unemployment gap as an alternative to the output gap.

The Output Gap Multiplier

The 1993 Taylor rule proposed that the multiplier of the output gap should be 0.5. In a recent article, Ben Bernanke (2015) suggested that the Taylor rule should be used with a Beta of 1 and that the rule be considered non-prescriptive.

Fed Funds Rate (1990-2019)

$y = 0.9048x + 4.2348$
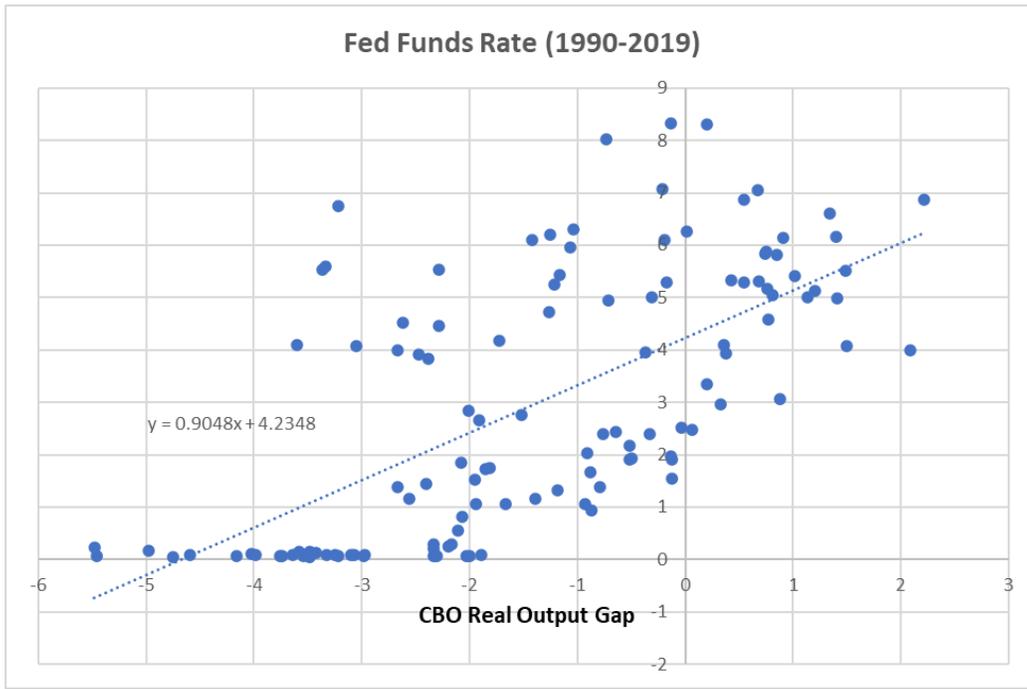
CBO Real Output Gap

A quick statistical study of the relation between the end of quarter Fed funds rate and the real output gap from the CBO provides a **coefficient of 0.9**, indeed closer to 1.

The Inflation Multiplier

Studying the FED's response to excessive inflation in the past, we observe a **coefficient of 1.86**, higher than the 1.5 prescribed by equation (2): **the FED tends to react more to inflation than the 1993 Taylor rule suggests**.

Fed Funds Rate (1990-2019)

$y = 1.8606x + 2.2992$

Excess Inflation
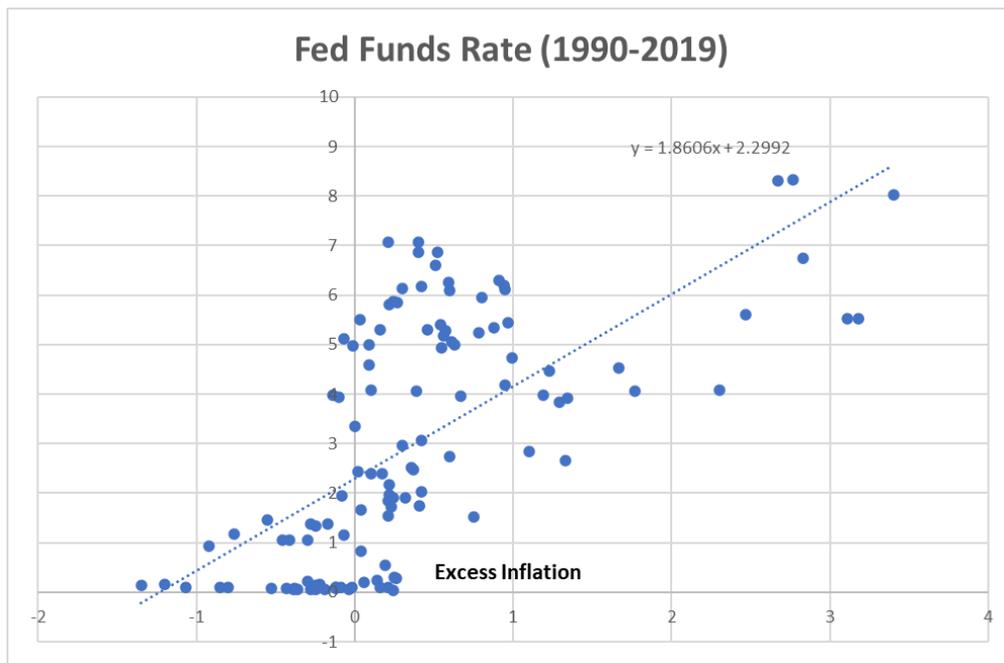
The Natural Rate

Finally, the natural rate is the real rate consistent with the potential real GDP, allowing for full-strength growth simultaneously with sustainable inflation. This rate is unknown, and its value should be assumed, just like the 2% hypothesis from J. Taylor, or estimated via models.

The two main models to estimate r* are the Laubach-Williams model (2003) and the Holston, Laubach, and Williams model (2017). We will not detail those models here but retain that they produce r* estimates with a strong downside trend, reaching levels around 0.5% just before the epidemic started.

Among the drivers pushing the natural rate down, Hong and Shell (2019) explain that the demographic factor and the aging population decrease the productive capacity of the economy, thus leading to lower potential GDP and lower neutral rate.

The publications of r* by the New York FED were suspended in 2020.


Source: Fed of New York, https://www.newyorkfed.org/research/policy/rstar
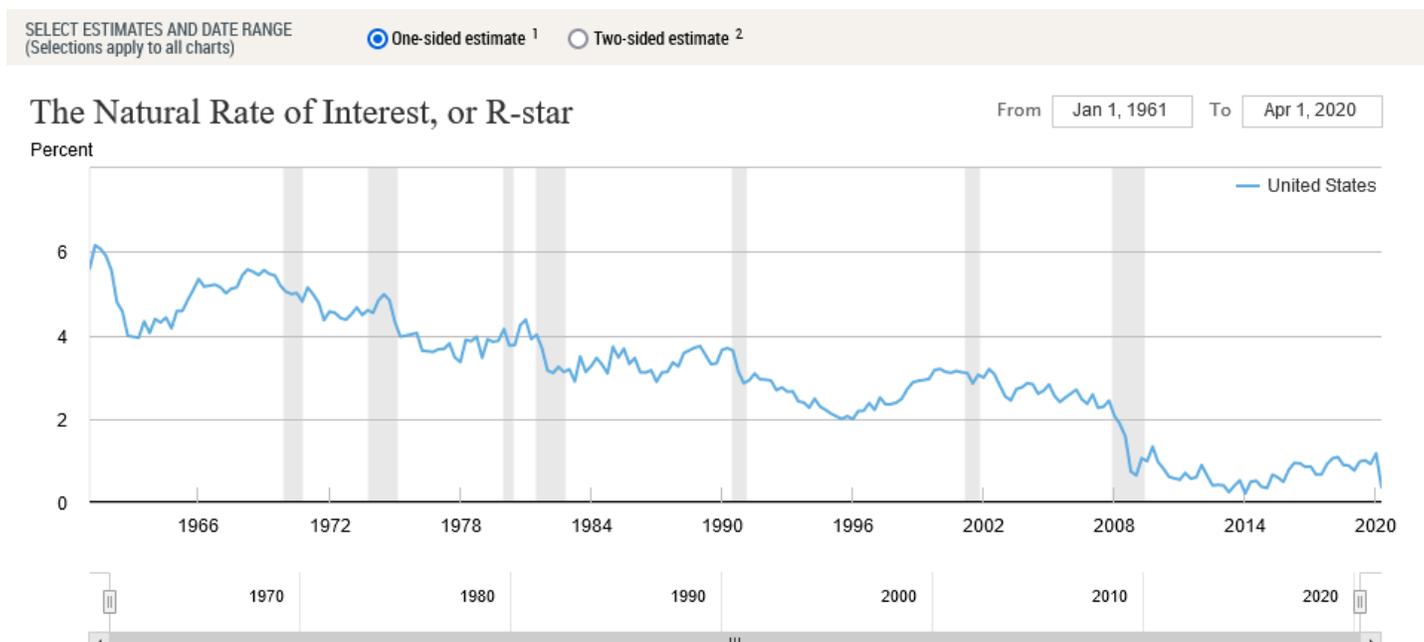
In our analysis, we will set a fixed level of natural rate, below the potential real GDP level. **We propose the level of 1.5%,** justified by the regression analysis of the Fed funds rate against the excess core inflation together with the output gap for the period 1990-2019:

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	3.49	0.15	23.15	0.00	3.19	3.79
Excess Inflation	1.68	0.13	13.10	0.00	1.42	1.93
Output Gap	0.81	0.06	12.95	0.00	0.69	0.94

The intercept obtained is 3.50%, that is the target inflation rate of 2% added to 1.5% of real natural rate.

Possible Targets for Fed Funds Rates

Applying the Taylor rule based on our coefficients, we can see that the path of the Fed funds rates was close to the Taylor rule until 2020, but the recent events disrupted the relationship, and the FED is now clearly behind the curve.
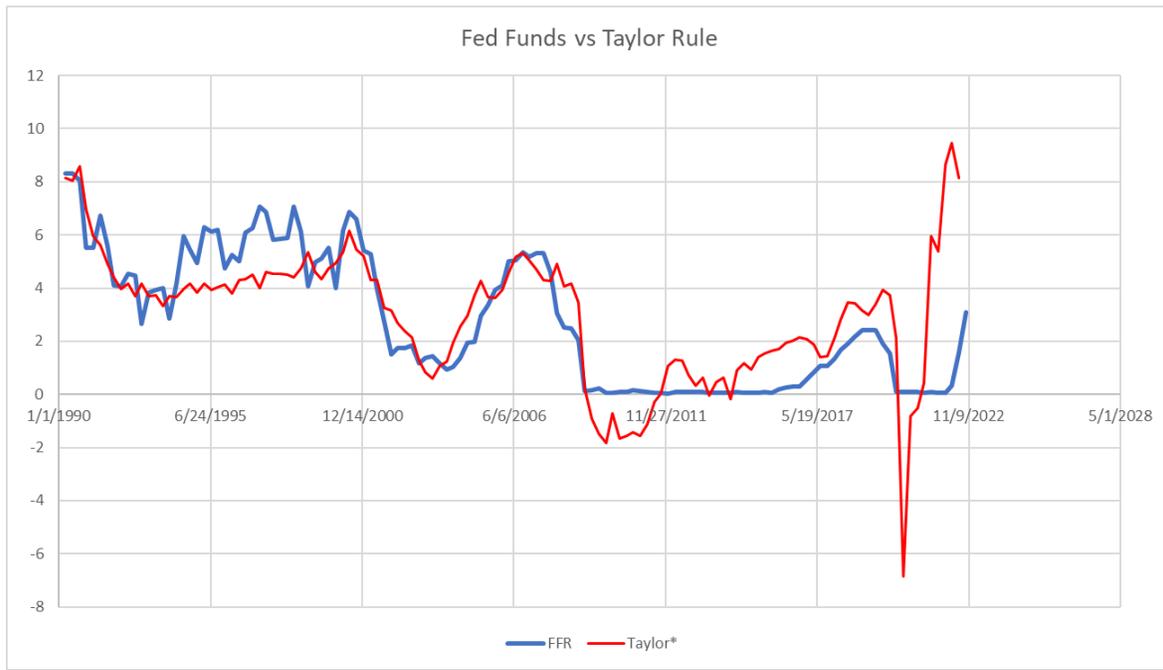
To propose a credible path for Fed funds rates, we recover our projections for Core inflation from our previous article, and the GDP forecasts from the Fannie Mae economic report of September 2022.

	Q3 2022	Q4 2022	Q1 2023	Q2 2023	Q3 2023	Q4 2023
Core Inflation forecasts	6.5	5.6	4.3	4.0	3.5	2.8
GDP growth forecasts	0.8	0.7	-0.4	-1.5	-0.7	0.7
Taylor Rule	9.10	7.40	**4.79**	3.64	2.33	1.00
FF Possible Path	3.10	4.00	**4.75**	4.75	4.25	4.00
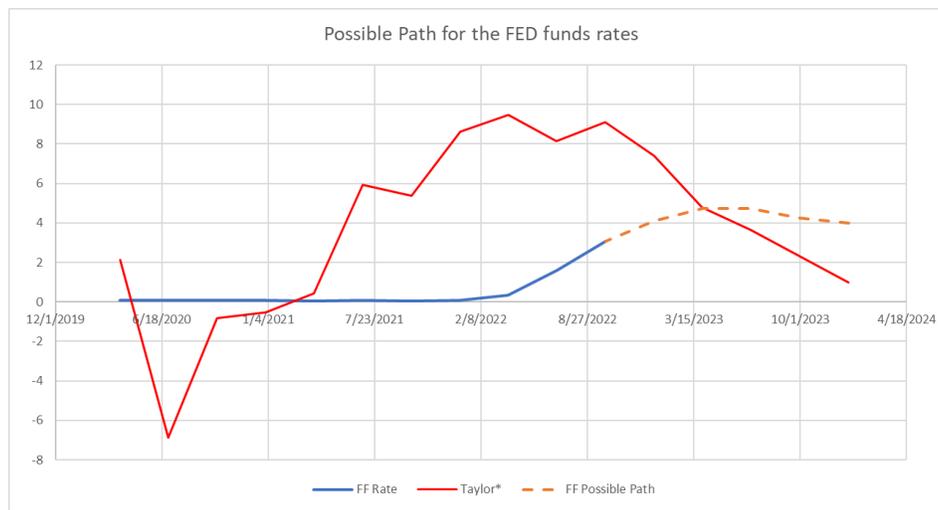
The FED already published their dots and said that they would raise rates by 100bp before the end of 2022. We believe that **the rates will peak in the 4.75 to 5.00 region at the end of the first quarter of 2023: this is the prescribed 'Taylor rule level' for that date and also when real rates will become positive, thanks to an expected decrease in Core inflation**. Then, based on the negative GDP outlook from Fannie Mae, the Taylor rule tells us that the ideal rates should decrease fast to dampen the negative growth shock. Instead, **to ensure a steady decrease in inflation, we believe that the FED will stay put for one to two quarters, keeping real short-term rates in the 0.5% to 1% range. At some stage in Q3 or Q4, the Fed funds should decrease by 50 to 100bp from the peak toward the end of 2023.**

References

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Laubach and Williams. 2003. "Measuring the Natural Rate of Interest," Review of Economics and Statistics 85, no.4 (November): 1063-70.

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The FED Taylor utility tool: https://www.atlantafed.org/cqer/research/taylor-rule

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