



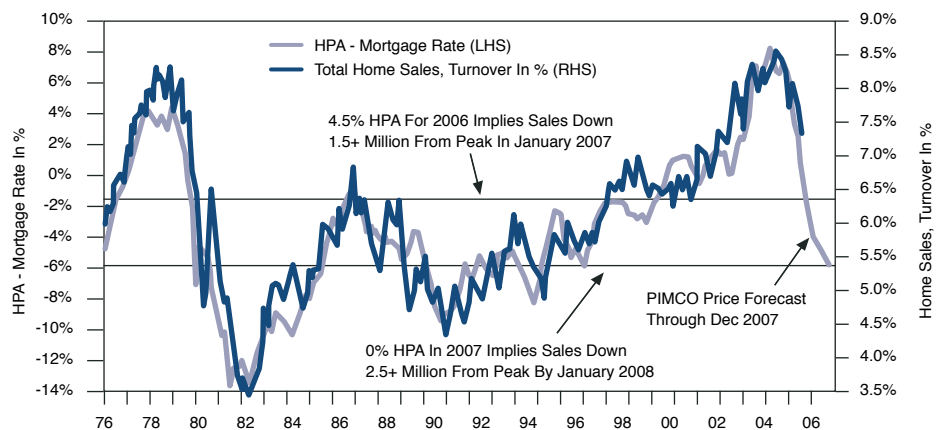
Time-Varying Variables Vary

Long before the Fed started its now-finished tightening campaign in June 2004, from a 1% starting point for Fed funds, we here at PIMCO analyzed and debated intensely where the “neutral” Fed funds rate might lie, notably in real terms.¹ Bill Gross and I very publicly argued that both theory and long-history empirical work suggested that the neutral real Fed funds rate should be in a ½%-1% range. We tacked on a presumed long-term inflation rate of about 2%-2½%, and that resulted in a neutral nominal Fed funds rate estimate of 2½%- 3½%. And then we forecasted that that would be where the Fed would stop its tightening campaign.

That last step was clearly a mistake, with the campaign not ending until 5¼% Fed funds. And the dominant reason is that we underestimated the power of America’s housing boom, riding on self-feeding momentum and the mortgage banking industry’s creativity, pushing “affordability” products, notably pay-option, negative-amortizing mortgages, which thwarted the Fed’s tightening will. But not to beat upon ourselves too hard, we did recognize a year ago that the Fed would continue tightening until property markets cried uncle.²

And so it has come to pass, with the U.S. property market now not just crying, but

**Housing, As Reflexive As It Gets:
Price Appreciation Versus Interest Carry Cost
Drives Turnover Volume**



HPA = Home Price Appreciation
Source: Bureau of Census and Freddie Mac

screaming uncle and the inverted yield curve screaming that the Fed tightened way beyond “neutral,” setting the stage for a reversal to easing back toward or through neutral over the next year. On the surface, the timing question is the most urgent, as an inverted yield curve definitionally implies that betting on easing via holding longer maturities and durations is a negative carry trade. And there is nothing more distasteful in the fixed income portfolio management business than negative carry games – in the (very!) long run, the total return of bonds essentially equals their carry or yield.

And both theory and history say that the carry or yield of longer-dated bonds should be greater than shorter-dated bonds, to reflect the inherently greater price volatility of longer-dated bonds relative to shorter-dated bonds. Technically, the greater carry or yield of longer-dated bonds is called the “term risk premium.”

In the long run, capitalism requires that the term risk premium be positive, as is the case with credit and volatility risk premiums. Were it otherwise, capitalism as we know it would be turned on its head, as negative risk premiums for taking risk would destroy the appetite for taking risk, which is the mother’s milk of capitalism – what Keynes called “animal spirits.”

Thus, we can say with high conviction that the prevailing inverted yield curve will not long endure: either the Fed will re-slope it by cutting short-term rates below prevailing long-term rates, or long-term rates will rise back above prevailing short-term rates. Or, in the famous words of the great economist Herb Stein, the unsustainable will not be sustained.

In the end, the cyclical course of economic growth and, to a lesser extent, inflation – predominantly domestically, but to a lesser extent globally – will determine whether Fed easing or a nasty sell off in bonds restores the term risk premium. We believe strongly Fed easing will play that role, for two reasons:

- We share the FOMC staff’s forecast of below potential growth for the next four to six quarters, which will – definitionally, if the forecast comes right – open up slack in labor and product markets, imparting a cyclical disinflationary impulse to the economy.
- We believe that the residential property market will be just as inelastic to rate cuts on the backside of its bubble as it was inelastic to rate hikes while the bubble was inflating.

Revisiting Taylor

As I’ve written for many years on these pages,³ forecasting the Fed funds rate is all about forecasting the economy and inflation in the context of a Taylor Rule for monetary policy. Refreshing the memory, here’s Professor Taylor’s original specification of his Rule:

$$\begin{aligned} \text{Fed funds} = & \text{Equilibrium (Neutral)} \\ & \text{Real Short Rate} + \text{Actual Inflation} + \\ & 0.5(\text{Actual Inflation} - \text{Target Inflation}) + \\ & 0.5(\text{Actual GDP} - \text{Potential GDP}) \end{aligned}$$

As you can quickly discern, if inflation is at target and GDP is at potential, the two last terms in Taylor’s Rule drop out, and the “neutral” nominal Fed funds rate will equal the neutral real Fed funds rate plus the inflation rate. Mr. Taylor assumed the neutral real

rate to be 2%, and the Fed's implicit target for inflation (the core PCE deflator) to be 2%. Thus, if the economy was in perfect equilibrium – inflation at target and zero output gap, which implies actual unemployment at the “full employment” rate, also known as NAIRU – then the neutral nominal Fed funds rate would be at 4%, according to Taylor.

In contrast, if inflation is either above or below target, Taylor's Rule will add or subtract the amount of the miss in the Actual Inflation term, plus 50 percent of that amount, effectively pushing the actual real rate in the same direction. For example, if inflation was a percentage point above target, his Rule would say hike the Fed funds rate one and one-half percentage point. In contrast, if actual GDP is above or below potential GDP, implying a negative or positive output gap, Taylor's Rule says to move the Fed funds rate by one-half percentage point in the same direction as each percentage point of the output gap.

As a practical matter, however, most non-economists don't think in terms of output gaps but rather unemployment gaps: is the unemployment rate above or below the full-employment rate? Fortunately, there exists an easy way to jump between the two concepts, called Okun's Law, which posits about a 3 to 1 ratio between the output gap and the unemployment gap: an output gap of three percentage points of GDP would mean an unemployment gap of 1%. Thus, we can substitute the unemployment gap into Taylor's Rule and raise the co-efficient by three, meaning that a one percentage point deviation of the unemployment rate from the full employment unemployment rate (again, NAIRU) should lead the Fed to hike or lower the Fed funds rate by one and one-half percentage points.

What does it imply right now? The Core PCE deflator is presently running about 2½% versus the Fed's 2% target, so that would imply the Fed should be holding the Fed funds rate 75 basis points above neutral – the 50-basis point upside miss, plus a penalty of one-half that amount. In turn, the unemployment rate is presently about 4½% versus the Fed's presumed 5% full employment unemployment rate; that miss would imply tacking another 75 basis points on top of the neutral Fed funds rate.

And, voila, all that arithmetic foots to a 5½% Fed funds rate, only 25 basis points about where the Fed is! This helps explain, I think, why FOMC members are constantly saying that the prevailing Fed funds rate is “appropriate,” defending pausing at that level as the right thing to do while remaining biased to further tightening. On the face of it, hard to argue with that assertion, unless you want to argue with the three assumptions embodied in the Rule: a neutral real rate of 2%, an inflation target of 2% and an unemployment target of 5%.

Which, of course, I want to do. But before I do, let me stress again that by the Fed's own reaction function, it is where it is supposed to be and where it is comfortable. In turn, easing to 4% would be justified if and only if the inflation rate drifted down to 2% and unemployment drifted up to 5%. The Fed didn't go quite that far in forecasts released to Congress this July, with the central tendency of the FOMC's projections for 2007 standing at 2%-2¼% for the core PCE deflator and 4¾%-5% for the unemployment rate.⁴ Running those numbers through the Taylor Rule, they would imply a 4%- 4¾% Fed funds rate (4% if inflation comes in at the bottom of the range and unemploy-

ment at the top of the range, and 4¾% if the other ends of the ranges unfold).

Thus, by the FOMC's own reckoning, it is not unreasonable for the markets to be pricing in easing in 2007, even as policymakers "push back" at the markets doing so, notably Vice Chairman Kohn two weeks ago.⁵ Far more interesting, however, and not discussed openly by Fed officials, is whether the anchor in Taylor, the presumed neutral real Fed funds rate, is indeed fixed at 2%.

The state of the empirical art in specifying Taylor Rules is, actually, to assume that it is not fixed, as Mr. Taylor did, but rather that the neutral real rate is "time-varying" – to wit, it depends on what else is going on in the economy and markets.

First, it is posited, the neutral real short rate will fluctuate with productivity growth: the greater is productivity growth, the greater will be the return on investment, which will increase the demand for capital relative to supply of capital, requiring an increase in the real rate so as to ration out investment that carries a lower rate of return; and vice versa, of course. Second, it is posited that the neutral real short rate will fluctuate with the state of risk appetites and risk premiums, frequently lumped into a measure of financial conditions: the greater is risk appetite and the lower are risk premiums, the higher will be the real short rate so as to elicit the "right" amount of investment; and vice versa again, of course.

Capital and Money are Different

Conceptually, I have no problem with either of these propositions, with one huge exception: **they should apply to the neutral real**

long-term rate, not the overnight real return on cash. Yes, the "equilibrium" real long rate is not a constant, but rather a time-varying variable, which is a function of other variables. Of these other variables, productivity growth is the most important over secular horizons, along with fiscal and current account positions. Over cyclical horizons, the most important "other" variable by far, in my view, in moving the "equilibrium" real long-term rate around is the state of risk appetites – Keynes' old fashion animal spirits.

Again conceptually, the reality of a time-varying equilibrium real long-term rate is why the Fed doesn't peg real long-term rates directly, which it has the power to do (okay, maybe not in the very long-run, if it picked the "wrong" peg, but certainly over periods measured in years). In contrast, the Fed does directly peg the real short-term rate. To be sure, any real rate involves a nominal rate minus expected inflation; so purists might argue that the Fed can't/doesn't even peg the real overnight rate, because inflation expectations cannot be taken as a given. But most sensible people would disagree: there is little uncertainty about inflation expectations for the next 24 hours, as the actual inflation rate for the past 24 hours is a most reliable estimator of the inflation rate for the next 24 hours (except in countries experiencing hyper-inflation).

Thus, I believe firmly that the "equilibrium" real long-term rate and the "neutral" real short-term rate are fundamentally different concepts. Yes, I know that they are linked by the expectations thesis of the term structure of interest rates, or the yield curve. Yes, I do know that! Indeed, on most days, that's all you have to know in managing a bond

portfolio: the yield curve is a forward curve on expected short-term interest rates, plus a risk premium for uncertainty about future short-term interest rates, which can also be viewed as a risk premium for greater price volatility of longer-dated fixed income claims. All standard textbook stuff.

Where the textbook breaks down, I've argued for years, is that money and capital are fundamentally different: the former always trades at par, while the latter does not. Holders of money do not face any price risk whatsoever, but rather two taxes: the explicit income tax on nominal interest (if received outside tax exempt/deferred accounts) and the implicit purchasing power tax of realized (not expected!) inflation. Thus, I fundamentally believe that money should only pay a sufficient nominal return to make holders whole for those two taxes. Put bluntly, I believe that money should pay a zero real, after tax rate of return!

And even in that case, money would be "better than gold" under the Bretton Woods arrangements from 1945-1971, when the United States stood ready to exchange one ounce of gold for \$35 (for official holders, it must be added, but not for private sector holders). In that regime, the dollar bought the same physical volume of gold, year after year and decade after decade. But dollar money did not generate a rising claim on ounces of gold. Indeed, given that physically holding gold involves insurance and storage costs, the dollar was actually not just as good, but better than gold during the Bretton Woods regime.

No, I'm not a gold bug. Never have been, never will be. My point here is simply that

money, here viewed as always-trade-at-par overnight bank deposits (or Repo, if you prefer), is fundamentally different than capital, which most certainly does **not** always trade at par. To be sure, you can borrow the former to lend the latter, known as leverage and also as the foundation of banking. So yes, it is ineluctably true that the rate of return on capital is tightly, if not mechanically linked to the rate of return on (borrowed) money. Put differently, an inverted yield curve is antithetical to capitalism as we know it, as an inverted curve rewards the risk-averse relative to the risk-seeking.

Neutral is a Function of the Taste for Leverage

So, you ask: what is the right or neutral slope for the yield curve, also known as the term premium? The short answer, no surprise, is that it is time-varying, just as is the case with the "equilibrium" long-term real rate – it depends, on the state of risk appetite, notably the state of appetite for leverage. Which, of course, makes the Fed's job very, very difficult, particularly in a world with **leverage without regulation, the mother's milk of asset price bubbles**.

Thus, my idealist world of a "neutral" zero real, after-tax return on money is not, I must acknowledge, realistic, only a construct. Were that I had recognized that back in 2003, where I started writing about it! Not that I would not have still taken exception to Taylor's assumption of a constant 2% neutral real short rate. Rather, I would have stuck with my zero real, after-tax thesis as a secular concept (which I still think is robust), but would have also explicitly made it cyclically time-varying, linking it explicitly to risk appetites, notably the appetite for leverage.

It would have been hard, if not impossible, to model this econometrically, I grant, as risk appetite is not just a cyclically time-varying concept, but also one linked to the regulatory constraints, or lack thereof, on the capacity of risk seekers to exploit leverage. And in recent years, the unregulated capital markets have dramatically increased the capacity for speculative use of leverage, in explicit forms, such as that for property lending and in indirect, economic forms, notably embedded leverage in structured derivative instruments.

When such a structural change is underway, econometrics is a weak analytical reed for analysis, as any econometrician will tell you: data mining cannot pick up structural change before the fact, only after the fact. So, I will be the first to admit that my amended construct for a time-varying neutral real short-rate constant in Taylor is still very much an idealist concept; the econometrics is no easier (possible?) today than three years ago.

At the same time, I believe strongly that the idea is very robust conceptually and also conforms to what the Fed “had to do” over the last two years: take the Fed funds rate higher and higher, putatively because a simplistic Taylor Rule said that was the right thing to do but in reality, because the Fed “needed” to tighten until it cracked risk appetite in residential property markets. This is what I belatedly said the Fed was going to do over a year ago and, I submit, is precisely what the Fed did, as the bubble in property is deflating with a vengeance.

While the housing bubble was inflating, it seemed impervious – or inelastic – to the Fed’s rate hiking, so the Fed kept tightening, on the thesis that an unresponsive mule is not

really unresponsive, just in need of additional whacks on the head with a two-by-four. And it worked, as the mule has gone into severe retreat this year. No surprise here, really, as housing is, using the word of George Soros in the mouth of PIMCO’s housing guru Scottie Simon, one of the most “reflexive” asset markets in the world, the ultimate momentum market: can’t get enough on the way up and can’t run away fast enough on the way down (see graph on cover).

Which brings me to my core thesis looking forward (and on the opposite side of former Fed Chairman Greenspan): housing is going to be very inelastic to falling interest rates on the way down, just as it was very inelastic to rising rates on the way up. To think otherwise after a bubble is to not understand bubbles. Risk appetite in property markets will not be restored by modest declines in market-determined interest rates, particularly if the Fed refuses to “validate” them with lower short-term policy rates, limiting or even reversing declines in market-determined interest rates.

Thus, just like policymakers and market participants kept ratcheting up estimates of the time-varying neutral real short rate while the housing bubble was inflating, I think they will be ratcheting down those estimates, again and again, as the air continues to escape from the property bubble. Put differently, irrational exuberance, which lifts the cyclically neutral short rate, will, when followed by irrational fear, reduce the cyclical neutral real short rate.

Bottom Line

For public consumption purposes, but with limited quantitative transparency, the Fed

manages monetary policy according to a Taylor Rule, which has three key variables: an assumption for the “neutral” real short-term rate; a non-targeted inflation target, also known as a comfort zone; and a non-specified full employment unemployment rate, also known as NAIRU. Essentially, this Rule is a formula for cyclically managing the economy accordingly to a Phillips Curve trade-off between inflation and unemployment, even as policymakers religiously preach that no such trade-off exists in the longer run. I don’t say any of this out of cynicism, but simple observation: this is what the Fed does.

Indeed, the Rule, as originally specified by Taylor with an assumed 2% “neutral” real rate, a presumed 2% target for inflation and a presumed 5% assumption/target for the unemployment rate does an amazing job of “justifying” exactly where the Fed is pegging the Fed funds rate right now: the Rule says 5½% and the Fed stands at 5¼%, biased to tighten. What is more, the Rule says that if inflation drifts down from the prevailing 2½% rate to 2-2¼% and unemployment drifts up from the prevailing 4½% to 4¾%-5% over the next year, as the FOMC is explicitly forecasting, the Fed will be able to “justify” easing to 4%- 4¾% by the end of next year.

Yet the Fed continues to threaten the possibility of further tightening, if inflation doesn’t moderate quickly towards its non-target target, even as the fixed income market discounts easing. This is a conundrum that can only be explained by the Fed’s so-called risk management paradigm: err on the variable in the Phillips Curve where it would be the least costly to fix a mistake. In this instance, the Fed’s revealed bias is that it would be

more costly to fix an inflation rate stuck at 2½% than it would be to fix an unemployment rate rising above 5%. Put differently, the FOMC’s revealed bias is to nurture an increase in the unemployment rate with sustained below-trend growth, so as to pull inflation back down towards target.

In isolation, this stance makes sense, with the caveat that no one on the FOMC can argue with a straight face that inflation at 2½% rather than 2% would make any difference at all to the microeconomic efficiency of the economy, where relative price signals are not distorted or overwhelmed by generalized inflation. So, policymakers make their case that somehow 2½% inflation, which they forecast will be falling, runs the risk of un-anchoring inflation expectations, which will tip the economy into a wage-price spiral, given that the unemployment rate is below the presumed non-target target of 5%. They do this notwithstanding the fact that inflation expectations, as revealed in the TIPS market, have been falling, not just in short-dated tenors dominated by oil prices, but in five year, five-year forward inflation breakevens, which presumably lie beyond the noise of either the business cycle or commodity prices.

In a younger day, I’d suggest that a touch of inflation nuttury is leaking into the water cooler outside the FOMC meeting room. But since I ain’t young anymore, I won’t say that. Rather, my axe to grind is that the FOMC is paying way too little attention to the proposition that the “neutral” real rate is indeed time varying, linked to risk appetite, notably for leveraged asset speculation, and that such risk appetite is plunging in the residential property market. Hopes for a quick and short correction from the property market

bubble are just that, and history says, at least to me, are unrealistic. When a bubble market swings from being a seller's market to a buyer's market, it stays shifted, and shafted, for a long, long time. (Thank you, Brother Grantham, PIMCO Secular Forum guest in May 2001, for teaching me that verity!).

Which says to me that while the Fed can, and most likely will, keep singing a hawkish tune for a while longer, pushing back against the yield curve's embrace of easing, the fundamentals of a burst property market bubble will eventually force the Fed to change it's tune, forcing the Fed to embrace the thesis of declining "neutral" real rate.

In the matter of time-varying cyclical variables, what goes up, does come down.

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¹ Gross, William H. (2003). "Is That All There Is – To A Fire?," *Investment Outlook*, May/June 2003.

² McCulley, Paul. (2005). "Pyrrhic Victory?," *Fed Focus*, September 2005, <http://www.pimco.com/LeftNav/Featured+Market+Commentary/FF/2005/FF+September+2005.htm>

³ McCulley, Paul. (2003). "Needed: Central Bankers With Far Away Eyes," *Fed Focus*, August 2003.

⁴ McCulley, Paul and Balls, Andrew. (2006). "Don't Shoot Ben and Don't Short Bonds," *Global Central Bank Focus*, August 2006, <http://www.pimco.com/LeftNav/Featured+Market+Commentary/FF/2006/FF+August2006.htm>

⁵ <http://www.federalreserve.gov/boarddocs/speeches/2006/200610042/default.htm>