Good afternoon everyone. I am Andy. And I am happy standing here to share with you our topic. The Shiller P/E and Macroeconomic conditions. First of all, what is Shiller P/E. Shiller P/E is introduced by Robert Shiller and John Campbell. And in fact, John is a doctoral student of Robert Shiller. It’s called cyclically adjusted price to earnings ratio (CAPE) or Shiller PE.

What’s the difference between Shiller PE ratio and normal P to E ratio?

This is the P to E equation. P to E ratio equals to share price divided by earnings per share. For normal P/E, share price is the current share price, while for Shiller PE, share price is the current real price. For normal P/E, earnings per share is for the most recent 12-month period. While for Shiller PE, it’s 10-year average and inflation adjusted earnings. Normal p to e is a better predictor of shorter-term returns of one month to one year, and Shiller PE is an excellent predictor of long-term returns over 3 to 10 years.

Next, I am going to talk about macroeconomic conditions. How do inflation and real interest rates affect stock price? Many investors, commentators, and policymakers seem to believe that rock- bottom levels of inflation and real interest rates provide the best economic conditions for stock prices to rise. Their logic is straightforward. Consider the textbook valuation formula relating the current price of a stock or portfolio, *P*  to the sum of discounted expected future dividends, *D*: Given that the discount rate, *r*, is the sum of expected inflation, real interest rates, and an equity risk premium, it seems obvious that a reduction in any of those three variables should reduce the discount rate and consequently raise stock prices. In this reasoning, the relationship between stock prices and either inflation or real interest rates is *monotonically inverse*.

Yet this straightforward logic is not supported by the data. In the messy real world, market participants appear to value stocks based on the rule that: The levels of inflation and of real interest rates have to be “just right” to sustain high valuations. When either deviates from its “sweet spot”—*in either direction*—valuations tend to fall. The relationship between stock prices and inflation, and between stock prices and real interest rates, can be simplistically described as a mountain. It peaks at medium levels of inflation and real interest rates and slopes downward from that point in any direction.

How can we explain this mountain-shaped relationship? Where does the logic described above break down? To answer these questions, notice that the relationship is monotonic only if all other variables remain constant when the inflation rate or real interest rate changes. It turns out that cash flows, and risk premiums exhibit nonlinear and nonmonotonic interrelationships with inflation and real interest rates.

For instance, using data starting in 1871, we consider a monthly regression of three-year nominal earnings growth (∆*E*) on concurrent three-year inflation rates. This is the regression result. But it gets even more interesting when we include the square of those same inflation rates.

According to the logic presented earlier, very low inflation rates would drive the discount rate down and stock prices up. However, this regression shows that the growth rate in profits falls even faster, given the highly negative quadratic term. At times of very low—even negative—inflation rates, market participants evidently should worry about the economy and reduce their expectations of *real* earnings growth. The negative quadratic term creates a mountain-like relationship between earnings growth and inflation rates, influencing stock prices to display a similar relationship with inflation rates.

Similar arguments can be made about real interest rates. A prolonged period of low real interest rates may suggest a market expectation of slow macroeconomic growth, or increased fear, which might require a higher equity risk premium, hence lower valuations.5 For instance, consider a forecasting regression of future three-year inflation volatility, which is a measure of price uncertainty, on current real yields (*yt*) and the square of current real yields:

According to the logic presented earlier, very low real interest rates would drive the discount rate down and stock prices up. However, the strongly positive quadratic term shows that abnormally low real interest rates tend to indicate higher uncertainty in prices. It seems reasonable that market participants actually increase the discount rate as inflation volatility rises, causing stock prices to go down and not up. The positive quadratic term creates a U-shaped relationship between inflation volatility and real interest rates, again influencing stock prices to display a mountain-like relationship with real interest rates.

In this study, we formalize the mountain-shaped relationship between the stock market valuation and inflation rates and real yields. For the details of our model. I will hand over to Jiaqi. Let’s welcome.