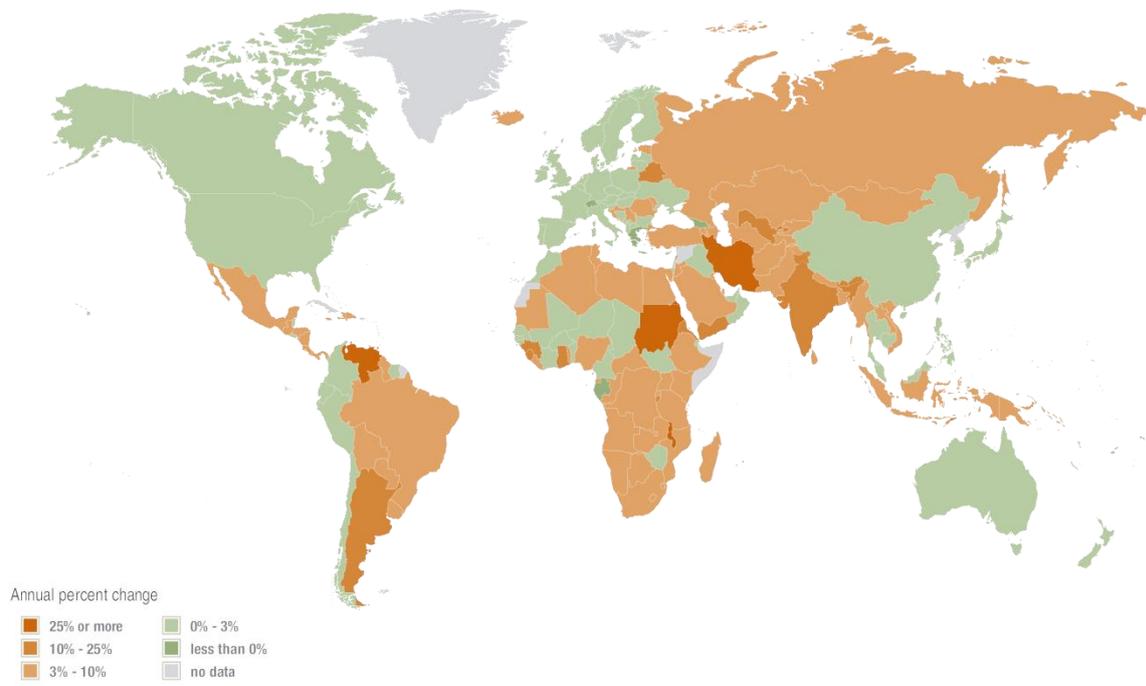


Inflation

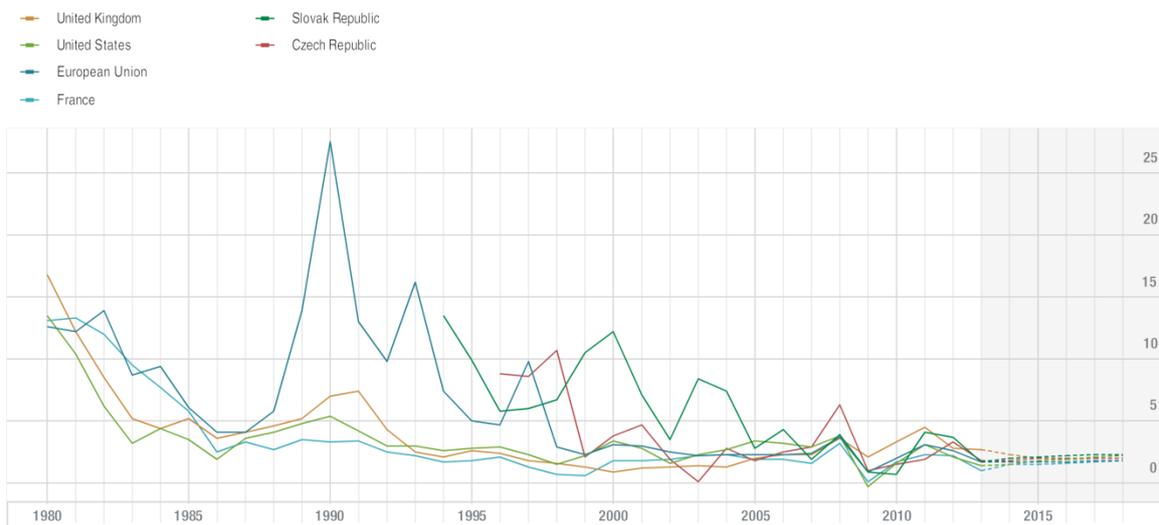
IMF Data Mapper ®

Inflation rate, average consumer prices (2013)
 Source: World Economic Outlook (October 2013)



IMF Data Mapper ®

Inflation rate, average consumer prices (Annual percent change)



©IMF, 2012, Source: World Economic Outlook (October 2013)

For several years Slovakia has had high inflation – although not as high as Poland – relative to other countries. That is stabilising and by 2013 the inflation rates of many countries are converging to a very low level of inflation of about 2%. Inflation in the Czech Republic has tended to be somewhat higher since the crisis began in 2008. The first graph also shows that Europe as a whole has low inflation in 2013, higher rates are in parts of Asia, South America and Africa.

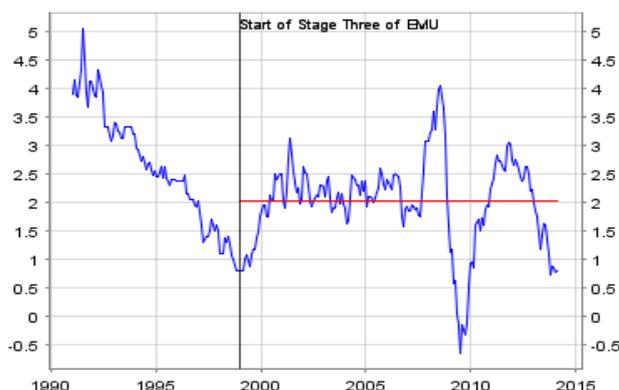
The above and much else is available on <http://www.imf.org/external/datamapper/index.php>

DEFINITIONS

Slovakia has had quite high inflation, as recently as 2007. But the economic crisis, at least temporarily, has stopped that.

Inflation is the percentage change in prices. We tend to measure prices by a consumer price index, in the UK often called the retail price index (rpi). This is an average of the price of a representative basket of goods which consumers buy. If we have an inflation rate of 3%, this does not mean that every price has increased by 3%, it is an average and hence some prices will have increased more than 3%, some less and some may even have fallen.

In recent years, many governments have based their economic policies around targeting a specific rate of inflation, so that a comparison of the outcome for inflation against the target provides a means of measuring the success of the relevant economic policies. The ECB aims at inflation rates of below, but close to, 2% over the medium term. It uses an average of inflation rates across the Eurozone and its performance is shown below



The red line shows the average inflation rate since 1999. The blue line shows the actual average inflation rate at any one time period. That looks quite good, but the deviations are substantial. Nonetheless these have been difficult times.

This was extracted from, and can be accessed at: <http://www.ecb.europa.eu/mopo/html/index.en.html>

THEORY

For a long time inflation has been one of the key ‘targets’ of government policy. In recent years however, it has been much less of a problem and rumours abound as to the ‘death of inflation’. Such rumours may be premature.

Quantity Theory of Money

Over the years there have been two theories of inflation which have dominated the literature. First there is the quantity theory of money. This is over 500 years old. Indeed it may even date from Confucius. It is a monetarist (as opposed to Keynesian) theory. Monetarists believe that most changes in prices reflect changes in the nominal money supply. It is based on the following IDENTITY (not an equation but true by definition)

$$MV \equiv PQ$$

(1)

M=money supply (intuitively the number of pound coins in the economy)
V=velocity of money (intuitively the number of times an average pound gets spent)
MV= total amount spent in a given time period

P= average price of goods in transactions
Q= the number of transaction, i.e. the number of things bought and sold
PQ= total amount spent in a given time period

Hence (1) is true by definition. Let us rearrange

$$P \equiv MV/Q \quad (2)$$

Still an identity. But let us suppose Q and V are constant such that

$$k=V/Q \quad (3)$$

Hence

$$P=kM \quad (4)$$

Now we have a theory, (3) is an assumption not necessarily true. (4) tells us that if M increases by 10% then P also increases by 10%. Hence the way to control inflation is to control the money supply. The crucial issues are (i) are V and Q really constant? and (ii) can the Government, or the Bank of England, control the money supply. With respect to (1) it does not matter too much if V and Q do vary, provided:

- (i) they vary in a predictable fashion and
- (ii) they do not vary in such a way that P is insulated from an increased in M. For example, if an increase in M of 10% simple reduced V by 10% then nothing would happen to prices.

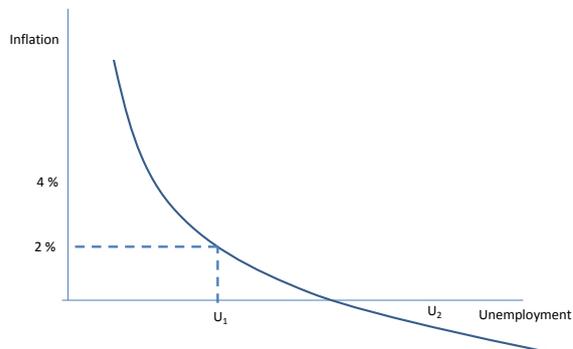
The Phillips Curve

Compared to the Phillips Curve, the quantity theory of money is both an older theory (Irving Fisher, Chicago, 1920s and others) and a newer theory (to a considerable extent revived by Milton Friedman, Chicago, in the 1970s) as a reaction to the 'Keynesian' Phillips curve. When Keynes wrote the General Theory it was argued that there was a 'missing equation' from his model, something to explain prices. Bill Phillips supplied this with the Philips curve which postulated an inverse relationship between inflation and unemployment. The rationale for this, which I have always favoured, is a labour market one. That when unemployment is low (and conversely vacancies are high) employers have difficulty in attracting new workers and retaining existing ones. In order to help with this they increase wages, which gets passed on to higher prices. Hence:

$$\dot{p}_t = f(U_t) \quad (6)$$

That is it is shaped like:

The Phillips curve

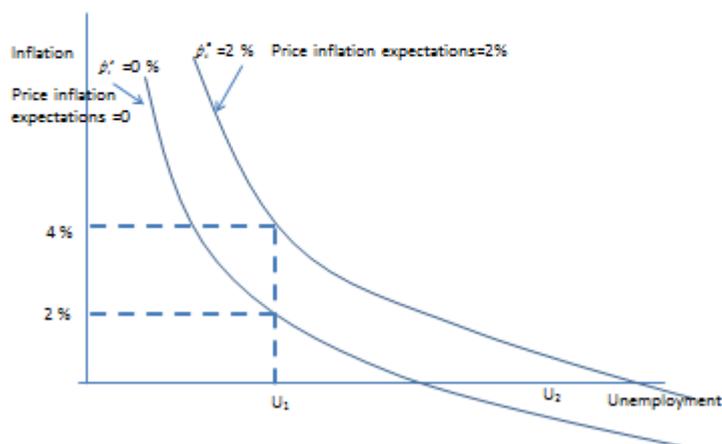


Problems emerged with the Philips curve in the 1970s when we observed high inflation and high unemployment - something which was not supposed to happen. Ed Phelps had put forward a theory in about 1970 (almost simultaneously with Friedman publishing a similar one) which explained this. Basically it was argued that if workers expect prices to increase by 10% then in order to maintain the attractiveness of the wage offer, we must add to (6) *expected inflation* (\dot{p}_t^e). Hence (6) becomes:

$$\dot{p}_t = f(U_t) + \dot{p}_t^e \quad (7)$$

This was known as the **expectations augmented Philips curve**.

Expectations augmented Phillips curve



In the 1960s and 1970s a lot of work was done surrounding how people form their expectations. There are two main types of theories. Firstly, that people form their expectations of what is happening in the future by what has happened in the past (often termed a backward looking theory), "prices rose by 20% last year, 15% this year, they look like they are on a downward trend I think they will rise by 12% next year). That is we extrapolate from the past into the future. The most widely used form of extrapolative expectations is adaptive expectations:

$$\dot{p}_t^e = (1-\alpha) \dot{p}_{t-1}^e + \alpha \dot{p}_t \quad (8)$$

That is current expectations of inflation are a weighted average of expectations in the previous period and what actually happened this period. Another way of writing (8) is that we adjust expectations according to the previous error in expectations, hence it is sometimes called an error learning mechanism:

Error



$$\dot{p}_t^e = \alpha(\dot{p}_t - \dot{p}_{t-1}^e) + \dot{p}_{t-1}^e \quad (8)$$

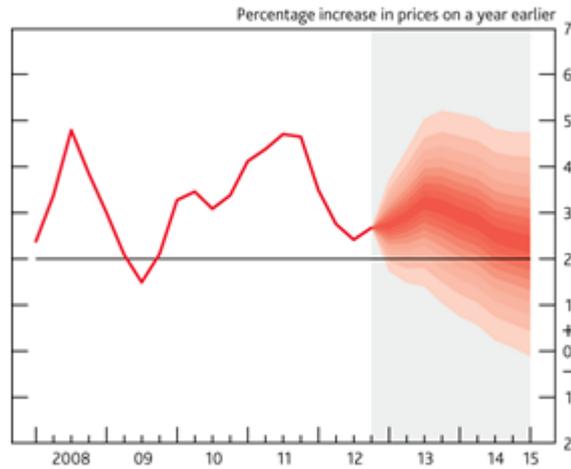
That is people adjust their most recent expectations up or down according to whether they were too low or too high. In the mid late 60s early 70s Bob Lucas revived an idea in a paper by John Muth that firms form their expectations according to the relevant economic theory and applied it to expectations of inflation by consumers, workers, etc. Quite literally the **rational expectations** theory implies that if the relevant economic is the quantity theory of money, then workers, firms, housewives, everyone will base their expectations of inflation according as to what is happening to the money supply. This is often termed a forward looking theory. Particularly the beginning of the following is interesting:

http://public.econ.duke.edu/~kdh9/Source%20Materials/Research/Rational%20Expectations%20Panel%2030%20May%202011_.pdf

Rational expectations does require a great deal of sophistication and knowledge on the part of ordinary people and this is questionable even for business people. Economists found this a very attractive theory nonetheless. However, it has come under a great deal of criticism since the economic crisis began, as an example of unrealistic economic models.

The following is taken from the Bank of England's website. The 'fan chart' shows the spread of what might happen. The further we go to the future the more uncertain we come. The different shadings reflect different confidence intervals. The darker the colour the more certain we are. But basically there is considerable uncertainty about where we will be in 2015.

Chart 5.15 CPI inflation projection based on constant nominal interest rates at 0.5% and £375 billion asset purchases



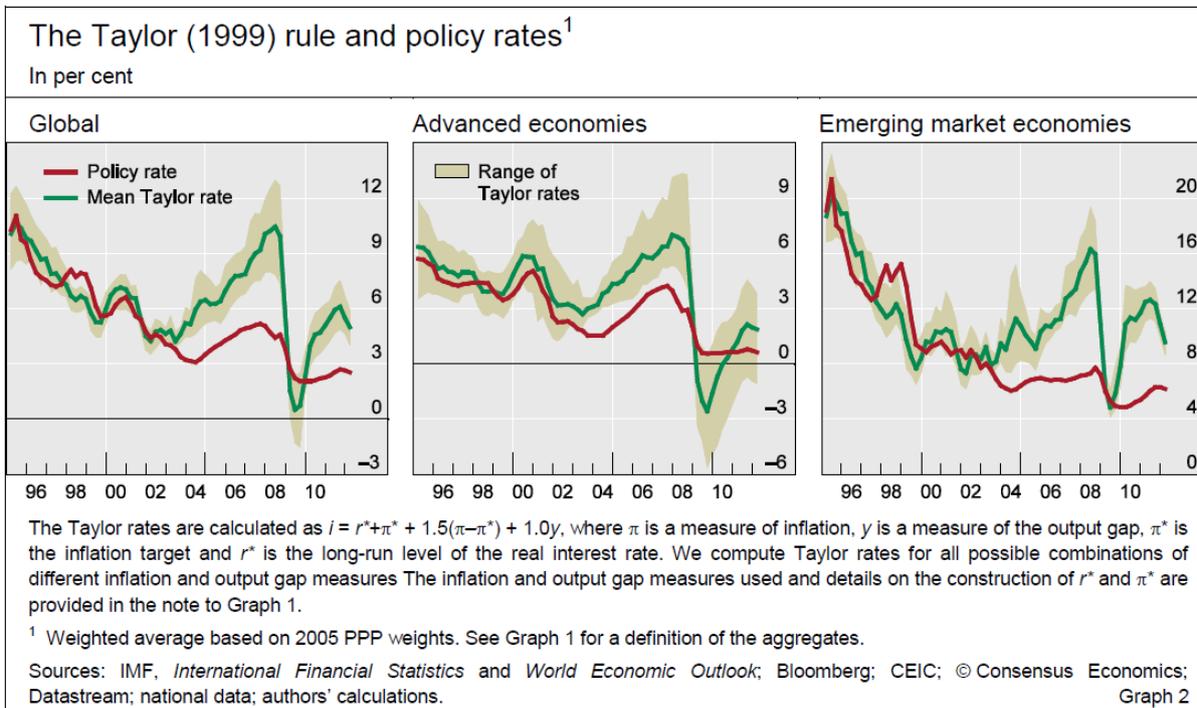
See footnote to Chart 23.

The Taylor Rule

Formally, the Taylor rule implies that real interest r obeys:

$$r - r^* = a(\pi - \pi^*) + b(Y - Y^*)$$

In the long run, the real interest (or target) rate is r^* , inflation is π^* , and real output is Y^* . Inflation above target, or output above target, is a signal to raise interest rates and vice versa.



The piece above is taken from a paper on the Bank of International Settlements (BIS) website. Compared with our Taylor rule:

$$r - r^* = a(\pi - \pi^*) + b(Y - Y^*)$$

$$r = r^* + a(\pi - \pi^*) + b(Y - Y^*)$$

To get the actual interest rate we need to add on expected inflation and we have the formula in the graph were $a=1.5$ and $b=1.0$. According to this analysis interest rates have typically been set too low. But as the paper warns, the Taylor rule should not be blindly accepted. See http://www.bis.org/publ/qtrpdf/r_qt1209f.pdf