

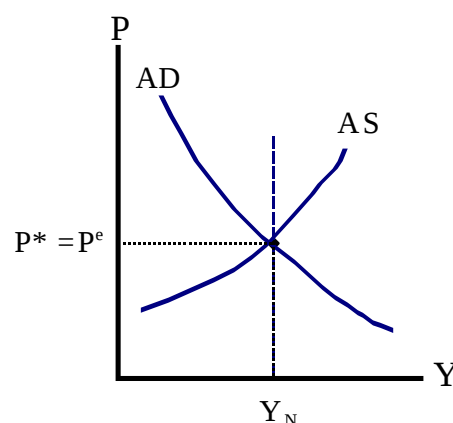
Session 7 outline

Some of the content of session 7 is not found in the Krugman, Obstfeld and Melitz (KOM) textbook. KOM is the source for the interest-rate parity-money market modeling framework. The reserve reading in Appleyard, Field and Cobb is useful (both for the IS-LM-BP framework that was used for exercise 2 and the material related to AD-AS). There is other useful background information that is provided in the SRP and/or on the slides for session 7.

**1. AD-AS framework and the P, Y macroeconomic relationship**

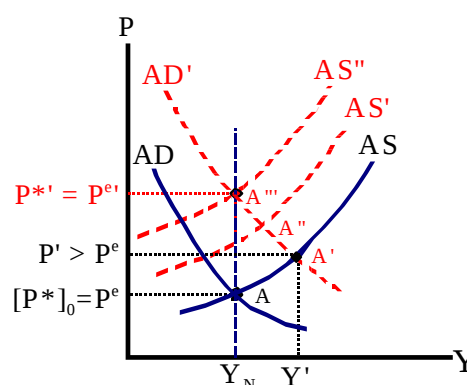
Motivate: During exercise 2 we looked at fiscal and monetary policy effects in the absence of prices changes (i.e., short-term effects). Now it is time to focus on the price changes and changes in expectations. The AD-AS framework provides a straightforward way in which to consider the changes in prices and expected prices.

In equilibrium, the economy operates at  $Y_N$ , which refers to the natural rate of output, i.e., the output level that corresponds with “full employment”, or the level of unemployment where inflation is low and stable (non-accelerating inflation rate of unemployment, NAIRU). This NAIRU is the equilibrium between the state of the macroeconomy and the labor market (where the level of unemployment is at its natural rate,  $u_n$ ). Thus, at  $Y_N$ , the inflation rate is  $P^*$  which is equal to the expected rate of inflation,  $P^e$ .



Recently, in more “normal times”, an inflation target has become a central bank’s benchmark by which to balance economic growth and employment and inflation. If the inflation rate exceeded the target, the central bank tightened monetary policy to slow the economy and bring the rate of inflation back toward the target. (A bit more on inflation targeting is discussed later, so this is ignored for now.)

Now, suppose the economy is running at  $Y'$  (a level of  $Y > Y_N$ ) because of an increase in AD (from AD to  $AD'$ ) for some reason. To increase output beyond the natural rate, there must be more employment (beyond the full employment level). The need for more employment (lower unemployment), in turn, pushes up wages. Firms trying to hire more workers who are already employed gives labor more bargaining power relative to firms (and or raises the search cost of a firm to find jobless persons). This higher cost of hiring labor (increased wages and search cost) causes prices to increase, from  $[P^*]_0$  to  $P'$ .

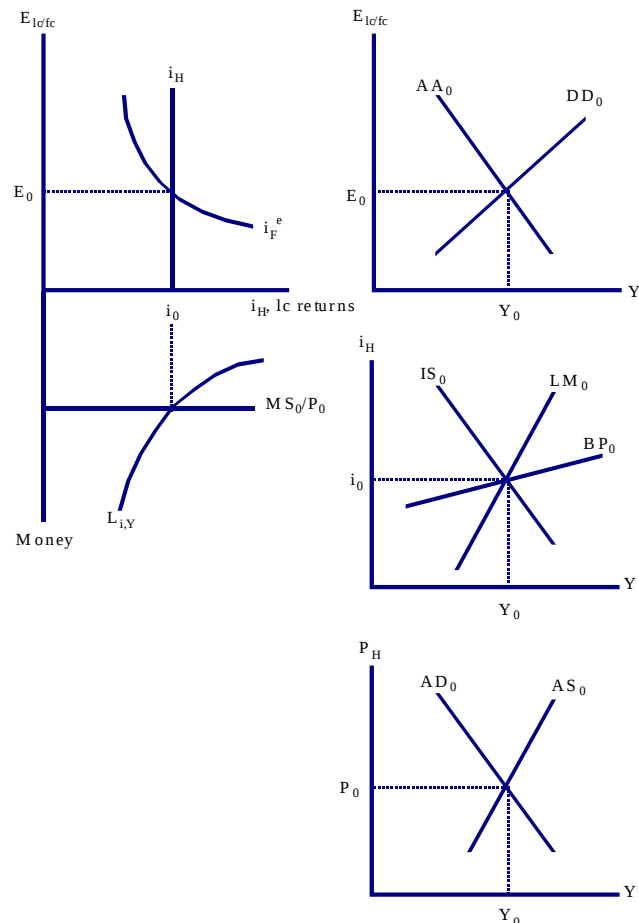


Expected prices only increase once the economy comes to understand that general prices are starting to increase, so at first  $Y' > Y_N$ , the level of unemployment  $< u_n$ , and  $P' > P^e$ . This is the move from point A to A'. Once the price increase is felt, the economy begins to expect higher prices. An increase in expected prices, in turn, causes wages to increase (workers demand wage increases to keep real wages from falling). This process can be summarized as:  $\uparrow P^e \rightarrow \uparrow W \rightarrow \uparrow \text{costs} \rightarrow \uparrow P$  for each firm and an  $\uparrow$  general prices, i.e., the inflation rate. The

$\uparrow P^e$  causes the AS curve to shift to the left and reduces the demand for labor and reduces the output level below  $Y'$ . This is represented as a move from  $A'$  to  $A''$ . If price changes take some time to catch up then expected prices increase further until the new rate of inflation,  $P^{**}$ , is equal to the expected rate of inflation,  $P^e$ . This process brings the economy back to the natural rate,  $Y_N$ , at a higher rate of inflation, the equilibrium shown as  $AD'=AS''$ . This is maintained until or unless the aggregate demand returns to its previous level,  $AD$ .

## 2. Permanent increase in money supply under a stable equilibrium situation

Motivate: It is now time to reflect upon the implications of changes in prices and expectations. As an exercise for yourself, you can start to think about how the price changes matter both for the medium and long term. The purpose of exercise 2 was to consider the short-term effects of macroeconomic policy. The results showed the macroeconomic policy implications by type of exchange regime and by the degree of capital mobility, and its effectiveness. But how do the changes in prices and expectations matter? Use the graph provided to answer the following questions. This is an example of a Part 3 type question on the exam.



Step 1. Suppose there is a permanent increase in the rate of growth in money supply (MS). Repeat the case (from exercise 2) of an increase in MS under a flexible exchange regime (under the assumption of mobile capital as shown in the IS-LM-BP graph). Just use the top four graphs.

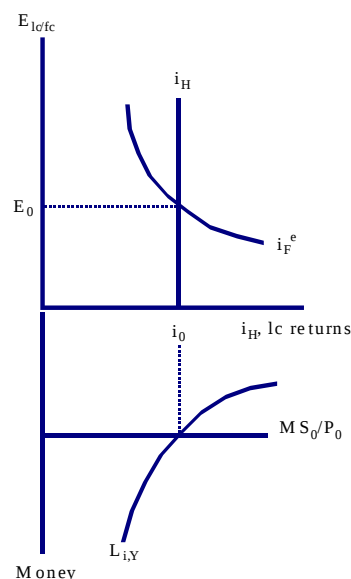
Step 2. How does what you show in step one affect the AD-AS graph? What might the medium-term equilibrium look like (i.e., when prices begin to change and when expected prices have yet to change)?

Step 3. Now consider the long run. Let the expected prices change and general inflation increase. How does the equilibrium from step one change as actual and expected prices increase? What does the final long-run equilibrium look like? Hint: the AD-AS will show you the final equilibrium more easily. From that final equilibrium, you can follow the changes through to the rest of the modelling framework.

### 3. Long-term effects of policy: non-stable equilibrium situation

Motivate: Textbooks usually focus on well-behaved equilibrium situations (as does the Mundell-Fleming model, the IS-LM-BP framework). The purpose of this thought exercise is to consider what happens when policymakers behave less responsibly. As a further extension of understanding the changes in prices and expectations, exercise 3 as provided at the arken.nmbu.no site, asks you to consider the long-term implications of repeated macroeconomic policy intervention. The long term has two meanings: the policy intervention (fiscal or monetary policy) is repeated, and prices have time to catch up.

Take a situation where the policy in the short-term was effective and that the policymakers decide to repeat it again and again. Think about how this might affect the macroeconomy. To help you, develop a scenario for how the long-term macroeconomic situation might change. Then use the modeling framework to help tell that story. First, consider using the i-parity-money market framework. Once you see the pattern you can try and use the rest of the modeling framework. Explain what the longer-term logical consequence of such policy behavior might be.



I have found this audio/video clip to be useful to capture the post-crisis period nicely. I will refer to it again in session 8 when European monetary integration is covered. So, the first four minutes of this clip for now is most relevant.

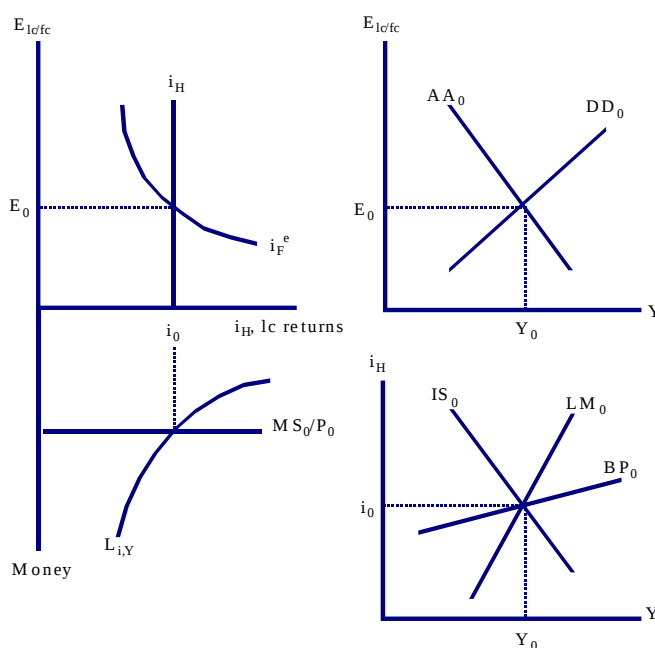
Audio/video clip [watch the first 4 minutes: <https://www.stlouisfed.org/annual-report/2011>]

### 4. Domestic macroeconomy concerns

#### 4.1 Budget deficits and interest rates

Motivate: The theory holds that larger budget deficits are associated with higher interest rates. This is a result shown in exercise 2 when expansionary fiscal policy was applied (under either fixed or flexible exchange regimes).

The SPR for session 7 (pages 1-3) raises the question as to whether bigger budget deficits cause higher interest rates, in theory and practice. Additional information is also presented in the slides for session 7 (slides 2 and 3). The premise is that capital markets are hindering global economic adjustment.

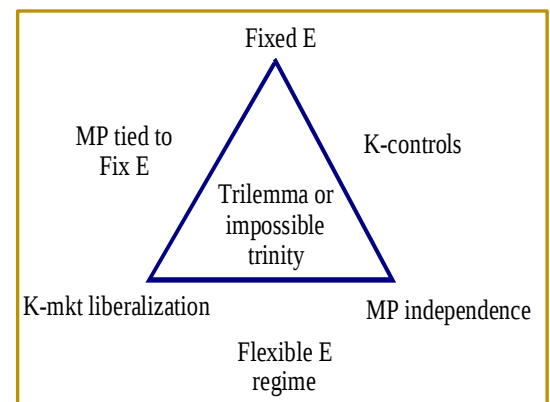


The reoccurring debate involves the relationship between increasing US budget deficits, interest rates and the value of the dollar. Read the related pages in the SRP and think about the nature of disagreement. How is the modeling framework relevant to

weigh in on the debate? What does the Mundell-Fleming model (IS-LM-BP) framework say about budget deficits? Are there limitations with the Mundell-Fleming model? How might such a debate, among qualified macroeconomists, be resolved? Focus again on expectations and the assumptions/limitations behind interest-rate parity.

#### 4.2 Monetary targets and the monetary policy-exchange regime-capital market trilemma

A country can have a fixed exchange rate regime, free movement of capital or independent monetary policy, but not all three simultaneously. Under the gold standard, countries' capital moved relatively freely (mostly in the form of loans or investment for physical infrastructure), but monetary policy was adjusted to maintain the peg to gold. Bretton Woods fixed exchange rates under independent monetary policy, but it required capital controls. The breakup of Bretton Woods brought in flexible exchange rate regimes with independent monetary policy and greater capital market liberalization.



Nothing in economic theory offers guidance for what is the best exchange rate for a country. As with other aspects of economic theory there are trade-offs that suggest advantages and disadvantages, which on balance will depend on the specific case at a particular time. The chart below summarizes the advantages and disadvantages of different exchange regimes and targets.

| Target                      |                   | Advantage                                                                                                                                                                                                                                                                     | Disadvantage                                                                                                                                                                                                                                                                                                                 |
|-----------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fixed E                     | Fixed E-regime    | ① Stable E is good for macroecon<br>② Fix E is good for small, open economy (external balance)<br>③ Helps country with history of high inflation to peg to low-inflation country<br>④ If CB is weak or lacks MP experience; MP not so important<br>⑤ FP can be very effective | ① Fix requires stable $P_c/P_f$ relationship - $\Delta P$ across countries is not the same<br>② CB action is not transparent: How/when will MP be used?<br>③ K-mobility makes fix E more difficult<br>④ International K is more difficult to control; a fix is vulnerable to speculation<br>⑤ MP is less effective (useless) |
| $\Delta$ MS growth rate     | Flexible E-regime | ① MS target is transparent<br>② Works if the MS-P is stable<br>③ Works if real MD is stable                                                                                                                                                                                   | ① MD has become less predictable with financial deregulation: <ul style="list-style-type: none"> <li>• There are more financial instruments</li> <li>• Capital more internationally mobile</li> </ul>                                                                                                                        |
| $\Delta P$ Inflation target |                   | ① Gov't sets target, $P^T$ , and CB has discretion<br>② CB has accountability – judged on the ability to meet the target<br>③ MP is transparent; aimed at keeping inflation at $P^T$                                                                                          | ① MP operates with a lag and $P^e$ is hard to forecast<br>② Not straightforward which P to focus on: CPI or retail P index<br>③ Hard to prevent a bubble in asset prices if the P target is not correlated with asset prices                                                                                                 |

#### 4.3 Macroeconomic concerns with inflation/deflation

It is always useful to go back to the basic definitions of macroeconomic concepts such as inflation and deflation and to remind oneself about their implications for the economy.

High rates of inflation can have the following effects:

- (1) Increases interest rates (higher private borrowing costs) especially if the costs are indexed to account for increased risk;
- (2) Can lead to higher nominal wages especially if wages are inflation indexed (and/or if labor unions are strong), resulting in wage-price spirals (as was typically the case in the 1960s);
- (3) Lowers the real income of the poorest ( $\downarrow Y/P$ ,  $C(Y/P)$ ,  $W/P$ ), especially those with fixed income;
- (4) Distorts private behavior ( $C$ ,  $I$ , saving) and can result in barter transactions, hoarding or unhealthy speculation; but
- (5) Can reduce the cost of past government borrowing, reducing public debt.

Deflation also presents macroeconomic problems:

- (1) The loss of the use of monetary policy as a policy tool – CB cannot use low interest rate to increase aggregate demand, i.e.,  $\downarrow P \rightarrow \uparrow MS/P$ ;
- (2) If inflation is low and the nominal interest rate is close to zero, then real interest rates can be negative, making investment less attractive and delaying consumption, i.e.,  $\downarrow P^e \rightarrow \downarrow C$  (as consumers wait for prices to fall further);
- (3) If debt is in nominal terms, then low  $P \rightarrow \uparrow$  debt and slows economy further; and
- (4) If nominal wages are sticky, then low  $P \rightarrow \uparrow$  real wage, increased cost to firms and less employment further affecting consumption and slowing economy.

The slowing of inflation since 2000 and the deflation from after the global financial crisis has challenged the macroeconomic consensus of thought that has existed since the 1970s.

Monetary policy by an independent central bank is the means by which to control inflation. Inflation targeting, popularized in the 1990s, was further recognition that central bankers had learned to manage inflation. However, the post-crisis deflation and low, zero or negative interest rates has exposed the challenges that central bankers now have in maintaining inflation targets. The talk now is rather than a specific target the central bankers should accept a target range. The lack of traditional monetary policy is now part of the problem and there is no consensus or lessons learned from the global financial crisis (SRP, pages 3-6).

#### 4.4 Labor markets, employment and inflation [use with SRP, page 3-11, and slides 4-11]

The labor market in advanced economies is undergoing substantial change: a declining and ageing population, the digital technological revolution, and increased income inequality. These changes can be interrelated. Skills-based technology can be a driver of wage inequality and affects the demand for labor. The demand for middle-income occupations (slide 4) has declined as technology has allowed capital (e.g., machinery) can more easily substitute for that labor (e.g., computer substituting for secretarial services). The ageing population and the decline in the labor force is a change in the supply of labor. Some have attributed “secular stagnation”, weakness in demand and excessive savings limiting economic growth, to the change in demographics (SRP, p. 9).

Mature economies were argued to have tamed the business cycle through the “great moderation”. Economic expansions are lasting longer, implying less negative downside and consequences (slides 5 and 7). But what is causing the economic booms to survive for longer? The composition of the economy has changed, so the nature of recessions should also change. Several factors are considered drivers of the structural change in the economy, e.g., the decline in the importance of manufacturing, the rise in the importance of services, the blurring of manufacturing and services, global supply chains, changes in the nature of investment (from physical plant and equipment to intellectual property – non-physical capital), and the firms doing the investment (the large high tech firms). Global tech giants are

disrupting established firms in retail and other services (taxis, hotels). They are asset-light firms, shifting information technology (IT) spending from buying servers to renting them through the cloud. Seven of the top 10 largest firms in the world are tech firms, up from only two in 2010.

There is a debate regarding the disruptive effects of IT relative to the benefits that its productivity growth might bring. Productivity growth used to be accompanied by economic expansion (slide 8-11), but since the 1990s growth in productivity has come during recessions. The nature of the structural changes has something to do with it, resulting in jobless recoveries. Economists trying to measure productivity generally find it rising slowly, suggesting a lack of real technological breakthrough from IT (slide 10). However, when the IT productivity is mapped against the technological progress spurred by mechanization, 1890-1940, it could be that IT's benefits are still to come (slide 11). The mechanization of farming and transport displaced farming and brought on industrialization. Could deflation be related to the effect of the digital economy improving price transparency and bringing creative destruction? Technological progress can go two ways: machines replace workers, and/or new technology creates new, more complex tasks for workers. Each has implications for wages and employment.

Unemployment is a central question in macroeconomics. The problem of unemployment poses a challenge for policymakers and the macroeconomics profession has long debated the relative importance of fiscal and monetary policy in dealing with it.

A central bank does not have direct instruments over the supply-side of the macroeconomy. This is more in the fiscal policy realm. Fiscal policy and government regulations can apply tax-subsidy schemes for firms to increase production and/or employment in targeted sectors. On the other hand, fiscal policy is a less appropriate instrument for influencing interest rates and inflation. Changes in government spending and taxation take time to be implemented and these instruments affect the macroeconomy only with a lag. Fiscal policy is more political and is subject to the election cycle. That it more directly involves the redistribution of income across identifiable members of society adds to its political complexity (e.g., taxing the profits of capital owners to subsidize the consumption of the poor).

Monetary policy has tended to be more neutral in its political application. Nevertheless, it still involves redistribution of income and creates winners and losers. For example, a targeted rate of inflation affects creditors and debtors differently, or the rate of interest affects savers, borrowers and investors differently. Governments ceded control over monetary policy to the central bank to make its policymaking independent of the election cycle. However, central banks are still subject to political influence or interference. Central bankers are brought before parliaments and congresses for them to explain their actions, and it is not uncommon for a prime minister or president to apply pressure on central bankers to make changes in interest rates, exchange rates, or to complain about asset purchases.

It can be successfully argued that central bank independence is now more of a myth and that the importance of fiscal policy is making a comeback given the macroeconomic state of things in the more mature economies. Inflation targets are not being met, and with interest rates near zero or negative traditional monetary policy has become constrained in its ability to increase aggregate demand compared with fiscal policy. Stimulating the economy requires even more central bank-government coordination, implying that the central bank is giving up some of its independence. The central bank buying risky assets helps banks, financial institutions and investors, and some governments, but does not necessarily help the household directly. This made actions by the central bank and government in rich countries appear as if financial firms were bailed out while households struggling to pay mortgages on their homes were left having to tighten their belts under austerity programs. Moreover, the asset purchases

blur the distinction between monetary and fiscal policy and can look a lot alike printing money to increase the government's holding of public debt.

It is long been recognized that employment or unemployment has some relationship with inflation. The unemployment level where inflation is stable depends on the labor market and the goods market. The structural features of aggregate supply determine the underlying relationship between prices and wages.

The Phillips curve is the relationship between the rate of inflation and unemployment as observed by Phillips when comparing money wage growth and unemployment during 1861-1957 in the UK. The analysis was extended to inflation and unemployment and was observed in other industrialized countries. The inverse relationship suggested that there was a tradeoff between how much more inflation policymakers could accept in exchange for lower unemployment rates. In the 1960s, US-based Nobel-prize economists Solow and Samuelson argued that the Phillips curve presented policymakers with a menu of choice between inflation and unemployment. The concept of a natural rate of unemployment had not yet been developed.

The relationship between inflation and unemployment broke in the 1970s. The Bretton Woods fixed exchange rate regime with currencies anchored to the US dollar, set up in the late 1940s, unraveled ushering in a system of flexible exchange rates. Two oil crises and high US budget deficits led to high rates of inflation in the US. Inflation was tamed by raising interest rates while ignoring high rates of unemployment. Thus, high inflation and unemployment, or stagflation, coexisted bringing the relationship Phillips observed into question. High current inflation,  $\pi_t$ , was followed by higher expected inflation, i.e.,  $\pi_t \rightarrow \uparrow \pi_{t+1}$ . Expectations began to matter, such that current expected inflation was related to past inflation, i.e.,  $\pi_t^e = \theta \pi_{t-1}$ . Friedman and Phelps argued that there was no tradeoff between unemployment and inflation because expectations mattered. Unemployment could not be below the natural rate of unemployment without causing inflation.

Since the 1980s, the consensus in macroeconomics has been that the actual unemployment level relative to the natural rate of unemployment is what affects changes in the rate of inflation. The natural rate of unemployment is that rate at which inflation is stable, the non-accelerating inflation rate of unemployment or NAIRU. If the current rate of unemployment,  $u_t$ , is higher than the natural rate,  $u_n$ , the inflation rate is expected to increase, or  $u_t > u_n \rightarrow \uparrow \pi$ .

It was the ability of central bankers to use monetary policy to bring inflation under control that led to the government ceding the policy to unelected technocrats. The central bank's ability to control inflation went coincided with their independence. In the 1990s, the confidence in central bankers' ability to control inflation led to inflation targeting, where government set the target and central bankers used their discretion to meet the target.

## **5. Unorthodox monetary policy [use with SRP, p. 12-30 and slides 12-24]**

Traditional monetary policy primarily involves increasing or decreasing the interest rate through open market operations (buying/selling securities) to contract/expand the economy. It can also work through changing the discount rate (the interest rate charged to banks) and the reserve requirements a bank must hold. Monetary policy works through three channels: changing the cost of borrowing, changing the exchange rate, and changing the price of financial assets.

When interest rates are near zero, traditional monetary policy loses its effectiveness. Non-traditional, or unorthodox monetary policy, involves the use of quantitative easing (QE) and

negative interest rates. QE is the creation of new money on a large scale to buy financial assets to support the macroeconomy by restoring confidence in financial markets and institutions, increasing liquidity, and trying to raise asset prices. In 2001 the Bank of Japan pioneered the purchasing of assets by using the reserves that banks wanted to hold at the central bank.

The US and UK central banks also used QE after the global financial crisis. In the US, it took on three forms: credit easing, operation twist and QE proper. Credit easing involved increasing liquidity to raise asset prices and decrease the interest rate of open the credit channels. The Fed purchased mortgage-backed securities, assets that investors were not willing to buy (a decreased demand for them) and whose prices were falling sharply. This created new money that investors could invest in other asset types.

Operation twist was asset purchasing without creating new money. The Fed sold short-term debt and used the proceeds to buy long-term debt. This was a means to get investors out of long-term debt to buy other assets.

QE proper is the large-scale purchase of assets. Investors sold securities to the central bank and were supposed to use the proceeds to buy other assets as a means to increase asset prices, and to decrease bond yields to increase borrowing. Through the wealth effect, higher asset prices would lead to increase consumption. If QE led to an increase in foreign currency asset purchases, then the local currency value could decrease to increase exports and capital outflows. If central banks hold the government debt it buys, it reduces the government's borrowing costs. QE is a promise to keep short-term interest rates low and affect expectations accordingly.

Thus, QE affects monetary conditions through three channels: the scarcity channel where asset purchases of a specific maturity lead to an increase in asset prices (decrease in yields) for securities with similar maturities; the duration channel whereby central bank purchases lead to a decrease in the duration of outstanding stock of Treasury debt, lowering the premiums on securities across maturities (limiting the access to assets with long-term maturities); and the signaling channel where QE reinforces the central bank's credibility to commit to low short-term interest rates and "forward guidance" on how/when interest rate changes are likely to change.

Negative interest rates are unorthodox because society has become accustomed that interest rates should serve as a reward for saving or deferring consumption, rather than a tax on saving. Interest rates were thought to be bound by a zero rate. However, Fisher (1930) and Gesell (1916) wrote about negative interest rates in the previous challenging macroeconomic period. Macroeconomists were reminded that negative interest rates serve to attack "bad" deflation (a decrease in prices not due to increased productivity). The objective is to decrease borrowing costs, encourage lending and liquidity, and to stop idle cash balances accumulating as a means of increasing prices and GDP growth.

Negative interest rates are charges that the central bank applies on banks when they hold excessive deposits. The costs to banks have been small and these were passed on to only a few large firms. Households did not have their savings taxed. Negative interest rates mostly affected currency markets, causing capital outflows from those countries which had negative rates to those where rates were higher (emerging market economies), resulting in some distortion of currency markets as well as capital markets.

Sweden recently ended its experiment with negative interest rates. Some call negative interest rates a mistake because they cause people to save more rather than less. Denmark, the ECU and Japan are still among the countries with negative interest rates. For Sweden now the issue is whether bringing interest rates to zero has an effect on inflation and economic growth. The

governor of the Sweden's Riksbank argues that negative rates were a success. It was introduced in 2015, not because of weak growth, but because it was intended to stop the deflation that began in 2014. By 2017 Sweden managed to hit its 2% inflation target. Going negative made inflation return according to the governor (slide 25).

The concern with negative rates is with the long term. Weakened financial institutions still struggle and low rates discourage lending and prompt savers and firms to hoard cash. Another risk is that negative rates can inflate asset price bubbles and can keep zombie firms alive longer through cheap credit, contributing to a high debt situation. The governor is less sure of the use of negative rates in the future. However, he stresses the importance of additional policies having to do some of the heavy lifting. For Sweden, for example the government has more policy space to increase debt. Swedish household have debt equivalent to almost 200% of disposable income, one of the highest in the world, while government debt is expected to be just above 30% of GDP in 2020.

The aftermath of the global financial crisis has brought no consensus in the discipline's thinking about macroeconomics. There is disagreement about the way forward in the next zero bound rate episode. After this weekend's announcement in the US that the Fed is dropping rates to zero in response to market turbulence from the corona virus QE crisis, it appears as if the next episode is now. It is not clear how successful QE will be in sparking a fast recovery. The corona virus crisis is both a medical and an economic shock, where the macroeconomic situation cannot recover until the medical situation is brought under control. The fiscal-monetary policy debate is still not settled and there appears little appetite for fiscal policy in the age of high debt levels. Economics explained why predictable monetary policy was able to control inflation and why that was preferable to fiscal policy spending to meet full employment. There has been no intellectual shift in thinking in response to the global financial crisis and the distrust in multilateral institutions does nothing to help in responding to a global shock such as the corona virus pandemic.

Finally, QE has blurred the distinction between fiscal and monetary policy and the distributional consequences of unorthodox monetary policy are much more contentious. That is, unorthodox monetary policy is seen as the central bank picking winners and losers. It is one thing to limit discretion on the use of monetary policy to limit changes in output from the natural rate of output. It is another thing entirely to undertake asset purchases or to lower interest rates to protect one segment of society (bankers, investors and finance managers) at the expense of another (households, and small/medium-sized enterprises).

The challenges of using QE by the ECB is discussed in session 8 when monetary union is discussed and formally treated.