Analysis

Is the euro area at risk of Japanese-style deflation?

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Euro area inflation has long been below the European Central Bank's objective for price stability and has continued to slow in recent months. This has given rise to heightened concerns that the euro area could soon be facing a prolonged period of deflation, as recently in Japan. The case of the United States shows, however, that the Japanese experience can be avoided. The key would seem to be the anchoring of inflation expectations. In the euro area, new measures of monetary accommodation have contributed to reducing the risk of Japanese-style deflation.



What determines inflation?

The objective of the ECB is to maintain inflation at below, but close to, 2% over the medium term. For this target to be achievable, the central bank must be able to use monetary policy to control inflation. This is made possible by the central bank's monopoly over the creation of money, which allows it to control the price and quantity of said money. Central banks typically use their key interest rates to control the price of money, which also sets the level of interest for the economy as a whole. There is a sound theoretical basis for achieving the inflation target through changes to the key interest rate if the changes are according to the Taylor principle. That means, the change to the key interest rate should be greater than the deviation of inflation from the target.

Rate changes based on this principle are aimed at influencing the level of nominal interest rates and thereby pushing real interest rates – the difference between nominal rates and inflation – in the desired direction. Changes in real interest rates are key, as they influence consumption and investment decisions in the economy. In other words, if inflation is higher than its target level, raising real interest rates will curb economic activity and thereby decrease the inflation rate. If inflation is lower than its target level, lowering real interest rates will boost economic activity and increase the inflation rate. A credible monetary policy will enable inflation expectations to be anchored: there will be no reason to expect any deviation from the inflation target beyond some

short-term volatility. Anchoring inflation expectations is key for reaching the inflation target, as expected inflation has an impact on actual inflation.[1]

Over the longer term, real interest rates are not controlled by the central bank, but are such that an equilibrium exists in the market for goods, i.e. demand equals supply in the market.[2] The nominal interest rate is then determined as the sum of this equilibrium real interest rate and the (expected) rate of inflation determined by the central bank. This relationship is better known as the Fisher equation: $i = r + \pi$. In this equation, i denotes the nominal interest rate, r denotes the real interest rate and π stands for expected inflation. The Taylor principle and the link captured by the Fisher equation guarantee that the central bank can keep the economy balanced. Inflation remains in line with the central bank's inflation target and real interest rates are at a level where the goods market is at equilibrium.

The literature does, however, suggest the possibility of another equilibrium.[3] This equilibrium can be deemed undesirable, as here price developments deviate from the central bank's target and could have a deflationary effect. A considerable negative disinflationary shock could result in a scenario where, following the Taylor principle, the central bank would bring nominal interest rates down to zero. This is commonly known as the liquidity trap. At the zero lower bound of interest rates, the Taylor principle can no longer be followed by changing the key interest rate, and, as a result, inflation can leave the path consistent with the central bank's objective. An undesirable equilibrium value of inflation is determined by the level of real interest rates where the goods market is at equilibrium, i.e. inflation adjusts to match the negative market-clearing real interest rate.[4]

One example of undesirable equilibrium might be Japan.[5] One could argue that the undesirable state of equilibrium in Japan has now lasted 20 years, during which time price developments have been deflationary. And if Japan is considered to have been in a state of undesirable equilibrium, such a state is conceivable also for other advanced economies such as the United States or the euro area.

The possibility of the United States facing a similar situation as Japan has also been considered.[6] In the spring of 2010, inflation continued to fall in the United States even though interest rates were already at their zero lower bound. There were obvious parallels with the situation in Japan. In the euro area, the zero lower bound was reached in the autumn of 2014, with inflation continuing to fall. The situation in the euro area now is quite similar to that in the United States in the spring of 2010. Concerns about the euro area potentially facing a similar state of undesirable equilibrium and deflationary price developments as in Japan are thus well

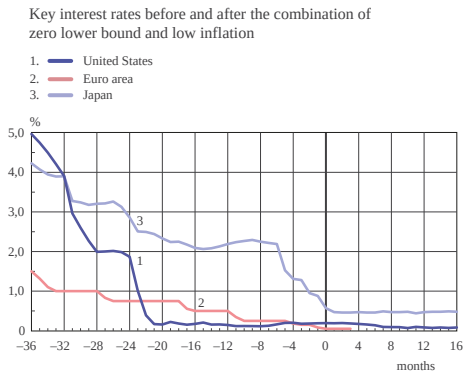
founded.[7] This article reviews those concerns.

The review is conducted on the same premise as the Bullard study that similarly reviewed the US economy. In addition, the article examines why Japan ended up in an undesirable equilibrium but the United States did not. On the basis of experiences from both the United States and Japan, the new expanded asset purchase programme of the Eurosystem considerably reduces the risk of the euro area facing similar deflationary developments as in Japan.

The peril of the Taylor principle: Japan and the euro area

The idea of two kinds of equilibria is illustrated in Chart 1, which depicts the relationship between the key interest rate and core inflation in Japan and the euro area. The dashed line in Chart 1 represents the Fisher equation, i.e. combinations of inflation and nominal interest rates where the real interest rate produces an equilibrium in the market for goods. If the combination of nominal rates and inflation is not in line with the Fisher equation, households and firms will expect inflation to change. Changes in inflation lead to nominal rate changes according to the central bank's monetary policy rule (solid line).Where the lines cross, inflation is at a level determined by the central bank and real interest rates are at levels where the goods market is at equilibrium. At these points, inflation and nominal rates no longer change, i.e. the economy is at equilibrium.

Chart 1.



The moment 0 depicts the moment when each economic region hit the zero lower bound of nominal interest combined with low inflation. For the United States, this was 9/2010, for Japan 9/1995 and for the euro area 10/2014.

Source: Macrobond.

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The intersection at the top right is the equilibrium the central bank is aiming for, and observations from the euro area are clustered around that equilibrium. The monetary policy rule will produce large changes in the key interest rate to keep inflation close to the target level in line with the Taylor principle. At the lower end of the chart, the zero lower bound of nominal interest rates restricts the applicability of the monetary policy rule. Changes in inflation thus lead to increasingly

small changes in the key interest rate, i.e. the Taylor principle cannot be observed. Monetary policy using the key interest rate can be considered active and in line with the Taylor principle at inflation levels just over 1%.

The second intersection of the Fisher equation and the monetary policy rule is at the level of very low inflation and represents the undesirable equilibrium where inflation is considerably below levels that the central bank is aiming for. The Japanese economy seems to have remained close to the undesirable equilibrium for a prolonged period. It is important to note that here changes in inflation do not result in a change in the key interest rate (the line representing the monetary policy rule is almost horizontal). This state is reached when inflation falls below 1%. Monetary policy becomes passive for two reasons. Firstly, the zero lower bound for nominal interest rates makes it impossible to lower the key interest rate further when inflation slows. Secondly, the central bank's target level for inflation is distant, which allows inflation to increase for a prolonged period of time without exceeding the inflation target. In other words, monetary policy becomes passive because the zero lower bound prevents rate cuts and there is no need for rate hikes when inflation is low.

What we should notice about Chart 1 is that the sets of observations from the euro area and Japan never intersect. An economy commonly experiences some fluctuation while always seeking to return to a state of equilibrium. Both the euro area and Japan have stayed close to their respective equilibria. In other words, observations from the euro area and Japan would seem to support the existence of desirable and undesirable equilibria.

While the latest observations from the euro area have been closer to observations from Japan than ever before – key interest rate at 0.05% and core inflation at 0.6% – this does not, however, represent a state of equilibrium. Active monetary policy would bring inflation back to a desirable equilibrium, while passive policy could lead to the kind of equilibrium experienced in Japan. The euro area has been following the Taylor principle in lowering the key interest rate, but at the zero lower bound active monetary policy through interest rate cuts is no longer possible. Monetary policy using the key interest rate becomes passive and could lead to an undesirable equilibrium, were unconventional measures not available.

The main reason why economies end up in undesirable equilibrium is the conduct of the Taylor principle in monetary policy. Around desirable equilibrium, the Taylor principle will contain inflation, and under such circumstances it is a good guideline for monetary policy. However, when the inflation target of the central bank is no longer close, the Taylor principle will lead to a liquidity trap for the economy, and monetary policy using key interest rates becomes passive. Passive monetary policy paves the way for undesirable equilibrium. In other words, the Taylor principle is a good monetary policy rule only around a desirable equilibrium and otherwise may lead the

economy into an undesirable equilibrium. This condition is the peril of the Taylor principle. According to Chart 1, for the euro area the 'peril' is more likely to materialise than ever before.

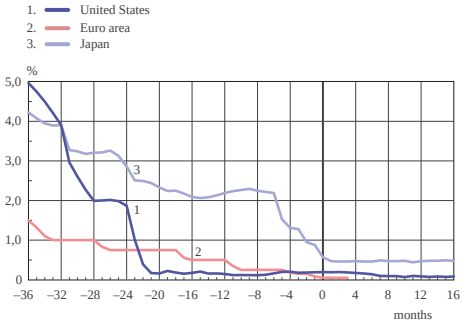
The euro area is not alone in having come close to a Japanese-style liquidity trap or undesirable equilibrium. The United States may also have come close.[8] We now know that the United States was able to avoid prolonged deflation. An examination of the United States and Japan at the zero lower bound provides a solid basis for asking what makes an economy end up in undesirable equilibrium and how this can be avoided.

Can Japanese-style deflation be avoided?

Inflation and key interest rate developments in the euro area over the past few years have parallels with those in the United States and Japan. Charts 2 and 3 show the development of core inflation and key interest rates in the United States, Japan and the euro area in a situation in which inflation is low and the economies have reached the zero lower bound of nominal interest rates. In essence, this is the situation described in previous chapter: monetary policy based on changing the key interest rate becomes passive, and the risk of undesirable equilibrium grows. We now know that the United States was able to avoid Japanese-style deflation. For the euro area, the key question is why Japan ended up in an undesirable equilibrium but the United States did not.

Chart 2.

Key interest rates before and after the combination of zero lower bound and low inflation



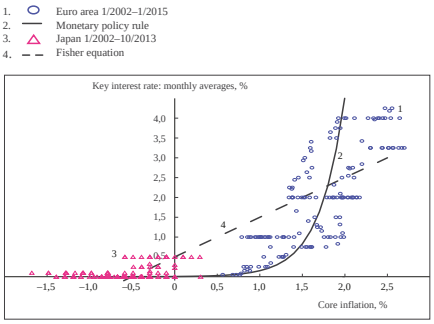
The moment 0 depicts the moment when each economic region hit the zero lower bound of nominal interest combined with low inflation. For the United States, this was 9/2010, for Japan 9/1995 and for the euro area 10/2014.

Source: Macrobond.

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Chart 3.

Key interest rate and inflation in Japan and the euro area



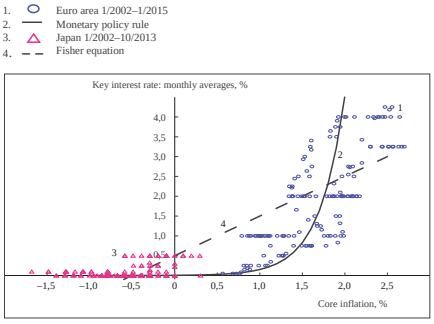
Source: Macrobond.

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The risk of Japanese-style undesirable equilibrium in the United States after the developments in 2010 have also been under scrutiny.[9] The study came to the conclusion that the probability of undesirable equilibrium was heightened but remained small. The results were interpreted as showing that inflation expectations basically determine the equilibrium the economy finally achieves. A change in the equilibrium would thus require a simultaneous (or coordinated) swing in economic agents' expectations from the equilibrium desired by the central bank to an undesirable equilibrium. Some evidence from the United States and Japan points to this conclusion, as long-term inflation expectations behave differently in the two economies (see Chart 4).

Chart 4.

Key interest rate and inflation in Japan and the euro area



Source: Macrobond.

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Long-term inflation expectations in the United States and Japan differed greatly at the time the economies hit the zero lower bound of nominal interest rates under conditions of falling inflation (time 0 in Chart 4). In the United States, inflation expectations remained stable and close to 2.8% even though inflation rates had already fallen considerably (see Chart 2). In Japan, by contrast, long-term inflation expectations fell by nearly 1.5 percentage points from approximately 2.5%. By

2003, long-term inflation expectations in Japan had fallen to 0.3%. In the United States, expectations remained anchored, unlike in Japan, where they were pointing to prolonged low inflation that also materialised. Of the two, the United States was able to avoid undesirable equilibrium.

In the euro area, inflation expectations remained stable until the beginning of 2014 (time -4 in Chart 4). Since then, they have fallen from 2.3% to 1.8%. In the first three weeks of 2015, observed inflation expectations averaged 1.6% (dotted line in Chart 4). If inflation expectations continue to fall, developments in the euro area could begin to mirror those in Japan and move away from the US path of anchored inflation expectations. This would augment the risk of undesirable equilibrium in the euro area. A particular risk for the euro area arises from the considerable fall in oil prices, which turned inflation rates negative in December. Falling inflation allows the inflation expectations of economic agents to diverge from the inflation target of the ECB. The decline in inflation due to the fall in oil prices must not be allowed to filter into inflation expectations in the euro area, because a change in expectations can lead to undesirable equilibrium.

The anchoring of inflation expectations is one of the key objectives of monetary policy, as inflation expectations can become self-fulfilling and lead to price developments that are no longer in line with the objective. The study concludes that the main reason why the United States avoided undesirable equilibrium and Japan did not was the difference in their monetary policy.[10] In other words, Japanese-style deflationary developments can be avoided with an active monetary policy. By examining the monetary policy in both countries at the zero lower bound we can find elements that can help monetary policy avoid prolonged deflation.

How can monetary policy help avoid Japanese-style deflation?

Apparently, on the basis of experiences in the United States and Japan, the anchoring of inflation expectations to levels consistent with the central bank's objective is key to reducing the risk of undesirable equilibrium. At the zero lower bound, it is no longer possible to use the key interest rate to increase inflation expectations, and the central bank must resort to unconventional measures. Quantitative easing (QE) was employed in both the United States and Japan to increase monetary accommodation, but the Federal Reserve also backed up its actions with forward guidance.

Quantitative easing can be understood as the central bank increasing the money base at the zero lower bound beyond levels required for conventional interest rate steering. Quantitative easing can take the form of e.g. purchases of long-term government bonds. The impact of such monetary

policy on inflation expectations is three-fold.[11]

Firstly, purchases of government bonds or other securities can increase the price of such assets and bring down their yields. This could decrease the level of interest rates in the economy more generally. Lower interest rates boost consumption and investment in the economy and increase both actual and expected inflation. This transmission channel is known as the portfolio balance effect. The effectiveness of this channel has yet to be proven conclusively, and empirical studies differ.[12]

A second transmission channel is the signalling channel, where the central bank indicates its commitment on forward guidance of low interest rates through quantitative easing.[13] Quantitative easing tied to an objective ensures that rates can stay low even when typical monetary policy rules would indicate a rate hike. The new monetary policy measure of quantitative easing shows economic agents that interest rates no longer necessarily follow the old, familiar path. The new lower path of interest rates leads to higher consumption and investments which, in turn, strengthen inflation expectations.

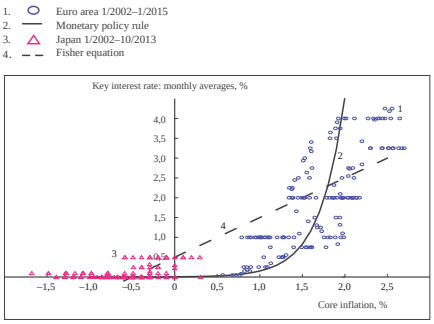
The third channel can be called the expectations channel. This uses the combined effect of monetary and fiscal policies to deter expectations of deflationary developments.[14] Quantitative easing systematically increases the money base to maintain price stability in line with a predefined objective, allowing the exclusion of price and money growth that would have to occur in the economy for deflationary developments to be possible. There are several workable combinations of monetary and fiscal policies. For example, for deflationary developments to be possible in the economy, the money base would eventually have to decrease in practical terms. By continuously increasing the money base (potentially for a very long time) the central bank signals to economic agents that a deflationary equilibrium can be ruled out.[15] This prevents the forming of expectations according to an undesirable equilibrium, allowing it to be avoided.

For the last two channels to function, quantitative easing must be credible. Merely expanding the money base will not in itself change economic agents' expectations of future inflation and interest rate developments. This is because expanding the money base is reversible. In Japan, quantitative easing began in 2001 and the money base expanded considerably, but after 2006 the money base returned close to its earlier levels. The economic agents in Japan never changed their views on future interest rate and inflation developments, probably because they felt that the monetary policy was not credible in its commitment to raising the price level. Eventually the expectations of economic agents prevailed and the central bank allowed the money base to return to levels consistent with deflationary developments.[16]

In Japan, economic agents had several reasons to question the credibility of quantitative easing. The central bank's communication did not fully support the policy, and the Bank of Japan was more concerned about rising inflation than about deflation.[17] It has been claimed that the Bank of Japan suffered a credibility problem, in particular in 1998–2003, when it tried to implement quantitative easing.[18] Because of the central bank's communication – or lack of it – quantitative easing was not expected to continue and its aims were not properly understood. Economic agents thus had no reason to change their expectations about future interest rate developments or inflation. By contrast, the quantitative easing implemented in the United States in 2010 does appear to have raised inflation expectations (see Chart 4).[19]

Chart 5.

Key interest rate and inflation in Japan and the euro area



Source: Macrobond.

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It is difficult to ascertain the final cause for the different impacts of quantitative easing in Japan and the United States. It can, however, be postulated that the differences in the implementation of quantitative easing led to different outcomes. In the United States, quantitative easing was backed up by strong forward guidance, whereas in Japan the aims and goals of the programme were not made explicit.[20]

Forward guidance enhanced the credibility of quantitative easing in the United States and led to a change in economic agents' views on future interest rate developments and inflation.[21] As a result, inflation expectations remained anchored (see Charts 3 and 4) and core inflation also eventually increased (see Chart 2). In Japan, the central bank's forward guidance and other communication did not convince economic agents of its commitment to a change in monetary policy. Hence they had no reason to change their expectations of future interest rate and inflation developments. Such circumstances make it increasingly unlikely for monetary policy to be able to stop the economy from sliding into undesirable equilibrium.

Monetary policy purchase programmes reduce risk of deflation in euro area

The kind of deflationary developments experienced in Japan are also possible in other economic areas where inflation is low and the zero lower bound limits the usefulness of key interest rates in monetary policy. Monetary policy using the key interest rate becomes passive, opening up the possibility of prolonged deflation in the economy. The likelihood of prolonged deflation grows if inflation expectations are not properly anchored. In the euro area, the likelihood of deflationary developments was higher than ever before at the end of 2014 and the start of 2015. Inflation was low, the key interest rate was at the zero lower bound and inflation expectations were waning.

The situation was similar to that in the United States in 2010. Then, the Federal Reserve deployed quantitative easing based on purchasing long-term government bonds. Japan used the same instrument in the early years of the new millennium, but with very different results. In the United States inflation rose, while in Japan it remained low.

An examination of the quantitative easing employed in the United States shows that it has the potential to reduce the risk of deflationary developments in an economy. For quantitative easing to have the desired impact on inflation and inflation expectations, however, it must be credible. The central bank must convince economic agents that it will not allow money and price developments consistent with a deflationary trend. It seems that, in Japan, quantitative easing did not bring about a sufficient change in economic agents' beliefs about future interest rate developments or inflation. It also seems conceivable that, in the United States, quantitative easing produced the desired results because the central bank was able to convince economic agents that it was prepared to do whatever it took in order to avoid deflationary developments. In this, forward guidance is an important tool.

In the euro area, a decision on quantitative easing was made in January 2015, when the Governing Council of the ECB decided on an expanded asset purchase programme. This quantitative easing also includes forward guidance on its aims and implementation.[22] Elements related to forward guidance make quantitative easing in the euro area similar to that in the United States, and unlike the quantitative easing implemented in Japan in the early years of the new millennium. The United States avoided Japan's path mainly because of quantitative easing. In the euro area, too, current monetary policy measures are making a significant contribution to reducing the risk of Japanese-style deflationary developments.

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Notes

1. For the determination of price level in typical models of monetary policy see Cochrane (2011), Woodford (2003, Chapter 2) and Eusepi (2007). ↑
2. Here the term equilibrium refers to a steady state or, more precisely, a long-term equilibrium in the model. In the literature the term is commonly used in the context of equilibrium values (or equilibrium solutions) that satisfy the conditions in the model. The real interest rate at which supply and demand in the market for goods are at equilibrium is also known as the Wicksellian natural rate of interest. ↑
3. See Benhabib et al. (2001). ↑
4. The real interest rate is defined by the Fisher equation as the difference between nominal rates and (expected) inflation: $r = i - \pi$. At the liquidity trap, nominal interest rates are at zero: $i = 0$ when, in an undesirable equilibrium, inflation has to be the negative of the market-clearing real rate of interest: $r = -\pi$. ↑
5. For example, Eggertson and Woodford (2003) mention the possibility of Japan being in a state of undesirable equilibrium as discussed by Benhabib et al. (2001). See also Evans – Honkapohja (2005) and Evans – Guse – Honkapohja (2008). ↑
6. See Bullard (2010). ↑
7. For example Lawrence Summers claimed at the World Economic Forum in Davos that the euro area was on its way to being 'the new Japan' (see http://www.bloomberg.com/news/videos/2015-01-21/europe-on-its-way-to-being-the-new-japan-summers). ↑
8. Aruoba et al. (2014). ↑
9. This is a coarse simplification on potential transmission channels. For a more detailed discussion see Krishnamurthy – Vissing-Jorgenssen (2011). ↑
10. For a critical summary of the empirical research see Thornton (2014). ↑
11. See Woodford (2012). ↑
12. Eggertsson – Woodford (2003) pp. 193–198. ↑

13. Strictly speaking, the condition is that the expectation of the total nominal government liabilities must be changed from the path expected before quantitative easing began. The total nominal government liabilities consist of public debt and the money base. ↑
14. Woodford (2012, Chapter 2) describes in detail the reasons why quantitative easing failed in Japan in 2001–2006. The key conclusion is that quantitative easing based on the quantity theory of money will not increase inflation unless it is deemed permanent. ↑
15. See e.g. a 1999 speech by the Bank of Japan's then Governor Masaru Hayami. ↑
16. Ito – Mishkin (2006, p. 165). ↑
17. For a comprehensive analysis of the impact of quantitative easing on inflation expectations, as illustrated in Chart 4, see e.g. Krishnamurthy – Vissing-Jorgenssen (2011). ↑
18. The Federal Open Market Committee (FOMC) has used forward guidance since December 2008. For a good example of the aims and transmission channels of quantitative easing see Bernanke (2010). For a summary of the communications of the Bank of Japan see Ito – Mishkin (2006). ↑
19. Getler – Karadi (2014) suggest that forward guidance has been a key element behind the effectiveness of monetary policy in the United States. ↑
20. Quantitative easing in the euro area is described in more detail in the article by Kontulainen and Välimäki elsewhere in this publication. ↑

Keywords

deflation, euro area, inflation, Japan, monetary policy, Taylor principle