

## 4 Risk of deflationary spiral and monetary policy

With the recent announcement of a programme of continuous and massive purchasing of public debt and corporate bonds (Quantitative Easing, hereinafter QE) that will continue until inflation is brought in line with the price stability target, the ECB has ended its resistance to what has been the common monetary policy response of the developed economies facing a **“debt-liquidity trap”**. That is, an economic context of **short-term interest rates very close to zero, depressed aggregate demand and excessive household, business and/or government debt**.

Situations of this kind have been very uncommon over the past century, but they have always brought highly negative consequences for the welfare of broad sectors of the population and, in all cases, they have exhibited characteristics that are difficult to understand in the conventional macroeconomic theoretical framework, making traditional economic policies inefficient in this context. Particularly before 2008, the only examples of the debt-liquidity trap were the “Great Depression” of the 1930s in the US and Europe and the “lost decade” that started in the early nineties in the Japanese economy. The 2008 financial crisis, caused by the bursting of the US real-estate bubble, once again have forced the US economy and the leading European economies to face a situation of this kind.

**QE** is an economic policy measure that, until a few years ago, was only a theoretical simulation exercise. It is specifically designed for debt-liquidity trap situations and its **aim is to contain its greatest risk, a deflationary spiral, i.e., a prolonged period of persistent, widespread deflation** (general fall in wages and prices of goods, services and assets) **and economic stagnation or slowdown**. **The need to experiment with unconventional monetary policy measures like QE arises from the fact that conventional demand policies lack effectiveness in these situations**. In monetary policy, it is impossible to reduce the benchmark interest rate as it is already close to the minimum, and the alternative of providing the banking system with unlimited liquidity is inefficient insofar as the banks use this liquidity to substitute other sources of funding, generally more costly, without easing the credit squeeze for the real economy. An expansive fiscal policy, in turn, usually exhausts its room for manoeuvre in the early phases of the debt-liquidity trap from injecting capital into the banking system and the deterioration of the fiscal balance due to the effect of the automatic stabilisers and the fall in revenues.

This article has two objectives; first, to introduce the concept of “deflationary spiral” and other closely related terms, such as “vicious circle of debt-deflation”, and second, to introduce our debt-deflation tension indicator, which aims to assess the risk of “deflationary spiral”<sup>9</sup> and to use the estimated values of this index for Japan, the US and the European Monetary Union (EMU) in a comparative analysis of the debt-liquidity trap experiences of the three economies.

### 4.1 Deflationary spiral and vicious circle of debt-deflation

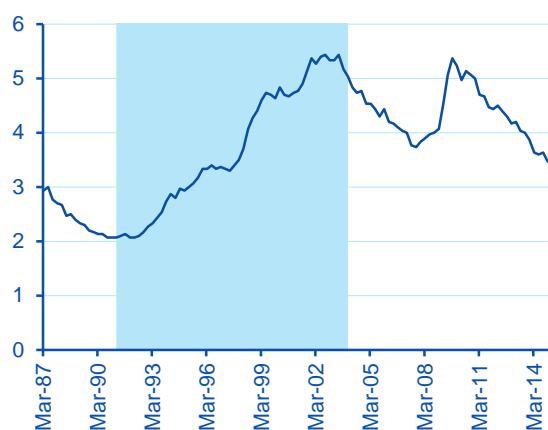
**“Deflationary spiral”** is a term coined in the 1930s by Irving Fisher, a US academic economist, to refer to the **persistent combination of deflation and stagnation in economic activity and employment** that characterised the US economy and the leading European economies in that decade (the Great Depression). It was triggered by the 1929 stock market crash and the consequent banking crisis. The contemporary example of this phenomenon is the “Lost Decade” of Japan, from 1991 to 2003<sup>10</sup>, after the real estate and stock market bubble of the late 1980s burst.

9: For a more technical explanation of this indicator and its results, see Méndez-Marciano, Cubero and Buesa (2015).

10: Shaded area in the following figures.

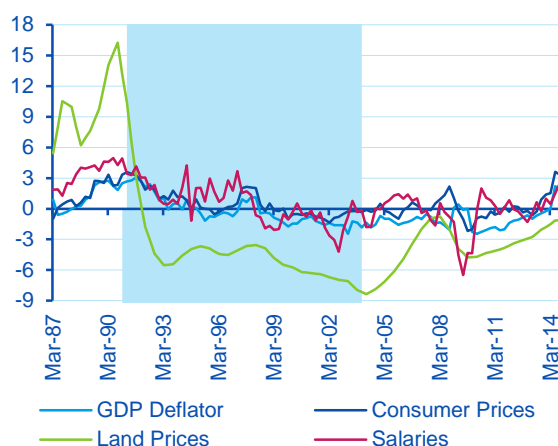
Figure 1 shows the prolonged and continual increase in Japanese unemployment during the “lost decade”, before starting an erratic recovery that, even now, remains only partial<sup>11</sup>. Figure 2 reveals that this prolonged economic slowdown has been accompanied by an initial stage in which inflation has fallen almost continually to negative levels since the mid-nineties. The price correction not only affected consumer prices; it also, and mainly, affected the GDP deflator (a more broad measure of the prices of goods and services), wages and, above all and to a greater extent, the price of real estate. The latter is a distinctive feature of **deflationary spirals in Fisher’s definition: the slow-down in prices is far more wide-spread than consumer prices would lead one to believe**. In fact, consumer prices fell less on average than other indicators during the “lost decade”. The deflation of asset prices plays the predominant role in this: notice that in the case of Japan it was greater and started sooner than the fall in wages and the prices of goods and services.

Figure 4.1  
Japan: Unemployment rate (%)



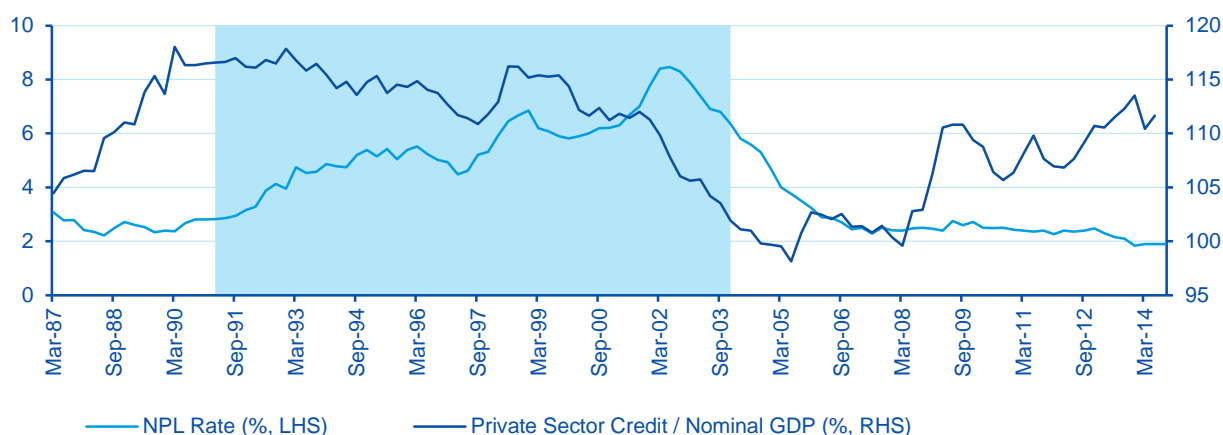
Source: BBVA Research

Figure 4.2  
Japan: Prices (% yoy)



Source: BBVA Research

Figure 4.3  
Japan: bank NPL ratio and private debt



Source: BBVA Research

11: Explaining why many prefer to talk about the two lost decades.

Finally, Figure 3 presents the third feature of a deflationary spiral: a **persistent banking credit squeeze** (in both outstanding level and new flows) and **deterioration in the debtor obligation compliance rate** (expressed as the increase in the non-performing loans ratio).

These characteristic traits led **Fisher to seek an explanation for the causes of deflationary spirals in the interaction between macroeconomic and financial variables**. The result of Fisher's analysis was his hypothesis of the "vicious circle of debt-deflation"<sup>12</sup> that has found ample support in subsequent empirical studies and theoretical development<sup>13</sup>. The latter attribute a leading role to the details of the interaction between the financial system and the dynamics of macroeconomic variables such as activity, employment and prices in explaining the phenomena of the debt-liquidity trap and the deflationary spiral.

In general, **the hypothesis of the vicious circle of debt-deflation posits that the simultaneous presence of a general fall in prices and lending are due to the causal feedback of both phenomena, propitiated by excessive net household and business debt** (normally the result of the growth and sudden bursting of an asset bubble). Specifically, **excessive private sector debt generates a slowdown in both the demand for and supply of bank lending**; in the former case because of a shift in resources from consumer spending and investment towards *deleveraging*, and in the latter because of greater provisions set aside by the banks to cover the increased risk of default. Altogether, this leads to a fall in bank lending and, in short, in the monetary multiplier. **The reduction in the monetary multiplier and aggregate demand generate general downward pressure on the price of goods and services, employment and assets** (in this latter case, reinforced by the asset selling off of businesses and households with difficulties in paying their debts). In turn, **this general fall in prices increases the net debt burden in real terms**, increasing the risk of default and forcing the private sector to rationalise its spending even further in an attempt to reduce its debt. The result is a new cycle of bank lending contraction and fall in prices, **and so on**.

Although the emphasis is laid on deflation in the original hypothesis, in modern approaches the vicious circle of debt-deflation is posited in the more general terms of the difference between expected and observed inflation. **The downward pressure on inflation arising from the vicious circle of debt-deflation generates a persistent inconsistency between current inflation and the greater inflation expected at the moment of contracting the debts**. This in turn produces an ever-increasing gap between the planned debt burden in real terms and the effective debt burden, causing defaults to spike and a greater *deleveraging* effort.

As suggested, Fisher's intuition that a mechanism of this kind was capable of generating a prolonged process of sustained deflationary spiral has been shown to be consistent with both the exploration and the theoretical simulation of debt-liquidity environments, including the most sophisticated modern exercises. The central principle of the policy recommendations that Fisher derived from his analysis has proved to be just as true: the need to drive a process of "reflation" (increase in inflation) to break the vicious circle of debt-deflation.

## 4.2 Debt-deflation tension indicator and the risk of deflationary spiral

**Using the debt-deflation theory as a starting point, an assessment of the risk of deflationary spiral must be based on monitoring credit flows and the risk of default on the one hand, and inflation, from a general and pertinent point of view for debtors, on the other**. Risk has not focused solely, or even mainly, on consumer prices (CPI), it focuses above all on what can be called "debtor prices", encompassing the price indicators that most directly affect the real severity of household and business debt burdens: the prices of the goods and services as a whole (both consumer and investment) produced within the economy

12: See Fisher (1933).

13: By way of example of the more classical and the most recent studies: in the empirical field, Bernanke (1995), Reinhart and Rogoff (2014) and Mian and Sufi (2014); in theoretical terrain: Fisher (1933), Bernanke (1983), Minsky (1986), Eggertsson and Krugman (2012), Geanakoplos (2010, 2014), and as an example of works in progress, Schorfheide, Arouba and Cuba-Borda (2015).

in question (the most general measure of which is the GDP deflator), average wages and asset prices. Thus, *ceteris paribus*, one would expect that **the lower the debtor inflation, bank lending and/or the risk of default, the more intense the vicious cycle of debt-deflation will be and, by extension, the greater the vulnerability to a deflationary spiral.**

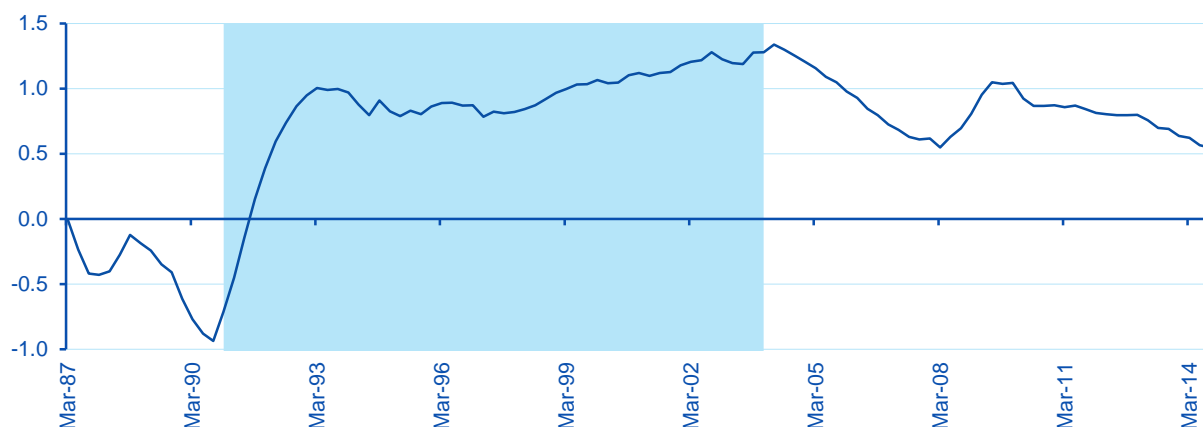
Our debt-deflation tension indicator (DDTI) is designed to do this monitoring in a simple and objective statistical way, and so helping to assess the risk of deflationary spiral in economies that find themselves in the debt-liquidity trap. If everything else remains constant, the indicator increases as debtor inflation and/or bank lending or the degree of debtor compliance falls, indicating the greater intensity of the vicious circle of debt-deflation that arises as a consequence, and the correspondingly greater vulnerability to a deflationary spiral<sup>14</sup>.

The final appendix to this article explains how the index is constructed in detail, but the interpretation of the results shown below only requires readers to bear in mind that the DDTI is a combination of two other indicators: the “*debtor inflation index*” (DII), which captures the general change in wages, the prices of goods and services, and the price of assets, and the “*bank intermediation index*” (BII), which synthesises the evolution of credit flows and the probability that debtors will comply with their commitments approximated by the “compliance rate” (one minus the non-performing loans ratio). Hence, in line with the debt-deflation hypothesis, the **DDTI will increase, indicating greater vulnerability to a deflationary spiral, as the average of the DPI and BII falls.**

#### 4.2.1 Japan’s “Lost Decade”

Figure 4 shows the quarterly debt-deflation tension indicator for Japan, reflecting its consistency with a debt-deflation interpretation of its deflationary spiral. The index rises sharply when the asset bubble bursts and remains at historical highs throughout the entire “lost decade”, that is, the period of deflationary spiral between 1991 and 2003. Although it starts to tail off, between fluctuations, after 2004, it still remains above pre-asset bubble levels. It should be pointed out that the index spiked between 1998 and 2003, insofar as it coincides with an accelerated deterioration in economic activity, unemployment and bank lending on the one hand and deflation on the other (Figures 1,2 and 3).

Figure 4.4  
**Japan: Debt-Deflation Tension Indicator**



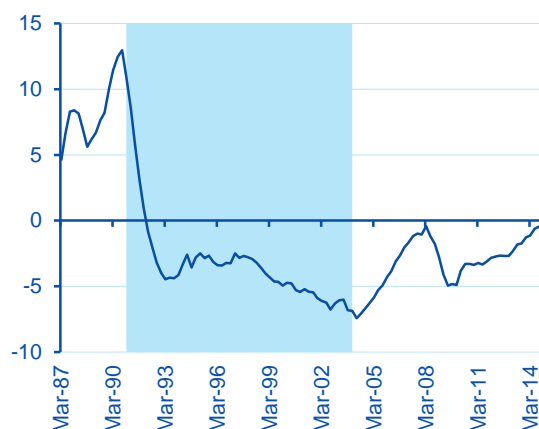
Deflationary spiral shaded area  
Source: BBVA Research

14: It is worth noting that the relative level and time path of our indicator for the different countries is highly consistent with the International Monetary Fund “deflation vulnerability indicator” (see IMF, 2003), despite the *ad hoc* nature of the latter, which, in essence, synthesises the expert opinion of a group of specialists, and the difference in the variables used in constructing each of them.

Figures 5 and 6 show the indicators that comprise the debt-deflation tension indicator for Japan. The substantial debtor deflation levels are clearly dominated by land prices (proxy for the price of assets in general), with general inflation of goods and services making a significantly smaller contribution and consumer deflation only making an even smaller one (see figure 2 again). One important fact is that while the deterioration of the debt-deflation tension indicator during the “lost decade” was the result of a similar fall in debtor inflation and bank intermediation, the recovery that started in 2004 has been driven more by the recovery of bank intermediation than by debtor inflation recovery.

Figure 4.5

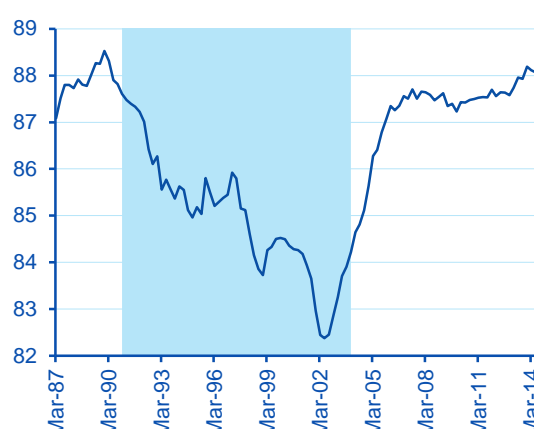
#### Japan: Debtor Inflation Indicator



Source: BBVA Research

Figure 4.6

#### Japan: Bank Intermediation Indicator



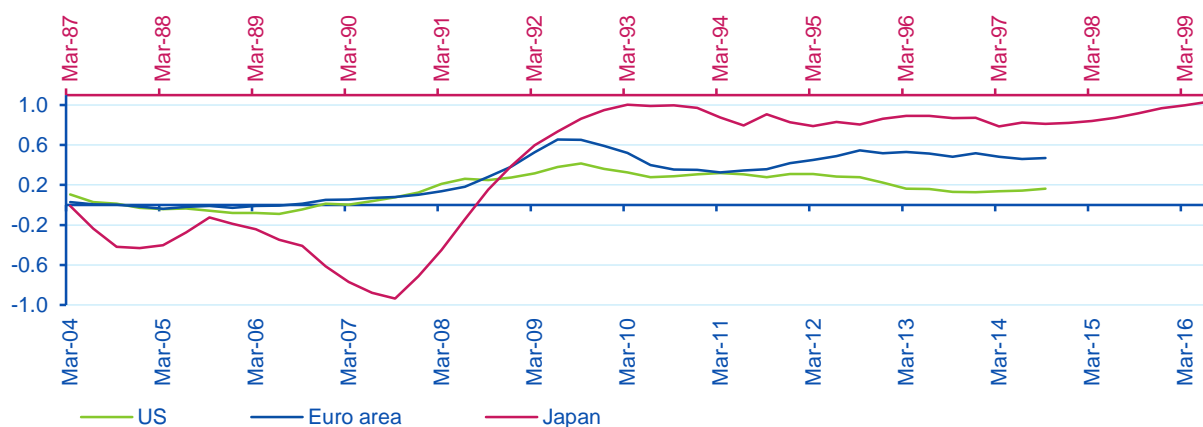
Source: BBVA Research

### 4.2.2 US and the EMU since 2008

Using the results of the Japanese case as a reference, we now analyse the evolution of the indicator and its components for the US and the EMU, economies facing a debt-liquidity trap since the 2008 financial crisis. Figure 7 shows the quarterly debt-deflation tension indicator for the two regions since 2004. This is also compared with the same indicator for Japan for the lost-decade. Until 2010, DDTI evolution was comparable in the US and the EMU economies. After a slight fall prior to 2007, when the real-estate bubble formed in the US and some peripheral economies of the EMU, the index climbed more sharply after 2007, coinciding with the start of the turn-around in the real estate bubbles. This trend continued until the middle of 2009, when it entered a downward phase that ended in the convergence of the two indicators at the end of 2010. Year 2011 was a turning point, with the US' indicator taking a different path (descending) from the EMU's indicator (ascending), both of which eventually stabilised at very different levels.

Figure 4.7

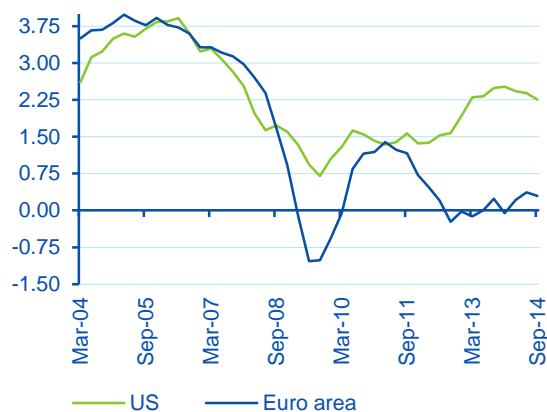
Debt-Deflation Tension Indicator: Japan (upper axis), United States, EMU



Source: BBVA Research

Figure 4.8

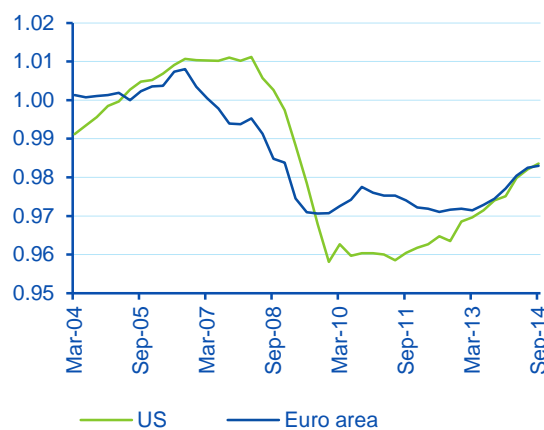
Debtor Inflation Indicator: United States, EMU



Source: BBVA Research

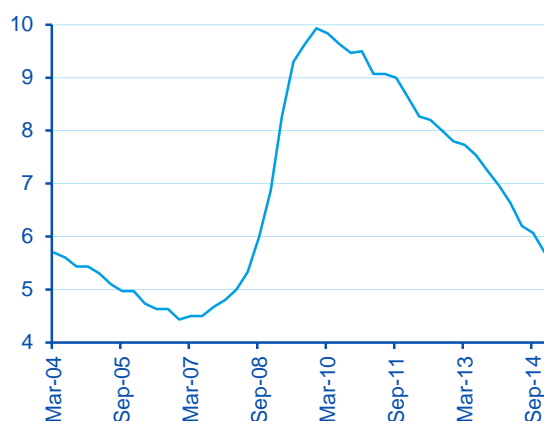
Figure 4.9

Bank Intermediation Indicator: United States, EMU



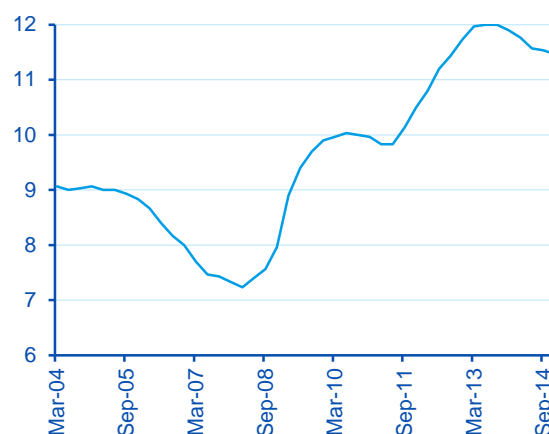
Source: BBVA Research

Figure 4.10

**US: unemployment rate (%)**


Source: BBVA Research

Figure 4.11

**EMU: unemployment rate (%)**


Source: BBVA Research

**A comparison of the US and EMU debt-deflation tension indicators with Japan, for the period around their respective bubbles burst<sup>15</sup>, shows remarkable quantitative differences given that the Japanese index is more volatile, but is also highlights noticeable qualitative similarities.** Thus, as can be seen in figure 7, in all three cases, the fall in debt-deflation tension during the formation of the bubble was followed by a climb in the indicator after the bubble burst until it reached a ceiling and then started to fall. But after this (i.e. from 2011 in the case of the US and the EMU, and from 1997 in Japan), the qualitative similarity only continued in the case of the EMU, at least until half-way through 2012. In both cases, the indicator started to spike, coinciding furthermore with a spike in the unemployment rate in both cases (see figures 1 and 11). After the second half of 2012, the EMU indicator flattened off, albeit at relatively high levels.

**Hence, the comparison of the US, EMU and Japanese debt-deflation tension indicators is consistent with the perception that analysts and monetary authorities have of a greater risk of deflationary spiral in the EMU than in the US.**

### 4.2.3 Some Eurozone countries

An analysis of the Eurozone aggregate hides the pronounced differences between the different economies of the zone and, especially, between the two largest economies and the peripheral economies. The differences between the States that comprise the Union in the case of the US, or the Japanese Prefectures, have to be reduced as they form part of full-fledge monetary unions: with the same political unity and also with integrated economic demand policies and supply regulations. The situation is very different in the EMU, as seen from the difficulties they have had in managing the sovereign debt and banking crisis. It therefore seems important to analyse the different economies within the EMU.

Figures 12 and 13 show the debt-deflation tension indicator for the five main EMU economies. A great variability can be observed both in the recent levels of the indicator and in its historical evolution. Stand out the high levels and volatility of the indicator for the “peripheral” economies, Spain and Portugal. In fact, they are not far below the Japanese indicator at the peak of its “lost decade” (1993-97). Also the low levels of France and Germany, to the point that, for Germany, the indicator has remained in negative territory in

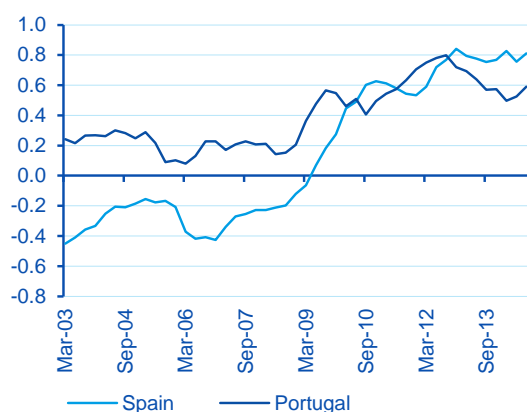
15: The bubble started to burst around 1991 in Japan, and around 2007 in the cases of the United States and the peripheral economies of the EMU affected.



recent years. These are historically low levels that are comparable with the evolution of Japan's indicator during the formation of its real-estate and stock-market bubble.

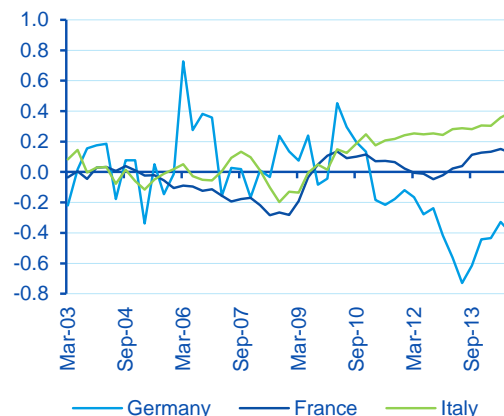
From this perspective it becomes clear that the focus of vulnerability to the risk of "deflationary spiral" in the EMU is concentrated in some of the "peripheral" economies<sup>16</sup>.

Figure 4.12  
Debt-Deflation Tension Indicator: Spain and Portugal



Source: BBVA Research

Figure 4.13  
Debt-Deflation Tension Indicator: Germany, France and Italy



Source: BBVA Research

### 4.3 Debt-Deflation Tension Indicator and Quantitative Easing (QE)

The differences in the EMU with respect to debt-deflation tension and the risk of deflationary spiral faced by the different member states, along with the institutional peculiarities of the EMU, help to explain the differences between the European Monetary Union and the US (or UK) with regard to their monetary and fiscal policy responses to the effects of the financial turbulence that they experienced in 2007-08 and the consequent debt-liquidity trap (close-to-zero interest rates, depressed demand and over indebtedness).

These differences include the role of Quantitative Easing (QE), understood as the purchase of both public and private-sector assets by central banks in secondary markets. Whereas QE has been used continually and massively in the US and the United Kingdom, since almost the beginning of the crisis, and always aimed at achieving monetary policy objectives, in the EMU its use has been more restricted and started later, with limited purchases of minimum-risk private sector assets with strong collateral guarantees or the acquisition, also limited, of peripheral public-sector debt at the times of maximum tension in the sovereign debt market.

**The greater relative weight of the financial markets in the intermediation process in US and the UK compared with the EMU's high dependency on bank lending explains, to a certain extent, the differences in the ways the Fed and the Bank of England on the one hand, and the ECB on the other, acted.** The ECB preferred to focus on providing the banking sector with liquidity, sometimes on the condition that it eased the credit squeeze to the private sector, but always at low cost and in sufficient volumes to defray funding restrictions in other segments. But, this divergence of opinion has recently taken a new turn with the announcement made by the ECB in January 2015 of the start of a programme of massive purchases of both public and private-sector financial assets in the secondary markets oriented to bringing inflation to around 2%. Initially, the programme will run until 2016, but it has already been announced that it will be extended if the desired inflation target has not been met by then.

<sup>16</sup> It should be taken into consideration that, even in the case of the Great Depression in US or the "lost decade" in Japan, there were significant regional differences in both prices and economic activity and employment. See for example, Rosenbloom and Sundstrom (1999) and Ishikawa and Tsutsui (2013).



This turnaround is understandable in the light of the positive performance of the debt-deflation indicator in the case of the US<sup>17</sup> in parallel with a rapid recovery of economic growth and employment, in contrast with the relatively high levels of the indicator in the EMU aggregate, especially in some peripheral economies, along with a very slow recovery of employment and aggregate economic activity and signs of recession or stagnation in large economies like Italy and France.

#### 4.4 Conclusions

**The intense financial turbulences experienced by US and Europe in 2007-08 led these economies into “debt-liquidity traps”:** the confluence of depressed demand, short term interest rates close to their lower limit of zero and excessive household, business and/or government debt. The only precedents for situations of this kind are the “Great Depression” of the 1930s in US and some European economies and the “Lost Decade” of Japan from the early 1990s to the early 2000s. **The greatest danger of the trap is a “deflationary spiral”: a prolonged process of generalised deflation, deterioration of financial intermediation and economic stagnation.** The advances made in the study of the “debt-liquidity trap” and the associated phenomenon of “deflationary spiral” put the debt-deflation hypothesis at the centre of the explanations of both phenomena and thus as an essential component in designing efficient economic policy responses in this context.

**This article has presented a new indicator aimed at assessing the risk of “deflationary spiral”.** The construction of the indicator is statistically objective and strictly grounded in the debt-deflation hypothesis. An analysis of the historic evolution of this indicator for Japan, US and some of the EMU economies shows that the debt-deflation hypothesis is a consistent explanation of the deflationary spiral that characterised the Japanese economy’s “lost decade” and highlight the differences between the responses and evolution of the US and EMU economies after the 2008 crisis. In fact, it shed light on the recent turn-around in EMU monetary policy with the announcement in January 2015 of a massive, open-ended programme of public and private-sector asset buying by the ECB.

#### 4.5 References

- Bernanke, Ben (1983): “Non-monetary effects of the financial crisis in propagation of the Great Depression”, *American Economic Review*, 73(3).
- Bernanke, Ben (1995): “The macroeconomics of the Great Depression: A comparative approach”, *Journal of Money, Credit, and Banking*, 27(1).
- Eggertsson, Gauti and Paul Krugman (2012): “Debt, deleveraging, and the liquidity trap: A Fisher-Minsky-Koo approach”, *Quarterly Journal of Economics*, 127(3).
- Fisher, Irving (1933): “Debt-Deflation Theory of Great Depressions”, *Econometrica*, 1(4).
- Geanakoplos, John (2010): “The leverage cycle”, published in NBER Macroeconomic Annual 2009, 24.
- Geanakoplos, John (2014): “Leverage, default, and forgiveness: Lessons from the American and European Crises”, *Journal of Macroeconomics*, 39(Part B).
- IMF (2003): “Deflation: determinants, risks, and policy options—Findings of an inter-departmental task force.” (approved by Kenneth Rogoff), International Monetary Fund, April 2003.
- Ishikawa, Daisuke and Yoshiro Tsutsui (2013): “Credit crunch and its spatial differences in Japan’s lost decade: What can we learn from it?”, *Japan and the World Economy*, 2013, 28(Issue C).

---

17: Although they are not shown in the article, we have estimates of the indicator for the United Kingdom and other countries. As in the US case, the UK indicator shows a highly positive evolution after the financial crisis.

Kiyotaki, Nuhhiro and John Moore (1997): "Credit cycles", *Journal of Political Economy*, 105(2).

Méndez-Marciano, Rodolfo; Julian Cubero and Alejandro Buesa (2015): "Deflationary spiral and the debt-deflation vicious circle: A canonical correlation analysis". Forthcoming in BBVA Research Working Papers Series.

Mian, Atif and Amir Sufi (2014): "HOUSE OF DEBT", The University of Chicago Press.

Minsky, Hyman (1986): "STABILIZING AN UNSTABLE ECONOMY", Yale University Press.

Reinhart, Carmen and Kenneth Rogoff (2014): "Financial and Sovereign Debt Crises: Some Lessons Learned and Those Forgotten", published in "Financial Crises: Causes, consequences and policy responses", edited by: S. Claessens, M.A. Kose, L. Laeven and F. Valencia.

Rosenbloom, Joshua and William Sundstrom (1999): "The sources of regional variation in the severity of the great depression: Evidence from U.S. manufacturing, 1919-1937", *Journal of Economic History*, 59(3).

Schorfheide, Frank; Boragan Arouba and Pablo Cuba-Borda (2014): "Macroeconomic Dynamics Near the ZLB: A tale of two countries", PIER Working Paper 14-035.

#### 4.6 Appendix: Construction of the Debt-Deflation Tension Indicator

The debt-deflation tension indicator (DDTI) is designed to supplement the weighted average of the debtor inflation indicator (DII) and the bank intermediation indicator (BII), i.e.:

$$DDTI = 1 - (DII + BII) / 2,$$

So it rises as the debtor inflation indicator (DII) and/or the bank intermediation indicator (BII) falls.

The debtor inflation indicator (DII) is constructed from a weighted average of: the GDP deflator variation rate, average wage variation rate and the average real-estate price variation rate.

The bank intermediation indicator (BII) aims to capture the flow of lending and the degree of debtor compliance from a weighted average of certain financial indicators for which there is homogeneous and widely available information internationally. In accordance with this objective and these criteria, we decided to construct the BII as the weighted average of the following variables: flow of new bank credit to households and businesses (as a percentage of nominal GDP), directly associated with financial intermediation and the monetary multiplier, and the "punctuality rate" (PLR), which is merely the opposite supplement of the conventional NPL ratio (NPLR), an indicator associated with the probability of non-compliance, i.e.,  $PLR = 1 - NPLR$ .

The weighting to be used in constructing the weighted averages that define the bank intermediation indicator (BII) and the debtor inflation indicator (DII) is of critical importance. First and foremost, three criteria must be met: i) the indicators have to be consistent with the debt-deflation theory, which requires a positive or direct correlation between the two indicators (a rise in one of them should be associated with an increase in the other); ii) they must be statistically objective; and iii) simple to calculate.

To meet the criteria, the weighting uses canonical correlation analysis (CCA). This technique enables us to analyse the relations between two sets of variables, in our case, the variables that comprise the debtor inflation indicator (DII) on the one hand, and the variables that comprise the bank intermediation indicator (BII) on the other. In particular, the technique enables us to find the weights or coefficients that combine each group of variables linearly but separately, in such a manner that the two linear combinations are as closely correlated as possible.

However, these weights or coefficients will act as the foundation for constructing our DPI and BII indicators only if they all bear the same signs, because this is the only way to guarantee that our interpretation of these indicators as proxies of debtor inflation and financial intermediation is valid. At the same time, if the weights do bear the same sign, this will be the first positive test of the debt-deflation theory.

Having met the condition of bearing the same sign, the coefficients, standardised in each case to add up to one, are used to calculate the weighted averages that define the DPI and BII. Finally, the resulting indicators are standardised by dividing them by their average prior to the debt-liquidity trap (and the preceding financial crisis or bubble). The DDTI is constructed by subtracting the weighted average of the DPI and BII from 1, where everything is standardised to the average value prior to the asset bubble and/or financial crisis that preceded the debt-liquidity trap, thus permitting a comparison of the values of the three indicators between countries.

**DISCLAIMER**

This document has been prepared by BBVA Research Department, it is provided for information purposes only and expresses data, opinions or estimations regarding the date of issue of the report, prepared by BBVA or obtained from or based on sources we consider to be reliable, and have not been independently verified by BBVA. Therefore, BBVA offers no warranty, either express or implicit, regarding its accuracy, integrity or correctness.

Estimations this document may contain have been undertaken according to generally accepted methodologies and should be considered as forecasts or projections. Results obtained in the past, either positive or negative, are no guarantee of future performance.

This document and its contents are subject to changes without prior notice depending on variables such as the economic context or market fluctuations. BBVA is not responsible for updating these contents or for giving notice of such changes.

BBVA accepts no liability for any loss, direct or indirect, that may result from the use of this document or its contents.

This document and its contents do not constitute an offer, invitation or solicitation to purchase, divest or enter into any interest in financial assets or instruments. Neither shall this document nor its contents form the basis of any contract, commitment or decision of any kind.

In regard to investment in financial assets related to economic variables this document may cover, readers should be aware that under no circumstances should they base their investment decisions in the information contained in this document. Those persons or entities offering investment products to these potential investors are legally required to provide the information needed for them to take an appropriate investment decision.

The content of this document is protected by intellectual property laws. It is forbidden its reproduction, transformation, distribution, public communication, making available, extraction, reuse, forwarding or use of any nature by any means or process, except in cases where it is legally permitted or expressly authorized by BBVA.

This report has been produced by the Economic Scenarios Unit:

### Chief Economist for Economic Scenarios

Julián Cubero  
juan.cubero@bbva.com

Rodrigo Falbo  
rodrigo.falbo@bbva.com

Rodolfo Mendez Marcano  
rodolfo.mendez@bbva.com

Sara Baliña Vieites  
mariasara.balina@bbva.com

Diana Posada Restrepo  
diana.posada@bbva.com

Alejandro Buesa Olavarrieta  
alejandro.buesa@bbva.com

Alberto Ranedo Blanco  
alberto.ranedo@bbva.com

## BBVA Research

### Group Chief Economist

Jorge Sicilia Serrano

#### Developed Economies Area

Rafael Doménech Vilariño  
r.domenech@bbva.com

##### Spain

Miguel Cardoso Lecourtois  
miguel.cardoso@bbva.com

##### Europe

Miguel Jimenez González-Anleo  
mjimenezg@bbva.com

##### US

Nathaniel Karp  
Nathaniel.Karp@bbva.com

#### Emerging Markets Area

Alicia García-Herrero  
alicia.garcia-herrero@bbva.com

##### Cross-Country Emerging Markets Analysis

Alvaro Ortiz Vidal-Abarca  
alvaro.ortiz@bbva.com

##### Asia

Le Xia  
le.xia@bbva.com

##### Mexico

Carlos Serrano Herrera  
carlos.serranoh@bbva.com

##### LATAM Coordination

Juan Manuel Ruiz Pérez  
juan.ruiz@bbva.com

##### Argentina

Gloria Sorensen  
gsorensen@bbva.com

##### Chile

Jorge Selaive Carrasco  
jselaive@bbva.com

##### Colombia

Juana Téllez Corredor  
juana.tellez@bbva.com

##### Peru

Hugo Perea Flores  
hperea@bbva.com

##### Venezuela

Oswaldo López Meza  
oswaldo.lopez@bbva.com

#### Financial Systems and Regulation Area

Santiago Fernández de Lis  
sfernandezdelis@bbva.com

##### Financial Systems

Ana Rubio  
arubiog@bbva.com

##### Financial Inclusion

David Tuesta  
david.tuesta@bbva.com

##### Regulation and Public Policy

María Abascal  
maria.abascal@bbva.com

##### Recovery and Resolution Strategy

José Carlos Pardo  
josecarlos.pardo@bbva.com

##### Global Coordination

Matías Viola  
matias.viola@bbva.com

#### Global Areas

##### Economic Scenarios

Julián Cubero Calvo  
juan.cubero@bbva.com

##### Financial Scenarios

Sonsoles Castillo Delgado  
s.castillo@bbva.com

##### Innovation & Processes

Oscar de las Peñas Sánchez-Caro  
oscar.delaspenas@bbva.com

## Contact details:

### BBVA Research

Paseo Castellana, 81 – 7th floor  
28046 Madrid  
Tel.: +34 91 374 60 00 y +34 91 537 70 00  
Fax: +34 91 374 30 25  
bbvaresearch@bbva.com  
[www.bbvaresearch.com](http://www.bbvaresearch.com)  
Legal Deposit: M-31256-2000