

# The Deflationary Tendencies of the Economic Systems in the Case of a Financial Crisis

Giovanni Antonio Cossiga<sup>1\*</sup>

<sup>1</sup> Presidente sindaci Policlinico Umberto I, Università degli Studi “Sapienza”, ROMA, Italy

\* Giovanni Antonio Cossiga, E-mail: g.cossiga@alice.it

Received: August 30, 2016      Accepted: September 5, 2016      Online Published: September 13, 2016

doi:10.22158/rem.v1n2p75      URL: <http://dx.doi.org/10.22158/rem.v1n2p75>

## **Abstract**

*The essay would like to explore the subject of instability, within an economy struggling with a speculative bubble and a financial crisis. In this context, the instability is showing its ambiguity, therefore showing poor growth and low inflation: thus it's giving a self-portrait of an apparent regularity. However, the possibility to find away to measure this distortion can allow us to certify that an unstable condition is affecting the economic system, even when the main variables are ambiguous. To this purpose, we should examine carefully the inflation trend that, in the case of a pre-financial crisis, is showing a clear tendency to deflation and therefore, has a profile which is inconsistent with the main variables. By the use of self-regressive equations, we will be able to review the trends of the main macro-variables within those countries affected by the recent financial crisis.*

*Therefore, we seek confirmation that the phenomenon regarding the ambiguous inflation trend (tendency to deflation) in relation to the economic cycle (limited growth) should be general, in the case of speculative bubbles spreading worldwide, as in the past ten years. If so, the sharp correction induced by the financial crisis perhaps could resolve the ambiguity showed in the performance of two variables, the Inflation and the GDP. We can assume that after the financial crisis blows, during the following years those two variables have got a more harmonious relationship, thanks to the instability correction system started by the deep economic depression. We tried to confirm this setting with the same number of self-regressive equations, with positive results for those countries that had already taken the way of a gradual return to stability. Finally, on the basis of this research experience, we have tried to build an Instability Index, as shown in the Appendix: this index has been calculated for many Western countries and for the Far East, as well.*

## **Keywords**

*deflation, instability, financial crisis, speculative bubble*

## 1. Introduction

We must consider the economic system instability as a specific state or even a sub-world where the economy falls when it's derailing from the stability path, which should be its natural state if and when not affected by internal or external shocks. The economic system derailment from the stability natural way, is generally due to human errors, which during the time will alter the relationship otherwise harmonious in its unfolding of the main variables. Because the world history is made of human errors—from the worst among disasters as the war, until all kind of adversities such as public affairs management conducted with selfish and one-sided ends—it is quite clear that the systems natural stability is quite rare and therefore the economic systems unstable condition is almost the norm, regardless of geographical area or time.

We are so used to the unnatural and altered conditions of the instability sub-world that, by a common experience habit, we feel those conditions as normal. An anomaly, a real “*trompe-l'oeil*” influencing even the knowledge of the economic environment, because the risk is to attribute the instability sub-world typical behaviours and scenarios to the economic systems normal evolution. However, there is a loophole because when the economy becomes unstable for a long time, the natural economic development performances are declining to become negative, the inflation grows beyond the limits considered normal and the deflation is appearing with all its dangerous effects. As if to say, that the economic system is giving the alert and then all of us are worrying about adverse conditions.

Our knowledge of the instability—including inflation, deflation, economy cycle alternations, boom and financial crises—moves back when facing the somehow unknown economy stability natural world. Stable economy essentially means an ideal situation, untouched by internal shocks, free from monetary phenomena, such as inflation and deflation, yet unscathed by the economic progress cyclical rhythm, subject to a linear development process whose inclination (economy rhythm growth) is fairly constant over the time and depends on its potential within a specific historical period. Therefore, the world natural stability seems so anachronistic and utopian, though it is immanent and also significantly affecting the instability sub-world for the unavoidable natural tendency to the economic systems stability, regardless of the time and space conditions.

This important influence on the tendency to stability is the essential paradigm, justifying the potential temporary nature of the unstable condition. From this natural tendency is coming the dissatisfaction invading all of us, when unconsciously feeling that economic things could have been better. In any case, all the warnings given by the unstable condition, such as inflation, deflation, cycles rhythm, are the economy unnatural state symptoms. Similarly, symptoms of the economy malaise are also the natural mechanisms that can repair the anomalies, gradually allowing the affected system to find the stability condition.

In other words, inflation, deflation, and finally the cyclic rhythm, can be considered as therapeutic tools, such as medicines bitter and deeply painful in social terms, but necessary to restore the altered systems towards the stability natural stage. It's remarkable that as a result of human errors, the therapy is

refused because bitter while instead should be avoided any naive attempt to force the development and evolution of the economies mechanisms, which are responsible for derailing from the natural path.

For the same reason (it isn't advisable trying to subvert the economy natural order), it becomes important not to contrast directly and abruptly the natural correction, by trying to stem deflation and economy depression, i.e., high inflation and negative growth, which indeed are simply the hard payment due for serious errors committed in the past. We cannot deny that some manoeuvres of fiscal and monetary policy could be successful, but it should always be avoided a direct interference with the correction system natural functioning. In any case, it must be clear that these manoeuvres, even when successful always leave a legacy, e.g., increase in public debt which we will have to face sooner or later.

In this essay we examine the extreme instability condition, leading economic systems to accelerate not the price system and inflation but the commerce emphasis in specific sectors, such as the Stock Exchanges and the residential housing market. Recent experience from the middle of the previous decade is examined to monitor the behaviour of certain variables that have a peculiar behavior, considering the severe excitement state otherwise concerning the economic activity.

In the same way of inflation and deflation, even the speculative boom paradoxical excitation must remain within the instruments complex that the economic system, in its structural tendency to stability, put in place to clean the affected system. In fact, we should assume that the speculative bubbles such as those experienced in the first decade of the new millennium, are only the final stage of a long-term instability process. In other words, the economy is recovering from prolonged actions counteracting the normal deployment of natural remedies, with the result that the system instability is extended over the time up to deform reality, as in the case of a speculative bubble.

With extreme synthesis, we could say that all the anomalies of an economic system, fallen into the instability sub-world, are demanding for a significant correction measure. In general, the correction of the instability state is involving a more or less long phase of a system suffering with the real economy recession. All precautions, starting from the cycle, till the inflation and deflation or speculative boom-financial crisis, have the common goal to force the system to have a pause in the economy development trend path. A corrective pause which, along the lines of Joseph Alois Schumpeter's creative recession, should achieve the excesses elimination and should induce the system rebalancing towards a sustainable development direction.

The research is showing results that seem to confirm the serious deterioration in the relationship between the main variables as well as the natural correction model capability to bring back, gradually, to the harmony and correlation of the main variables performance. Finally, in the Conclusion has been elaborated on the basis of the research data, an Instability Index: this index, applied to the main West and the Far East countries, is showing some appreciable information on the instability degree affecting an economic system.

## 2. Method

### 2.1 *Anomalies within an Unstable Economy: The Relationship between Economic Cycle and Inflation*

Globalization is proving to be a powerful instrument to reorganize the economic hierarchy among the continents, excluding (for how much longer?) Africa. However, there is a dark side in this process. The economic growth strong acceleration in some countries, especially in Asia, is unprecedented but carries a great and heavy amount of serious unbalances. Instability at the continental level is reflected in world trade and is condensed by high surplus (particularly China) and macroscopic unbalances with foreign countries (see the United States). Similarly, Europe seems to be dressed as a sort of Harlequin, with Germany in consistent and repeated surplus in its current account and Greece in potential default, while a long financial crisis continues to stop the development in Italy, Spain and Portugal. A well known instability scenario, openly recognized worldwide at the highest cultural and political level.

Let us be clear. The economy stability cannot and shouldn't mean that the economic systems can follow a growth and development process, linking countries and continents in a somehow similar growth. The development potential of an area or a country is depending on innumerable circumstances, such as resources availability, innovation capacity, culture and wealth distribution, entrepreneurial skills, social and political conditions and so on. The economy stability can ensure a growth level, compatible with its potential, and also the absence of disturbance factors along the development line, generally rectilinear with a nearly-constant trend. These disorder factors have some peculiar monetary expressions, such as: inflation, deflation, speculative bubbles with their impact on international trade, starting from the national currencies revaluation and devaluation, causing alteration on the level and quality of exchanges.

The recent phenomenon, which has extended worldwide the bubble speculative potential in the second half of the years 2000, does have a reasonable justification, though not so much in the altered international relations (which are indeed the consequence). Rather, the "contagious" effect has spread in the context of unstable economic systems or become so due to the influence of neighboring countries or due to finance and speculative capital. On the other hand, it cannot be excluded that the extension of the recent speculative phenomenon over the various continents, should be attributed to the same natural mechanism pushing the systems towards the economic process stability. In the sense that the extension of the instability phase in the major countries can provoke the challenge of new and even more widespread instability, yet forcing families, businesses and governments to more correct practices in their economic relations, under the lash of the financial crises, recession and deflation devastating effects.

Before continuing, it seems useful an outline of the instability correction system possible running rules, autonomously activated by the economic systems, to ease tensions investing unstable economies. And how we got at this point? Over the time, economic systems have always shown a natural tendency to stability, the ideal state for economic development. A natural tension which, in any time and all geographic areas, is able to configure the systems to correct human errors in economy that, in the

constant history storm, are the economy instability engine. *How to justify otherwise our endless evolution road, despite there current human errors in the history?* Well, if the systems naturally would converge towards stability, we have to admit that this particular quality is achieved for *the unusual natural ability, intrinsic inside the systems, to correct the accumulated errors*. The correction, however, is not free of charge, because is requiring “blood and tears” for a return to the economic stability natural state.

According to this interpretation, we can correctly argue that the anomalies occurred during the period when the bubble is formed and inflated inside those highly unstable systems, could be interpreted as the *starter* of a natural strategy aiming to restore the normality in the altered system. As to say that the error persistence and the inability to limit the obvious factors of unstable system, would require—though this may appear absurd—the bubble irrational mess, and then the bitter financial crisis finally correcting the error. *Ergo*, the bubble “trompe-l’oeil mechanism”, once started, wouldn’t be limited otherwise then through a financial crisis.

Therefore, the speculative bubbles recurrence, e.g., in the United States over the last decade, could be considered as a *natural* outcome of the anti-crisis operations, relatively efficient at least in appearance in giving strength to recovery. However, over the time they may compromise the system complete correction because of the lack of a full financial crisis. In other words, the anticipated economic recovery after a serious financial crisis may just leave unresolved, at least in part, the economic system instability. Therefore, the correction natural mechanism would charge a new and more engaging, speculative spiral that will cause a new financial crisis of unexpected proportions (Note 1).

Since instability is an unnatural condition weakening the economic system efficiency, it is unavoidable the transmission of the anomaly to the economic cycle and, by this way, to the price system. Although it may seem peculiar, within an unstable system struggling with as speculative bubble, the economy barometer remains weak, exception made for the acceleration in the speculation area (Note 2). Indeed, if we do not consider the speculative trend temporary dividend, which will be swept away by the crisis, the real economic growth during the speculation impact phase is weak or any way in acreeeping recession. It is for this reason that prices tend to move paradoxically in contrast with the movement of those sectors activated by the speculative bubble, and therefore they’re reflecting a creeping deflation.

Regarding the relationship between economic cycle and inflation, it is important to underline that in the unstable economic system, particularly when affected by speculative bubbles, *it is established a slavish relationship between the economic growth development and the nominal price profile*. In such unstable environments, it’s the economy real trend, somehow recessive, to affect the inflation trend in slow decline. Notwithstanding, during the phase of speculative excitement it may occur a real growth data alteration, pushing upward the relative GDP values. During this irrational phase, there is in fact a relative indifference of the price system towards the speculative excitement affecting some sectors of the economy. Only when the speculation emphasis is about to reach its peak, the speculative pressure is

modestly reflected on the prices, which are therefore marking a modest increase.

I would like to draw to your attention that, in recent experience, the characteristic phenomenon of slavish (low) inflation trend compared to the weak growth trend, is invariably repeated in those economies subject to extreme instability. This phenomenon doesn't occur in the economic realities that resist to the contagion of speculative bubbles, though acting within contexts more or less contiguous. The link, which is exclusive and characteristic, between the real economy and inflation is led as a reaction to the instability persistence. Therefore, this relationship is attenuating and gradually vanishing when the system, after due correction, has returned to the almost-stability normal condition. In other words, when a system falls into instability, *the concatenated trend of the economy cycles and the cyclical inflation in a slavish position, can be considered as an indicator, efficient enough, about the economy altered state.*

At this point, it can be useful—just to visually appreciate the intimate relationship between the economy and the inflation—to have a look at the figures of the two variables in some countries during the irrational pre-financial crisis. The comparison in graphic form is then extended too other two countries that were affected only and just as a reflection by the speculative turbulence and then by the crisis: these are large exporter countries, who have suffered for the vicissitudes of international trade. Afterwards, we have the figures relating to the inflation and GDP performance in the period 2002-2008, based on quarterly data for Spain and Greece, two countries subject to the speculative bubble in the real estate sector. Finally, other two countries: Germany that contained their rational exuberance and Korea essentially not involved.

*Inflation and GDP trends in Greece and Spain during the period January 2002-June 2008 (% change on previous quarterly period).*

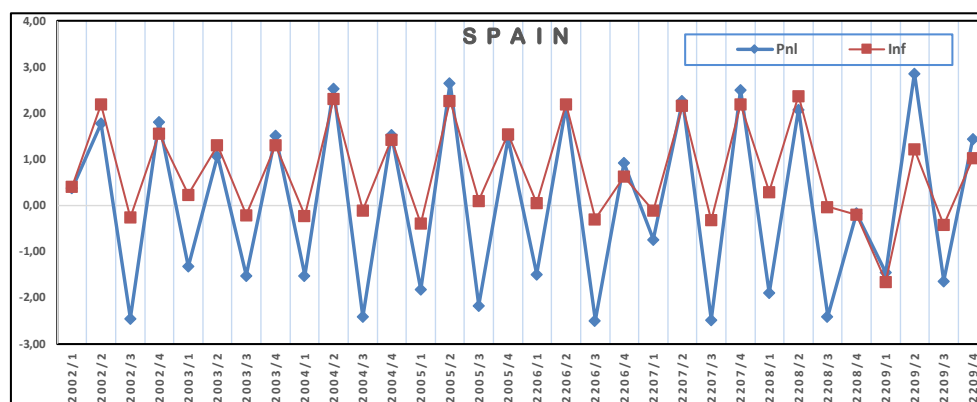




Figure 1. Elaborations on OECD data from “OECD. Stat Extracts”

*Inflation and GDP trends in Germany and Korea during the period January 2002-June 2008 (% change on previous quarterly period).*

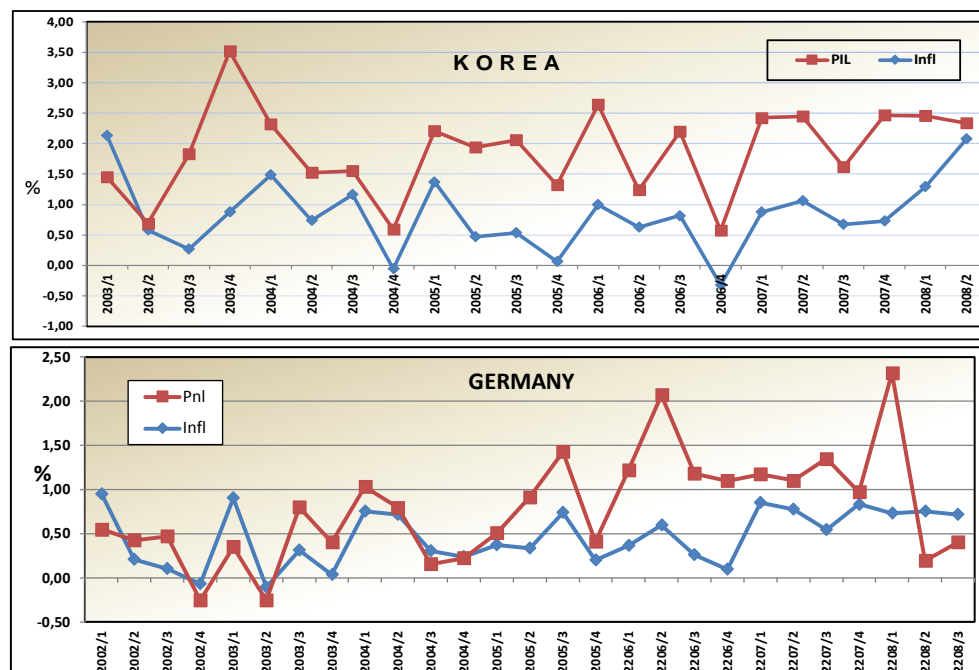


Figure 2. Elaborations on OECD Data from “OECD. Stat Extracts”

From Figure 2 is emerging clearly the close and diastolic link tying the two variables in the case of Spain and Greece, countries that have experienced a strong speculative boom, then collapsed into as ever financial crisis. The same evidence is almost absent in the case of Korea, essentially not involved in the bubble, while it's just partial in Germany, which has been much less sensitive to the irrational call (Figure 2). Therefore, what to say about it?

We must note that the phenomenon of the intimate relationship between inflation and GDP is always present in the case of unstable economic systems *subject to inflation*, as in the seventies, *as well as to deflation*, like in Japan and recently in the West. We must add that the cyclical inflation,

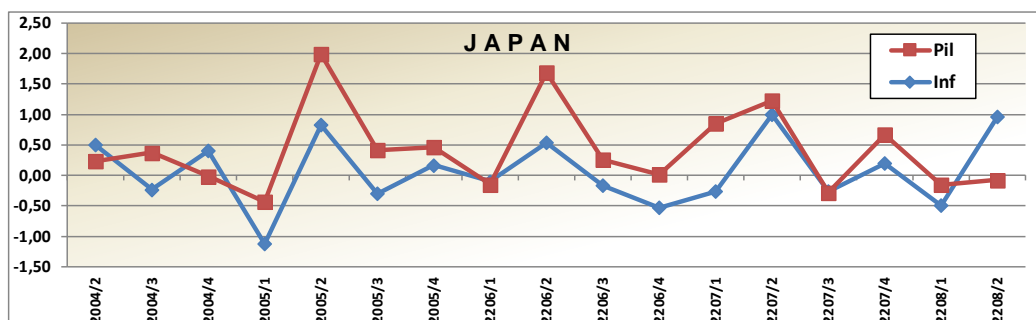
depending on the economic trend, is modulating the structural inflation or deflation profile (which is accumulated in the system with the unstable state persistence). This is creating a direct relationship between the whole inflation or deflation (structural + cyclical) and the GDP.

For reasons to be analysed later, a peculiar feature of the pre-financial crisis stages the creeping tendency towards economic systems deflation. Paradoxically, then, in the pre-crisis phase, despite the speculative excitement, there is a gradual inflation decline, so tending to the zero level. This progressive weakness of structural inflation is drawing the systems to the anomalous zero cyclical inflation or anyway very low, which is in fact recorded on the financial crisis eve. This structurally low inflation then will facilitate strong deflation emergence, when the recession will hurt the economy.

These peculiarities of the stage before the financial crisis—namely, a tendency to deflation and an intimate relationship between the GDP profile and inflation (low)—strangely can be found with a few changes also in the economic systems afflicted by a heavy burden of public debt. In general, when the public debt has reached and passed the 90-100 in terms of GDP, we can see a weakening of the economy potential growth, together with a marked tendency to deflation (Note 3). Here under are presented the Figures showing the two variables trend—inflation and GDP—for the period from early 2002 to mid-2008, based on quarterly data, for the two countries that have accumulated large stock of public debt, Japan and Italy.

As we can read from the Figure 3, the relationship between the two variables does not reach, in the case of Japan and Italy, the breath-taking level observed in the case of Greece and Spain: not with standing there is no doubt that even in these cases, the relationship taking place between the two variables is strong, though some how discontinuous. Even more tenacious is the deflation tendency occurring in both scenarios, without substantial differences. On average, inflation in the period 2002-2008 stands around 3% in Spain and Greece, around 0.3% in Japan and slightly above 2% in Italy.

*Inflation and GDP trends in Japan and Italy in the period January 2002-June 2008 (% change on previous quarterly period).*





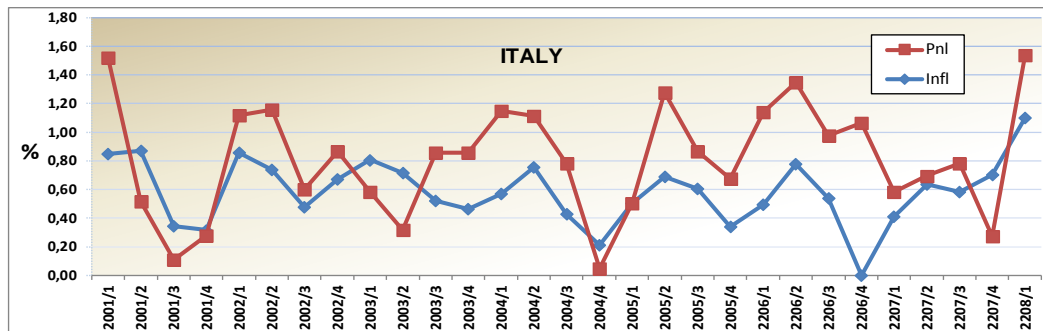


Figure 3. Elaborations on OECD Data from “OECD. Stat Extracts”

In both cases, unstable economies struggling with speculative bubble or countries with high public debt, the altered systems are showing a marked tendency to deflation. Why? The deflationary trend seems to be related objectively to the intimate relationship developed between *GDP performance and inflation cycle*. The intimate relationship between these two variables implies that the economy and the inflation (or deflation) cycles are moving in parallel and almost in sync. Based on quarterly data, within an unstable system we can witness the emergence of mini economic cycles—completed from a peak to another in around one year—so that in about twelve months we can see an alternation of small recoveries followed by mini recessions.

The economy in its unstable state is struggling with two sets of opposing forces. On one hand, the upward pressure over the whole economy by the sectorial bubble and, on the other hand, the recession trend powered by the economic system growing instability. Under the impetus of these opposing forces moving intermittently—short growth followed by an equally brief mini recession—the result is a moderate increase in the *GDP*.

On the inflation front, there is again the intermittent situation described above, with the prevalence of a very modest rising inflation during the cyclical inflation-ascending phase, followed by a decline during the cycle fall. In this case, differently from the *Gross National Product* where there is a moderate increase, the negative inflation is prevailing and gradually undermines the nominal price system. In fact, we should assume, also based on recent experience, that the emphasis on the *GDP* cycle produced by their rational speculative bubble, does not contribute to produce higher inflation.

Within an unstable economy, regardless of the reason, the natural therapy activating the deflation seems to be purposed to destroy the debt mountain, inconsistent with the real economy, which is generated because of the bubble. The deflation thus is becoming a recession powerful ally in demolishing the whole frame work bouillons and by the speculation, with terrible consequences at social, economic and financial level. It has probably serious limitations the conviction that intervention with massive Keynesian maneuvers and non-conventional monetary policies, could be able to contrast the recession and deflation winds. It's not just a coincidence that in USA, a few years after the irrational exuberance for the so-called *new economy*, a new speculative bubble has grown up and then turned in a financial crisis of exceptional magnitude, which has dragged the real estate sector up to a

raging bull level.

Learning to handle a financial crisis means first of all to admit that the interference with the delicate natural development mechanisms, can lead to unexpected results and serious consequences.

## 2.2 *The Economy Instability is Measurable?*

Recent experience shows the performance of the economy, struggling with a bubble, unexpectedly almost normal and therefore misleading and, finally, facing a severe financial crisis. This apparent regularity in an unstable economy is a kind of an aesthetic for the public and the authorities who should take steps to control the excesses. On the other hand, during the irrational acceleration for specific sectors, it's generated a perverse and automatic mechanism, making somehow more fluid the excess formation while the risk assessment capability is loosened.

Therefore, during the bubble formation in U.S. housing sector, the liquidity supplies for new loans granting was amplified beyond any reason by the creation of financial tools through a multi-level securitization of mortgage loans, offered to the public with the attractive returns prospective. All this created a continuous cash amount flowing no-stop, which could feed the new mortgage parallel flow, loosening the rules about the borrower's creditworthiness. For this reason, many loans granted during the year preceding the financial crisis outbreak are so-called *subprime*, which are at risk of insolvency, but packed in to financial vehicles (CDOs) were considered reliable because protected by a collateral real warranty.

Ambiguous economic data and poisoned tools fuelled the sectorial bubble and were a good narcotic to continue until the stop imposed by the crisis burst. Therefore, the question is how to measure the instability of a system hiding and incubating the possible next financial crisis. We have already mentioned that in economies at risk of persistent instability, the ambiguous evolution of strictly correlated variables, *GDP and Inflation*, takes a breath-taking and intermittent trend. A so peculiar phenomenon that cannot emerge when the economic systems are sufficiently reliable and stable and that, therefore, can be used as an indicator for the unstable economy condition.

These specific anomalies of a highly unstable system (ambiguity of the trend variables, strict correlation between *GDP* and *Inflation*) are leading to the assumption that within so altered systems, the trends forecast capability on those two variables is suffering for a severe distortion. In other words, the ability to trends forecasting could be strongly distorted because of the irregular behavior occurring in a persistent instability state. In general terms, these irregularities and distortions of the predictive power cannot occur, by definition, when economies are in a normal condition and almost stable.

To verify this hypothesis, we examined the results of two auto-regressive equations, respectively of the *Inflation* with two delays and of *GDP* also with two delays. We also used some predictors as regressors: The Public Debt relative to GDP, the long term Interest Rates, the Unemployment rate, the *Current Account* balance as % of GDP, the M3 Liquidity trend, and finally for each equation the variable related to two delays. Here below you can read the two regressive equations:

$$\Delta \text{Inf}(t) = \beta_0 + \beta_1 \Delta \text{Inf}(t-1) + \beta_2 \Delta \text{Inf}(t-2) + \delta_1 \text{GDP}(t-1) + \delta_2 \text{GDP}(t-2) + \delta_3 \text{Unemp}(t-1) + \delta_4 \text{DebPub}(t-1) + \delta_5 \text{Longterm}(t-1) + \delta_6 \text{M3}(t-1) + \delta_7 \text{Account}(t-1) + U_t \quad (1)$$

$$\text{GDP}(t) = \beta_0 + \beta_1 \text{GDP}(t-1) + \beta_2 \text{GDP}(t-2) + \delta_1 \Delta \text{Inf}(t-1) + \delta_2 \Delta \text{Inf}(t-2) + \delta_3 \text{Unemp}(t-1) + \delta_4 \text{DebPub}(t-1) + \delta_5 \text{Longterm}(t-1) + \delta_6 \text{M3}(t-1) + \delta_7 \text{Account}(t-1) + U_t \quad (2)$$

It should be specified that:

- $\beta_0, \beta_1, \beta_2, \delta_1, \delta_2, \dots, \delta_7$  are unknown coefficients, calculated using the OLS estimators;
- $\text{GDP}_{t-1}$  is the dependent variable related to the growth rate (GDP);
- $\Delta \text{Inf}_{t-1}$  is the regressor of the inflation variation (first difference);
- $\text{Unemp}_{t-1}$  is the predictor referred to the unemployment;
- $\text{Deb.Pb}_{t-1}$  is the predictor related to the public debt in terms of GDP;
- $\text{Longterm}_{t-1}$  is the predictor on the long-term rates;
- $\text{M3}_{t-1}$  is the predictor reported to the liquidity(M3);
- $\text{Account}_{t-1}$  is the predictor referred to the current account in terms of GDP.

For both equations (1) and (2) the error correction term is added, specifically the VECM [ $\text{Inf}(t-1) - \theta \text{GDP}(t-1)$ ] to the regression (1) and [ $\text{GDP}(t-1) - \theta \text{Inf}(t-1)$ ] in the expression (2), in the case of a confirmation of the co-integration existence between the two series  $\text{Inf}_t$  and  $\text{GDP}_t$ .

According to this approach, we proceed for each of the analyzed countries to establish as a priority that the two sets, Inflation and GDP, do have a stochastic trend, checking with the Augmented Dickey-Fuller test (Dickey & Wayne, 1979) the null hypothesis of a unit root existence. Then we'll proceed to ascertain that the two series have a stochastic trend.

In line with the procedure for the Augmented Dickey-Fuller (ADF) test, is checked first the null hypothesis  $H_0: \delta = 0$  against the unilateral alternative  $H_1: \delta > 0$  in the regression:

$$\Delta \text{Inf}(t) = \beta_0 + \delta \text{Inf}(t-1) + \beta_1 \Delta \text{Inf}(t-1) + \beta_2 \Delta \text{Inf}(t-2) + \beta_3 \Delta \text{Inf}(t-3) + \beta_4 \Delta \text{Inf}(t-4) + U_t \quad (3)$$

On the other hand, if the alternative hypothesis is that “ $\text{Inf}(t)$ ” is stationary with a deterministic trend, we have the following regression by adding “ $t$ ” (number of observations), where  $\alpha$  is an unknown coefficient:

$$\Delta \text{Inf}(t) = \beta_0 + \alpha t + \delta \text{Inf}(t-1) + \beta_1 \Delta \text{Inf}(t-1) + \beta_2 \Delta \text{Inf}(t-2) + \beta_3 \Delta \text{Inf}(t-3) + \beta_4 \Delta \text{Inf}(t-4) + U_t \quad (4)$$

Similarly, we proceed to apply the ADF test to auto-regressions:

$$\text{GDP}_t = \beta_0 + \delta \text{GDP}(t-1) + \beta_1 \text{GDP}(t-1) + \beta_2 \text{GDP}(t-2) + \beta_3 \text{GDP}(t-3) + \beta_4 \text{GDP}(t-4) + U_t \quad (5)$$

$$\text{GDP}_t = \beta_0 + \alpha t + \delta \text{GDP}(t-1) + \beta_1 \text{GDP}(t-1) + \beta_2 \text{GDP}(t-2) + \beta_3 \text{GDP}(t-3) + \beta_4 \text{GDP}(t-4) + U_t \quad (6)$$

The ADF statistic is the t-statistic of OLS, verifying “ $\delta$ ” in the regressions (3), (4), (5) and (6).

Applying the ADF test to all the analyzed countries, we can find confirmation that both series “ $\Delta \text{Inf}(t)$ ” and “ $\text{GDP}(t)$ ” for the period between 1993 and 2011 do have a unit root.

Now we can pass to the second stage to determine whether the series under consideration are co-integrated among them and, therefore, we should integrate the regressions (1) and (2) by adding the VECM, as explained in above detail. Checking the co-integration presence between the two variables,

it must be extended obviously to each country concerned and repeated for those years in which the housing market speculative bubble was formed and enlarged, and then also during the severe financial crisis that followed the irrational speculative boom.

We can proceed with the test of co-integration EG-ADF (Engle-Granger, Engle, & Granger, 1987), which is the test for the unit root existence applied to the regression of residuals (Note 4):

$$Y_t - \theta X_t = z_t \text{ idest: } \text{Inf}_t - \theta \text{GDP}_t = z_t$$

Where the expression  $Z_t$  represents the regression of residuals and  $\theta$  the Co-Integration Coefficients. The existence of a co-integration relationship between the GDP and Inflation variables is confirmed if the following relation is satisfied:

$$\text{Inf}_t - \theta \text{GDP}_t = z_t \quad \text{if: } z_t \sim I(0) \text{ (the series is stationary)} \quad (7)$$

A simple estimator of  $\theta$  is the DOLS (dynamic OLS-Stock and Watson, 1993). The DOLS estimator is based on a (7) modified version, which includes current and past values of  $X_t$ , as below:

$$\Delta \text{Inf}(t) = \beta_0 + \theta \text{GDP}_t + \delta_1 \text{GDP}_{t-1} + \delta_2 \text{GDP}_{t-2} + \dots + \delta_p \text{GDP}_{t-p} + z_t \quad (8)$$

To ascertain the possible co-integration of the two variables, the second step of EG-ADF test is still the t-test in the residuals of the regression (8), as below:

$$\Delta z_t = \rho * z_{t-1} + \rho_1 \Delta z_{t-1} + \rho_2 \Delta z_{t-2} + \dots + \rho_k \Delta z_{t-k} + \varepsilon_t \quad (\text{residuals regression}) \quad (9)$$

The EG-ADF test results are reported in Endnote (Note 11). Therefore, in the case of confirmed co-integration relationship between the two variables under consideration, in the developed regressions (1) and (2) it is added the error correction term (VECM) to the equations; more specifically, for the following countries: U.K., Germany, Iceland, Mexico, Japan and Korea.

At the beginning of the paragraph we have referred to some possible alterations that the operators predictive power may suffer during the boom times, due to the surplus liquidity in the market despite a low and declining inflation level. Well, the operators' short-sightedness, due to the behavior distortion of key variables during the boom time, could reverberate even on the values calculated using the pseudo-forecast technique, which therefore may present similar alterations when compared to real data. This attenuation of the normal prediction capability, capturing the market in periods of speculative boom or the systems in prolonged instability cannot continue, by definition, when the economy returns to its semi-stability condition. In other words, in a stable system the sustainable growth prospective over the time becomes a container able to shape the GDP evolution in harmony with all other variables, starting with the low inflation and the unemployment gradual decrease.

This difference between the unstable and the healthy economies—in other words, the variables anomalous behavior losing the normal harmonious relationship between them—can represent a sort of alarm signal for a system entering into an instability area. In the meantime, we'll have a look at some countries in the world different areas, to ascertain the possible deviation of the calculation forecast results compared to real data for the two analyzed variables. Let us start then with those (few) countries that during the speculative boom of the last ten years, have been immune or affected by the phenomenon just for a limited extent.

We begin our review from Korea, which maintains a relative equilibrium position at economic and financial level. We examined quarterly data, for the period from 1991 first quarter to 2011 first quarter, focusing our attention to the comparison between forecasts and real data on the 2007 second and third quarter. This period in fact is coinciding with the residential housing bubble *momentum loss* and the start of the spring-summer 2008 financial crisis, together with the post-war worst recession.

The country public debt at that time was on average 25% of GDP, the average inflation in the 2003-2007 period amounted to about 3%, the economy was strongly proceeding recording a GDP increase by a 4.6% average in the first decade of 2000. The equilibrium condition of the Korean economy during the period covered by the worldwide speculative boom and the subsequent global financial crisis, is leading us to suppose that the variables harmonious evolution has encouraged the forecast for both variables towards values nearly aligned to the real data.

The results reported in Table 1 are confirming essentially this assumption. The same table is showing, for comparison, the forecast data, always referred to the 2007 third quarter, calculated through the same equations (1) and (2) (Note 5) for Germany, Denmark, Netherlands and Switzerland. These Central European countries were relatively involved in the housing bubble season, which has spread from America and Europe up to Australia. The consequences on the real economy, therefore, are coming mainly from outside, also for the export orientation of the two central European countries.

Lastly, New Zealand has been less involved than the neighboring Australia in the real estate speculative euphoria (Note 12) having a traditional economy based on agricultural exports and tourism industry. As it can be seen in these tables, the forecasts for these six countries are reporting—compared with real data—a distortion that is quite clear for Inflation, while less pronounced for GDP.

In Table 2, the forecasting results are reported, compared with the real data obtained through the same equations (1) and (2) (Note 6), for the quarter prior to that considered in Table 1. The results for both quarters under observation showed a comparison appreciable symmetry regarding Korea, and conversely the comparison reliability lack for the second group of countries.

**Table 1. Comparison between the Actual Data of the Inflation and GDP Variation in Third Quarter 2007 and Estimates Calculated through the Equations (1) and (2)**

	Inflation		GDP	
	Forecasts	Real Data	Forecasts	Real Data
<b>Korea</b>	<b>0,455</b> $R^2 = 0,457$ Stat F = 1,685	<b>0,67</b>	<b>0,59</b> $R^2 = 0,258$ Stat F = 0,696	<b>0,95</b>
<b>New Zealand</b>	<b>1,45</b> $R^2 = 0,678$ Stat F = 1,874	<b>0,49</b>	<b>1,16</b> $R^2 = 0,440$ Stat F = 0,699	<b>0,45</b>
<b>Germany</b>	<b>1,04</b> $R^2 = 0,327$ Stat F = 0,970	<b>-0,23</b>	<b>-0,04</b> $R^2 = 0,647$ Stat F = 3,663	<b>0,80</b>

<i>Denmark</i>	<b>1,08</b> $R^2 = 0,470$ Stat F = 1,773	<b>-0,38</b>	<b>0,94</b> $R^2 = 0,446$ Stat F = 1,608	<b>1,09</b>
<i>Netherlands</i>	<b>0,37</b> $R^2 = 0,394$ Stat F = 1,298	<b>-0,41</b>	<b>0,57</b> $R^2 = 0,606$ Stat = 3,078	<b>1,16</b>
<i>Switzerland</i>	<b>2,54</b> $R^2 = 0,834$ Stat F = 10,49	<b>-0,48</b>	<b>0,96</b> $R^2 = 0,627$ Stat = 3,355	<b>0,94</b>

**Table 2. Comparison between the Actual Data of the Inflation and GDP Variation in Second Quarter 2007 and Estimates Calculated through the Equations (1) and (2)**

	Inflation		GDP	
	Forecasts	Real Data	Forecasts	Real Data
<i>Korea</i>	<b>1,082</b> $R^2 = 0,476$ Stat F = 1,717	<b>1,06</b>	<b>0,99</b> $R^2 = 0,317$ Stat F = 0,877	<b>1,39</b>
<i>New Zealand</i>	<b>1,04</b> $R^2 = 0,611$ Stat F = 2,961	<b>0,99</b>	<b>0,83</b> $R^2 = 0,409$ Stat F = 1,387	<b>1,59</b>
<i>Germany</i>	<b>0,508</b> $R^2 = 0,351$ Stat F = 1,021	<b>-0,07</b>	<b>0,66</b> $R^2 = 0,689$ Stat F = 4,182	<b>0,32</b>
<i>Denmark</i>	<b>-0,19</b> $R^2 = 0,484$ Stat F = 1,768	<b>0,91</b>	<b>1,83</b> $R^2 = 0,601$ Stat F = 2,85	<b>-0,85</b>
<i>Netherlands</i>	<b>-0,08</b> $R^2 = 0,5$ Stat F = 1,889	<b>1,27</b>	<b>1,13</b> $R^2 = 0,348$ Stat F = 2,910	<b>0,53</b>
<i>Switzerland</i>	<b>-1,44</b> $R^2 = 0,862$ Stat F = 11,78	<b>1,45</b>	<b>0,89</b> $R^2 = 0,611$ Stat = 2,978	<b>0,95</b>

*Note.* Elaborations on OECD data from “OECD. Stat Extracts”.

I would like to point out also that the data estimates are much closer to the real result, both for inflation and for GDP, when the economic system equilibrium and stability are at higher levels. Similarly, the magnitude of the differences occurring between forecasts and actual data are just another evidence of a high degree of instability.

Let us examine now the usual variables behavior in relation to those economies that, within the considered period, showed a strong acceleration (bubble) for specific sectors, but have been strongly affected by the financial crisis in 2008-2009. I refer in particular to the United States, Great Britain, France, Spain and Australia.

In situations of high instability degenerated into an intense speculative bubble, it can be supposed that the GDP slightly increasing evolution might have hidden, at least partly, the fragility of the real economy, already close to the financial crisis. In other words, the economy is virtually pushed upward

through the bubble improper mechanism, *so providing a false impression of normality hiding the recessive real tendency of the unstable system*. Unexpectedly then, with the help of this virtual component, the growth could, “mislead” the estimates calculated by the equations (1) and (2), exactly because it’s remaining relatively small in those economic systems with a speculative bubble in progress. At the end, the economic growth trend, equivocally normal in these very unstable systems, may instead paradoxically adjust (essentially wrongly) the forecast calculation.

Otherwise, the slow or even static performance of the “inflation” variable should continue to show an unreliable forecast. The virtual nature of the economic growth shouldn’t influence the price system course, which in fact remains subject to the (quite) recessive economic trend. In this context, the price deflationary trend is going to reduce the structural inflation rate previously accumulated by the system. The forecast then should indicate higher inflation, because the virtual growth pushed by the bubble is influencing the price trend calculation.

To verify this hypothesis, we have applied regressions (1) and (2) (Note 7), to calculate expected values for Inflation and GDP, again referring to the 2007 second and third quarter, for the above mentioned countries on the eve of a financial crisis with an intensity comparable to that of the thirties. We have also examined the quarterly data series for the period from January 1991 to the 2007 third quarter, i.e., the period when the bubble slowly originated and then inflated in real estate sector.

In the Table 3, the results of these calculations are presented in comparison with the Inflation and GDP real values, relative to the 2007 third quarter. In the following Table 4 the comparison is extended to the previous quarterly period.

Reading the two Tables 3 and 4, the sufficient quality of GDP estimates and instead the inadequacy of inflation estimates are confirmed. Specifically, the GDP estimates “erroneously correct” are not surprising because they’re balanced with the pre-financial crisis ambiguity. This development context is so alienating, because the trend even too serious of economic growth and the quiet inflation, make it plausible that the individual risk perception capability can be somehow faded in a sort of misleading nirvana.

Tables 3 and 4, in addition to the seven aforementioned countries, are also including three countries: Italy, Belgium and Japan. These countries were little or even not involved in the bubble vortex, but anyway were taken by depression and subsequent financial crisis due to the debt heavy load. Financial instability due to excessive public debt is drawing them—looking at regression results—to be assimilated with those countries most subject to speculative effervescence.

**Table 3. Comparison between the Inflation and GDP Variation Actual Data at Third Quarter 2007 and Estimates Calculated through Equations (1) and (2)**

Inflation		GDP	
Forecasts	Real data	Forecasts	Real data

<i>USA</i>	<b>1,35</b> $R^2 = 0,633$ Stat F = 3,456	<b>0,28</b>	<b>0,34</b> $R^2 = 0,460$ Stat F = 1,707	<b>0,56</b>
<i>U. K.</i>	<b>1,80</b> $R^2 = 0,794$ Stat F = 7,729	<b>-0,13</b>	<b>0,44</b> $R^2 = 0,343$ Stat = 0,941	<b>0,53</b>
<i>Spain</i>	<b>3,27</b> $R^2 = 0,841$ Stat F = 10,59	<b>-0,32</b>	<b>0,81</b> $R^2 = 0,699$ Stat F = 4,695	<b>0,70</b>
<i>France</i>	<b>1,13</b> $R^2 = 0,550$ Stat F = 2,443	<b>0,22</b>	<b>0,46</b> $R^2 = 0,433$ Stat F = 1,528	<b>0,65</b>
<i>Australia</i>	<b>1,86</b> $R^2 = 0,698$ Stat F = 4,615	<b>0,70</b>	<b>1,11</b> $R^2 = 0,520$ Stat F = 2,166	<b>0,39</b>
<i>Italy</i>	<b>0,87</b> $R^2 = 0,801$ Stat F = 8,067	<b>0,58</b>	<b>0,04</b> $R^2 = 0,396$ Stat F = 1,310	<b>0,20</b>
<i>Belgium</i>	<b>0,40</b> $R^2 = 0,411$ Stat F = 1,398	<b>0,56</b>	<b>2,91</b> $R^2 = 0,948$ Stat F = 36,79	<b>2,99</b>
<i>Japan</i>	<b>0,35</b> $R^2 = 0,365$ Stat F = 1,151	<b>-0,27</b>	<b>0,66</b> $R^2 = 0,649$ Stat F = 3,697	<b>- 0,01</b>

**Table 4. Comparison between the Inflation and GDP Variation Actual Data at Second Quarter 2007 and Estimates Calculated through Equations (1) and (2)**

	Inflation		GDP	
	Forecasts	Real data	Forecasts	Real data
<i>USA</i>	<b>1,75</b> $R^2 = 0,625$ Stat F = 3,148	<b>1,92</b>	<b>0,35</b> $R^2 = 0,544$ Stat F = 2,260	<b>0,80</b>
<i>U. K.</i>	<b>-0,33</b> $R^2 = 0,786$ Stat F = 6,958	<b>1,03</b>	<b>0,89</b> $R^2 = 0,354$ Stat F = 1,036	<b>0,56</b>
<i>Spain</i>	<b>-0,97</b> $R^2 = 0,865$ Stat F = 12,12	<b>2,16</b>	<b>0,99</b> $R^2 = 0,699$ Stat F = 4,378	<b>0,80</b>
<i>France</i>	<b>0,53</b> $R^2 = 0,606$ Stat F = 2,733	<b>1,04</b>	<b>1,59</b> $R^2 = 0,433$ Stat F = 1,444	<b>0,49</b>
<i>Australia</i>	<b>1,813</b> $R^2 = 0,686$ Stat F = 4,127	<b>1,22</b>	<b>1,27</b> $R^2 = 0,512$ Stat F = 1,985	<b>1,30</b>



<b>Italy</b>	<b>0,88</b>	<b>0,64</b>	<b>0,64</b>	<b>0,06</b>
	$R^2 = 0,801$	Stat F =	$R^2 = 0,387$	Stat F =
	7,633		1,192	
<b>Belgium</b>	<b>1,43</b>	<b>0,58</b>	<b>2,90</b>	<b>3,11</b>
	$R^2 = 0,423$	Stat F =	$R^2 = 0,948$	Stat F =
	1,383		34,47	
<b>Japan</b>	<b>-0,56</b>	<b>1,00</b>	<b>1,01</b>	<b>0,23</b>
	$R^2 = 0,371$	Stat F =	$R^2 = 0,683$	Stat F =
	1,112		4,064	

Note. Elaborations on OECD data from “OECD. Stat Extracts”.

To avoid this misleading *at ataxia*, therefore, the attention must focus on the *inflation* variable that is not involved by the bubble whirl, and thus is clearly and undoubtedly tending to decrease over the time or, at least, to remain neutral notwithstanding the intense excitement at a commodity price level. This unavoidable deflation trend, because of its peculiarity when compared to the other major variables behaviour, it's not properly evaluated by the regression analysis. Therefore, in a highly unstable economic context, inflation calculated in this way remains far from the real one. This discrepancy between the *Inflation* forecasts in some way *clarifies* the mystifying role played by all other variables. So let us look now more closely at this phenomenon.

During the compulsive stage preceding the financial crisis, the evidence is showing the addition of two different trends. The first is related to the economic cycle rise, relatively weak in spite of the tension created by the bubble. A weak cycle, because it's the recession trend result, typical of an unstable system, with the addition of the abnormal acceleration created by the bubble, which only partially is spreading to the whole economy.

The second trend is regarding the inflation, which is gradually decreasing due to the cyclical deflation trend influence on the price system, within a highly unstable economy. The economic cycle, excluding the bubble effect, is recessive and therefore is inducing to a negative cyclical inflation, which is depressing the structural inflation. The combination of the two parallel cycles (the economy and the cyclical inflation) apparently is fading, because the economy growth (quiet) is compared with the declining inflation, which is neutral relating to the speculative excitement.

As already said, it should be considered however that the growth virtual, in part due to the bubble, cannot influence the price general trend, which instead is sensitive almost exclusively towards the real economy basic trend (recessive). A proper comparison between the two variables should therefore compare the economy performance, ignoring its virtual part, and the inflation trend value. So amended, the comparison regains its consistency with both variables moving within a negative territory. About the virtual economic growth value due to the speculative bubble, we must consider that it's just a temporary value, which the imminent financial crisis will remove without leaving any

residues.

In other words, while the bubble is growing, there will be an *apparent and temporary* asymmetry between the correct economic growth movement and the cyclical inflation eccentric profile (negative). *An eccentricity making the inflation profile inconsistent with the other variables and not properly predictable through the regression equations.*

*The dissimulation among variables that it created within the economy during the period preceding the financial crisis, is not necessarily misleading, because at least the inflation structural trend (gradually declining) is revealing that the system is highly unstable.*

### 2.3 Can the Financial Crisis Reduce the Economy Instability

The reciprocal alteration in the main variables, due to the economic system instability and distortion, must be considered a temporary condition, altering the variables natural equilibrium, otherwise mutual and coordinated in an almost stable economy. A transient situation, therefore, because it's assumed that the economic systems are tending structurally to the stability. This structural tendency towards equilibrium, to be really effective, should contemplate also the existence of some mechanisms to correct the instability.

According to this reasonable interpretation, the bubble complex motion with the subsequent financial crisis have to be identified as mere natural factors, arising when economic systems are persisting in a serious instability. Therefore, they're consisting in a natural mechanisms complex designed to bring the altered system to the economic stability secure harbor, yet unfortunately with inexorable and painful consequences.

Following this conviction, the asymmetry shown by the main variables in the bubble evolution therefore should be resolved gradually, with the correction work progress. This improvement should occur when the financial crisis has already started its excesses correction and the recession has taken out the economy virtual part, grownup with the instability. *It's like to say that the financial crisis demolishes that part of virtual and transient growth accumulated in the system for the persistent instability, essentially bringing the economy back to the level preceding the fall into the unstable condition.* The crisis, therefore, is imposing the arduous and unavoidable path to restore the stability conditions and to bring the system back to its economic development potential real trend.

We can therefore say reasonably that the financial crisis hard reality is forcing the economic system to a natural treatment that is able to put it back on the road towards stability. The system, marked by recession and subject to the *Via Crucis* of severe unemployment and other social problems, therefore should regain gradually a better coordination of the main variables, which is the turning point to return to the development potential levels.

Applying this hypothesis to the context where the economy financial crisis was developed in 2008-2009 worldwide, we could presume that at the end of this period (fourth quarter 2009) the trend of the two considered variables in the analysed countries, should regain gradually a better mutual coordination. An improvement yet conditioned by the hypothesis that the natural therapy would have

mitigated significantly the economic system instability. If recovery wouldn't be ephemeral, we should ascertain a clear improvement in the estimate quality regarding the "inflation" variable, which during the bubble peak showed a remarkable asymmetry.

To confirm this hypothesis, regressions (1) and (2) (Note 8) have been applied to calculate the Inflation and GDP values forecast, for the five countries (Note 9) examined before for the bubble strength. We considered the last quarter of 2009, a date in which, after the real estate bubble burst, the recession was really strong as the result of a severe financial crisis.

It should also be noted that all the surveyed countries have adopted therapies designed to alleviate the recession impact, through public money strong allocation and unconventional monetary policy measures to restore liquidity inside the jaded system. On the theme of interventions to support the economy, we would like to stress out that their use has lightened the incisiveness of the *natural procedure* for the return of economic stability, notwithstanding has left a negative legacy with the public debt abnormal rise. Remaining at the late 2009 *status quo*, we may note that the recession easing, made through unusual support therapies, has had some *rebound* effects on the variable "inflation", adjusting his coordination on the economy trend (Note 10). Or rather, the relief obtained by the economy with the support maneuvers was transferred to the price system in an indirect yet correlated way. So It has been achieved, indirectly through the economic situation improvement, an attenuation of the price deflationist trend.

Are markable result that would not have been possible only with the use of the money channel to ease the deflationary pressure in the unstable system. *Deflation, in this case, is imposed by the severe economic recession. Therefore, only by acting on the economy with support measures we can get double result: in a direct way, to mitigate the recession and indirectly, to contain the deflation.* Therefore, it can be presumed that the economic and monetary policy actions, on a system struggling with a serious financial crisis, do not seriously affect the correction natural mechanism effectiveness, at least during the crisis acute phase. Left free to act, compatibly with the social protection needs, the financial crisis should therefore adjust the variables natural coordination.

In Table 5 we show the expected and actual data for the fourth quarter of 2009 in the five countries under investigation. As you can see, the novelty concerns the Inflation variable evolution. For the United States, Britain, France, Germany and Australia, seems evident the correction of the inflation forecast rate, which in late 2009 finally approaches the actual data, a clear signal that the instability correction is in progress.

**Table 5. Comparison between the Inflation and GDP Variation Actual Data at Fourth Quarter 2009 and the Forecasts Calculated through the Equations (1) and (2)**

Inflation		GDP	
Forecasts	Real Data	Forecasts	Real Data

<i>United States</i>	<b>0,02</b> $R^2 = 0,506$ Stat F = 3,189	<b>0,4</b>	<b>0,87</b> $R^2 = 0,476$ Stat F = 2,823	<b>0,92</b>
<i>France</i>	<b>0,69</b> $R^2 = 0,448$ Stat F = 2,528	<b>0,53</b>	<b>0,33</b> $R^2 = 0,558$ Stat F = 3,930	<b>0,13</b>
<i>Germany</i>	<b>0,17</b> $R^2 = 0,328$ Stat F = 1,517	<b>0,16</b>	<b>0,47</b> $R^2 = 0,519$ Stat F = 3,354	<b>0,16</b>
<i>U.K.</i>	<b>-0,13</b> $R^2 = 0,707$ Stat F = 7,535	<b>0,45</b>	<b>1,58</b> $R^2 = 0,503$ Stat F = 6,297	<b>0,74</b>
<i>Australia</i>	<b>1,11</b> $R^2 = 0,583$ Stat F = 4,353	<b>0,88</b>	<b>0,48</b> $R^2 = 0,232$ Stat F = 27,97	<b>0,50</b>

**Table 6. Comparison between the Inflation and GDP Variation Actual Data at Fourth Quarter 2009 and the Forecasts Calculated through the Equations (1) and (2)**

	Inflation		GDP	
	Forecasts	Real Data	Forecasts	Real Data
<i>Spain</i>	<b>3,27</b> $R^2 = 0,841$ Stat F = 10,587	<b>-0,32</b>	<b>0,81</b> $R^2 = 0,699$ Stat F = 4,695	<b>0,7</b>
<i>Netherlands</i>	<b>1,13</b> $R^2 = 0,550$ Stat F = 2,443	<b>0,22</b>	<b>0,46</b> $R^2 = 0,433$ Stat F = 1,528	<b>0,65</b>
<i>Belgium</i>	<b>0,40</b> $R^2 = 0,411$ Stat F = 1,398	<b>0,56</b>	<b>2,91</b> $R^2 = 0,948$ Stat F = 36,79	<b>2,99</b>
<i>Denmark</i>	<b>0,44</b> $R^2 = 0,355$ Stat F = 1,712	<b>1,11</b>	<b>-0,41</b> $R^2 = 0,414$ Stat F = 2,195	<b>0,46</b>
<i>Iceland</i>	<b>2,27</b> $R^2 = 0,492$ Stat F = 3,017	<b>1,20</b>	<b>-0,23</b> $R^2 = 0,452$ Stat F = 2,569	<b>0,59</b>
<i>New Zealand</i>	<b>-0,95</b> $R^2 = 0,331$ Stat F = 1,537	<b>0,37</b>	<b>0,63</b> $R^2 = 0,251$ Stat F = 1,045	<b>0,62</b>
<i>Greece</i>	<b>4,57</b> $R^2 = 0,331$ Stat F = 1,537	<b>0,22</b>	<b>-0,65</b> $R^2 = 0,251$ Stat F = 1,045	<b>-0,63</b>
<i>Switzerland</i>	<b>2,30</b> $R^2 = 0,799$ Stat F = 12,332	<b>-0,07</b>	<b>0,94</b> $R^2 = 0,708$ Stat F = 7,530	<b>0,41</b>
<i>Italy</i>	<b>-0,19</b> $R^2 = 0,464$ Stat F = 2,692	<b>0,43</b>	<b>0,02</b> $R^2 = 0,625$ Stat F = 5,190	<b>0,42</b>
<i>Japan</i>	<b>-0,52</b> $R^2 = 0,365$ Stat F = 1,151	<b>0,13</b>	<b>0,69</b> $R^2 = 0,465$ Stat F = 2,707	<b>1,23</b>

Note. Elaborations on OECD data from "OECD.Stat Extracts".

The following Table 7 is showing the forecasts and the real data, again for the fourth quarter of 2009, related to those 10 countries that are still lagging behind regarding their economy rebalancing. Therefore, they continue to show a large gap between actual data and forecasts for Inflation, while observing the “GDP” variable we can find nearly a coincidence of the regression (2) results in four countries: Spain, Netherlands, Belgium and New Zealand. About Spain and Greece, we note the considerable gap size between the actual data and the prediction for Inflation provided by the regression (1). We have a four points gap, almost a negative thermometer about the persistent instability of the economies in question.

Differently in the case of Japan and Italy, two countries with a public indebtedness heavy load, where this gap is reduced to just a little more than half a point. This is a signal that the correction imposed by the severe recession in 2009—5% for both countries, has mitigated however the instability degree, although they’re still penalized for a public debt, difficult to be removed.

Regarding the U.S. economy, the speculative bubbles repetitive burst in the American country over the first decade of millennium is causing some concerns. One could think that the U.S. economy has travelled for over ten years on a persistent instability prolonged wave, evidently unresolved and just mitigated with the financial crisis in the first decade early years. In the second half of this decade, we’ve seen a new impressive speculative acceleration in real estate, followed by a financial crisis comparable to the 1930-1931.

The consecutiveness of the two crises, with an increasing intensity, makes plausible that the monetary policy strong activism, at the time of the Greenspan Fed, caused an interference in the *natural* instability correction process during the first financial crisis. Therefore, we may assume that the incentive, in the 2000 second half, for a new bubble formation with a subsequent financial crisis of incredible magnitude, has been “offered” by the Federal Reserve pro-cyclical monetary policy during the decade early years, so moving in contrast with the *natural* economy rehabilitation work.

It is undeniable that speculative bubbles in economy are always the legacy of not compatible economic governance interventions. *It follows that during the financial crisis, even the instability correction mechanisms interference, made by direct contrast, is moving within the same logic of activities incompatible with the natural order.* Experience is showing that the adoption of measures applied to support the economy in crisis, appears to play an active role in recovery restarting. In the medium term, however, the *natural* order hard contrast may emphasize the persistent instability degree that can generate, therefore, an amplified reaction of the correction natural mechanism.

The financial crises social effects are unbearably serious and justify the attempts to mitigate the hard and harsh recession impact. Experience, however, is warning us against the adoption of economic and monetary policy measures that may inhibit the correction natural mechanism. To remain passive is unacceptable: however, it’s required a highly balanced action in promoting whatever intervention.

### 3. Result

The instability of an economic system is appearing with different typologies, depending on the development process state in the economic system. During the seventies, the post-war economic development long running in the West area is affected by instability, causing a long-term inflation. In recent years, however, the major countries instability is appearing with an opposite phenomenon, the deflation. With more than ten years' deflation, Japan has concluded its accelerated growth long parable with a financial crisis, difficult to remove. The USA of the last decade, but principally the Euro area in Europe seem to be in a phase of their economy, apparently somehow similar to the Japanese case.

In the experience of recent decades, a system is developing instability if the growth process is forced, in the attempt to accelerate the development beyond its potential. The economic systems reaction to the instability, in view of the return to stable condition, is cautious and even slow. The instability can last for years, until the unstable system is subject to the financial crisis correction, with the Schumpeterian "creative destruction" cleaning up the economy from its excesses. When over the time the system is becoming permanently unstable, the conditions are favorable to a speculative acceleration, pushed by a transgressive risk assessment. The speculative emphasis is accentuating the difference between the apparent economy, enhanced by the bubble, and the under-tone real economy, until the outbreak of a great and extensive financial crisis will sweep away the abnormal excesses.

The possibility to contrast the financial crisis with a strong support by the economic and monetary policy requires great caution, in order to not interfere severely with the instability correction natural mechanism. Therefore, the risk of non-conventional interventions lies in the possibility of preventing the natural correction. As a result, the economy instability would be dragged unresolved over the time, with the risk to become chronic. In this deplorable situation, the economy subject to repeated crises may not have any more available its defence tools, having exhausted the public finances and monetary policy resulting in effective.

We should consider also that the natural correction process is directly affecting the economy cycle which in its turn is influencing the inflation cycle. If the economic or monetary policy remedies are not available to support the economic cycle, then the situation remains critical. On the other hand, it is not permissible to look for a feedback to affect - indirectly - the recessive cycle of the economy by acting on the inflation (deflation), since this direction, from inflation to the economy, is precluded.

In other words, in this stand-off it would not make sense to take any action to mitigate inflation or deflation by means of monetary policy and, consequently, to reach an improvement in the economy recessive cycle. Any direct link between the inflation cycle and the economy cycle would be precluded.

### 4. Conclusion

In all previous pages, we have attempted to define a simple way for the interpretation of the instability status within an economy. We are moving within the hypotheses difficult ground and we can only suggest a probabilistic framework to assess economy trends. Inspired by the method of comparison and difference analysis between calculated data and actual data over several inflation years, we can attempt to build an economic system *Instability Index*.

To follow this approach, we can start with an auto-regressive equation, which has as its dependent variable the differential natural logarithm (in absolute value) between inflation calculated data and actual data for several years. Then the regressors should be the first three delays of the difference logarithms between calculated and actual inflation. Finally, we can add more addends with a predictor function. The predictors added to the regression function, which can be called Instability Index rate, may be the same ones already included in the equations (1) and (2). Moreover, we must add that to determine the inflation calculated values, for an appropriate time in relation to the present context, we proceed with the equation (1), using as predictors: the GDP, the Current Account balance, the long term Interest Rates, M3 and Public debt in terms of GDP, each of them with a delay.

We must consider also the regressive equation development calculating the instability index and the setting of certain binary variables, which are intended to monitor the occurrence of events that may have the stable effect of worsening the economy instability condition. Therefore, we will indicate with  $D_1, D_2, \dots, D_n$  the binary variables equal to 1 in the case of conditions worsening the potential instability, otherwise equal to 0 in the case of conditions having no negative effect on the system stable state. Therefore, it can be defined as a condition of instability, a Public debt exceeding 80% of GDP or it can be considered, as a condition of instability, an elevated Current Account deficit for many years, or a persistence of high Real Interest Rates.

An “Instability Index” can be described in abbreviated form as the arithmetic mean of the differences between the calculated data and the actual inflation for the period of observation. According to this hypothesis, we can establish that increasing average values of differentials-referring to a period for which we suspect an economic stability crisis—are symptoms of an appreciable alteration in progress. The U.S. decade in which the bubbles are formed in the new economy and housing market and the current decade of accelerated growth trends in China, are certainly periods of time to be tested for the reliability of an instability rate.

A model of an “Instability Index” could be produced by an equation of auto-regression, with predictors and binary regressors defined as follows:

$$\text{Instability Index} = \beta_0 + \beta_1 (\text{Ln Diff.inf}_{t-1}) + \beta_2 (\text{Ln Diff.inf}_{t-2}) + \beta_3 (\text{Ln Diff.inf}_{t-3}) + \beta_4 \text{GDP}_{t-1} + \beta_5 \text{Deb.pub}_{t-1} + \beta_7 \text{Long.term}_{t-1} + \beta_8 \text{M3}_{t-1} + \partial_1 D_1 + \partial_2 D_2 + \partial_3 D_3 + \partial_4 D_4 + u_t \quad (10)$$

On equation (10), please note the following:

- The Instability Index is showing the average differences in inflation rates, real and calculated;
- $\beta_0, \beta_1, \beta_7, \partial_1, \partial_2, \dots, \partial_5$  = unknown coefficients to be calculated;

- $\text{Ln Diff.inf}_{t-1,2,3}$  = delays related to Ln of the difference (in absolute value) between real inflation and calculated inflation;
- $\text{GDP}_{t-1}$  = first delay of the annual change in Gross National Product;
- $\text{Account}_{t-1}$  = first delay in the annual variation of the Current Account balance;
- $\text{Deb.pub}_{t-1}$  = first delay of the debt/GDP;
- $\text{Long.term}_{t-1}$  = first delay of the long-term Interest Rate;
- $D_1$  = binary regression equal to 1 if the real interest rate is greater than 2%;
- $D_2$  = binary regression equal to 1 if GDP/debt exceeds 80%;
- $D_3$  = binary regression equal to 1 if the current account balances have long been negative;
- Alternatively,  $D_1, D_2, D_3$  are equal to 0;

Equation (10) is giving a value of probability concerning the existence or not of an economy instability state. The expected result of equation (10) is a differential data, which is providing an indication about the potential possibility that the economy could be in a relatively steady state or at the instability threshold, or otherwise seriously unstable.

In other words, the differential value given by the equation (10) may be below or above the threshold beyond which for the economic system is envisaged an instability growing tendency. Concretely, the threshold value may be set equal to or greater than zero: a value which may show an initial distortion in the relationship between the economic system main variables. High values are postulating a state of increasing instability; otherwise, negative values are showing symptoms of a system tendency to the stable or normal condition.

The following table presents the values that are assumed as Instability Index for the main countries, starting with the United States, Spain, United Kingdom, France, Holland and following with Germany, Australia, Korea and Japan. The Instability Index is measured at third quarter of 2009, a period of financial crisis that followed the speculative bubble explosion in real estate sector that, with few exceptions, has been extended from America to Europe and to Australian continent. For the calculation of the differential values between real and calculated inflation, reference is made to the results of equation (1), described in the preceding pages.

The values for the “Instability Index”, indicated in the table below, are utilizing quarterly data of the difference logarithms (in absolute value) from the third quarter of 2006 to the second quarter of 2009. By taking the difference logarithms between calculated and actual inflation in the regression (10), the Instability Index is negative for countries with stable or improving economy, while positive values are indicative of instability and values greater than one are indicating a severe instability.

**Table 7. Values for Instability INDEX in 2009, Defined by the Instability Index Average of the Previous Three Quarters**

Unstable	Instability Index	More	virtuous	Instability Index
----------	-------------------	------	----------	-------------------



countries		countries	
Greece	1,25	Belgium	-0,40
Spain	1,00	Australia	-0,73
Israel	0,72	Korea	-0,81
USA	0,36	Denmark	-0,95
Japan	0,16	Netherlands	-1,22
France	-0,14	Germany	-1,9
U.K.	-0,14		
Italy	-0,14		

## References

- Ben, S. B. (2000). *“Essays on the Great Depression” Princeton University Press—Princeton*. New Jersey.
- Thomas, F. C. (1997). “The political economy in Japanese monetary policy”—HUTCHISON, TAKATOSHY. *Massachusetts Institute of Technology*.
- Giovanni, A. C. (2016). L’inflazione, La Deflazione, Il Ciclo Economico E L’efficienza Dei Sistemi. *International Multilingual Journal of Science and Technology*, 1(1).
- The case of Italy International Journal of Economy, Management and Social Sciences. (2015). Unstable economy. *Reflections on the effects and consequences in the event of deflation*, 4(10), 457-468.
- David, D., & Wayne, F. (1979). Distribution of the Estimators for Autoregressive Time Wayne Fuller Series with an Unit Root. *Journal of American Statistical Association*.
- Dornbusch, F., & Moderate, I (1993). *World Bank Economic Review*, 7, 1-44.  
<http://dx.doi.org/10.1093/wber/7.1.1>
- Engle, R., & Clive, G. (n.d.). Cointegration and Error Correction: Representation, Estimation and Testing. *Econometrica*, 55(2).
- Timothy, F. G. (n.d.). STRESS TEST—Reflections on Financial Crises. *RH Business Books*.
- Friedman, M. (2007). *On economics—Selected Papers*. University of Chicago Press.
- Charles, K. (1973). *The World in Depression: 1929-1939*. University of California Press.
- Paul, R. K. (2008). *The return of depression economics and the crisis 2008*. W.W. Norton & Company, Inc. New York.
- Inquiry Report. (n.d.). *THE FINANCIAL CRISIS—Final report of the NATIONAL COMMISSION on the causes of the financial and economic crisis in the United States*. Official Edition.
- Leon, N. L. S. (n.d.). *The Politics of Inflation and Economic Stagnation*. MAIER, Brian BARRY Brookings Institution-Washington D.C.
- Nouriel, R. (n.d.). *Crisis Economics: A crash Course in the Future of Finance*. Stephen MIHM Nouriel.
- Roubini, A. (n.d.). *Political Cycles and the Macro economy ALESINA, G. COHEN*.

- Raines, J. P., & Leathers, S. (n.d.). *Innovation and Deflation: The Theories of Fisher, Schumpeter and Minsky*—Edward Elgar Massachusetts.
- Carmen, R. (2009). *The Time Is Different—Eight Centuries of Financial Folly*. Kenneth S. ROGOFF Princeton University-Press-Princeton and Oxford.
- Shilling, A. G. (2001). Deflation. *How survive and thrive in coming wave of deflation*.
- Stephen, S. R. (2009). *The next Asia—Opportunities and challenges for a new globalization*. John Wiley & Sons, Inc.
- JH Stock, MW Watson. (1993). A simple estimator of cointegrating vectors in higher order integrated systems. *Econometrica: Journal of the Econometric Society*.
- Schumpeter, J. (1939). *Business Cycles: A theoretical, historical and statistical analysis of the Capitalist process*. New York Toronto London McGraw-Hill Book Company.
- Peter, T. (n.d.). *Lessons from the Great Depression*. The MIT Press-Cambridge-Massachusetts.
- Nicholas, W. (n.d.). *KEYNES-HAYEK The Clash that Defined Modern Economics*. WW Norton & Company-New York & London.
- IMF and OECD. (n.d.). *International Financial Statistics*. Database, various years—“OECD. Stat”—Database, various years.

## Notes

Note 1. From The Financial Crisis Inquiry Report—“National Commission on the causes of financial and economic crisis in the United States”—“The profound event of 2007 and 2008 where neither bumps on the road nor an accentuated dip in the financial and business cycles we have come to expect in a free market economic system. This was a fundamental disruption—a financial upheaval, if you will—that wreaked havoc in communities and neighborhoods across the country”. We can read etiam “We conclude this financial crisis was avoidable. This crisis was the result of human action and inaction, not of Mother Nature or computer models gone haywire”.

Note 2. In the figure is shown the price trend in Japan during the years before the 1990 financial crisis and in the United States from 2003 to 2008, when the two countries have developed an exceptional speculative bubble in the real estate sector. In Japan, the inflation decline is accentuated in the middle of the 80s decade even until the zero, but only to go up again under the input of an exasperated bubble. In the U.S., inflation is also declining from 2005 to 2008, when are starting the financial crisis and the creeping deflation. Also in the U.S., the inflation seemed to recover in 2007 during the peak of the real estate bubble.

Note 3. Essentially then, at first sight the scenarios related to the unstable economy subject to speculative bubble, like those instead subject to a high public debt, do not seem to be different. Both suffer for a creeping tendency to deflation and the weak economic growth linked to a strong relationship with inflation (low).

Note 4. If the co-integration coefficient is unknown, now it is necessary to estimate it before assessing

the presence of a unit root. The EG-ADF procedure considers two steps. Specifically, in the first step the co-integration coefficient is obtained with the OLS regression model:  $Y_t = a + \theta X_t + z_t$ . Then, in the second step, a Dickey-Fuller t-test (with intercept but no time trend) is used to assess the presence of a unit root in the regression residuals.

Note 5. Adding the error correction term (VECM) to the equations, when necessary.

Note 6. Adding the error correction term (VECM) to the equations, when necessary.

Note 7. Adding the error correction term (VECM) to the equations, when necessary.

Note 8. Adding the error correction term (VECM) to the equations, when necessary.

Note 9. United States, United Kingdom, France, Spain and Australia (see Tables 3 and 4).

Note 10. In an unstable economy, during the correction process to return to normal stability, it's established a close link between economic cycle and the conjuncture inflation parallel cycle, which is shaped by the stagnant economic situation. During the financial crisis, this strong link allows to influence, though indirectly, the price system deflation trend. Acting on the economic cycle, through support measures, it's realized an economic and financial situation improvement, which is indirectly transmitted to the price system, slowing down their deflationist trend.

Note 11.

Countries	ADF test results for checking the null hypothesis of unit	Critical values of EG-ADF test at the 5%	Statistic	Reporting periods
U.K. *	- 3,865	-3,41	7,966	2001/2 – 2010/3
USA	- 2,025	“	2,483	2001/2 – 2010/3
Germany *	- 3,540	“	7,486	2001/2 – 2010/3
France	- 2,647	“	2,877	2001/2 – 2010/3
Italy	- 3,381	“	13,137	2001/2 – 2010/3
Denmark	- 2,514	“	2,992	2001/2 – 2010/3
Netherlands	- 3,238	“	6,104	2001/2 – 2010/3
Greece	- 2,132	“	3,572	2001/2 – 2010/3
Switzerland	- 2,079	“	2,045	2001/2 – 2010/3
Iceland *	- 3,540	“	7,486	2001/2 – 2010/3
Mexico *	- 4,126	“	4,374	2001/2 – 2010/3
New Zealand	- 0,850	“	0,354	2001/2 – 2010/3
Australia	- 1,826	“	0,909	2001/2 – 2010/3
Japan *	- 4,592	“	28,876	2001/2 – 2010/3
Korea *	- 3,516	“	4,669	2001/2 – 2010/3

\* Countries linked by a co-integration relationship.

Note 12. The Figure below, taken from the Economist, gives evidence of the percentage change in house prices over the ten-year period 1997-2008.

<b>The Economist's house-price indicators</b>			
% change			
	<b>Latest</b>	<b>Q1 2007</b>	<b>1997-2008</b>
	<b>on a year earlier</b>	<b>or latest</b>	<b>or latest</b>
Singapore	29.8	13.8	na
Hong Kong	28.2	5.6	-23
Australia	13.8	9.6	174
Sweden	11.3	8.0	150
China	10.7	5.6	na
Belgium	7.5	10.0	147
South Africa	6.8	15.6	401
New Zealand	6.5	11.7	125
Canada	5.7	9.6	80
France	5.7	8.1	151
Italy	5.1	5.6	102
Spain	3.8	7.2	195
Netherlands	2.5	4.3	99
United States (OFHEO)	nil	4.4	92
Switzerland	0.5	2.5	19
Denmark	0.3	10.0	124
Japan	-0.7	-1.5	-33
Britain	-1.0	9.5	202
Germany	-4.7	0.6	na
Ireland	-8.9	9.2	220
United States (Case-Shiller national index)	-8.9	-1.7	104
United States (Case-Shiller ten-city index)	-13.6	-1.2	138

Sources: ABSA; ESRI; Hypoport; Japan Real Estate Institute; Nationwide; Nomisma; NVM; OFHEO; Quotable Value; Stadim; Swiss National Bank; Standard & Poor's; government offices