

## **Ignazio Visco: The financial crisis and economists' forecasts**

Commencement address by Mr Ignazio Visco, Deputy Director General of the Bank of Italy, to the students of the Master in Public Economics at the Faculty of Economics, La Sapienza University, Rome, 4 March 2009.

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*The original speech, which contains various links to the documents mentioned, can be found on the Bank of Italy's website.*

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### **1. Introduction**

It is perhaps early to draw lessons from the crisis that has hit the global economy. The crisis appears severe and widespread, its effects far-reaching and long-lasting. Measures of various kinds have been taken or are in the process of being taken regarding monetary policy, the use of public resources and the revision of rules and institutions on which the proper functioning of the markets and the operation of financial intermediaries depend. The present is undoubtedly a period of maximum efforts on the part of economic policy and overall political action, efforts that are directly proportional to the seriousness of the crisis. But this is also a moment in which the interpretative models used in analyzing our economies start being reconsidered and attempts are being made at identifying the reasons underlying the failures of markets, economic policies and economists' forecasts. Besides, this is also necessary in order to better define interventions – global, substantial, focused and lasting – aimed at overcoming the crisis and, as far as possible, preventing, with the design of new rules, new institutions and new policies, such serious instability from occurring again. If overcoming the crisis will be arduous and complex, the process of revising the theoretical and quantitative frameworks of analysis, and the domestic and supranational guidelines and instruments of economic and financial policy will be equally difficult and laborious.

To begin, one can and certainly must ask how seriously economic analysis, together with forecasting models, has failed, but also why economic policy, in its various forms, has been so late to respond to the alarms of economists' analyses and forecasts. This is the subject I should like to address briefly in what follows, while anticipating an obvious answer: if economic policy bears serious responsibilities, economic analysis and forecasting models have also shown important limitations that must be addressed.

### **2. Origins of the crisis and the economists' diagnosis**

Until two years ago the world economy had known an exceptionally long period of rapid expansion, with much smaller GDP growth rate fluctuations than in preceding periods, accompanied by low and stable inflation in practically all the main areas of the globe. Thanks also to the high economic growth rates of large emerging countries, consensus forecasts were for continuing and relatively stable growth. That confidence was gradually eroded by the events that occurred between the summer of 2007 and the autumn of last year and collapsed rapidly in the last few months, giving way to a pronounced and generalized increase in the volatility of markets and economic activity and widespread uncertainty about the future.

As is well known, the first signs of the crisis we are passing through were the difficulties encountered by intermediaries that had invested massively in “structured” financial products, linked to the performance of mortgage loans (and hence of the prices of the underlying real estate) granted in the United States to borrowers with low credit ratings (so-called subprime borrowers). The crisis spread rapidly to other segments of the financial market and, in the

last few months, to the real economy. The seat of infection was set in fact in a broader context of fragility of the international financial and economic system. The problems that emerged in 2007 in the markets of structured products linked to subprime mortgages triggered the crisis, but the conditions for it to take hold and spread rapidly had gradually accumulated over time. The pre-existent elements of fragility and potential instability had already been partly identified and indicated as possible sources of danger.

### ***Economic, demographic and technological changes***

Great changes have taken place in the last twenty years, in terms of the integration of economies and markets, demographic movements and technological and financial innovation. The growth in world trade of goods and services was extremely rapid, as was that in foreign direct investment. The emerging Asian economies now account for more than a quarter of world exports, twice the level in 1990. In little more than a decade, direct investment rose from 10 per cent of world GDP in 1995 to 25 per cent, with the advanced and emerging economies recording similar increases. Financial integration increased remarkably: in 2007 the ratio of foreign financial assets and liabilities to GDP was equal to 300 per cent in the advanced economies, compared with 140 per cent in 1995, when the prevailing expectations were for rapid growth in both the emerging and developing countries, in conjunction with the progressive removal of the constraints on the mobility of capital. Globalization has obviously brought a large increase in countries' interdependence and accordingly in the probability of cross-border transmission of real and financial shocks. At the same time the greater risk diversification associated with the increase in the global exposure of financial portfolios should have produced, at least in principle, a smaller exposure to perturbations of a local nature.

As regards demography, the very rapid population growth in the developing economies has begun to be matched by a progressive ageing of the population in the industrial countries and in some of the large emerging economies as well (especially China). The increase in life expectancy has gone hand in hand with the reduction in births, causing a sharp rise in old-age dependency ratios (of the elderly in relation to the population of working age), which is set to continue in the coming decades. This has led to a downward trend for public pensions and an increase in supplementary pension schemes offered by pension funds, insurance companies and other institutional investors. In the meantime households' direct exposure to financial risk has grown: in 2008 in the three largest euro-area countries the proportion of households' financial assets administered by these intermediaries has reached about one third, up by about 10 percentage points since 1995.

Lastly, the development of new information and communication technologies has had a growing impact on every sector of the economy, and society in general. This has had important effects on productivity and economic growth, and on all the building blocks of the financial system, from payment system infrastructure to intermediaries, and from markets to investment instruments. In particular, the securitization of banks' assets expanded considerably, together with the supply of so-called structured financial instruments (ABSs, CDOs, etc.) whose valuation is generally rather complex. The traditional model of credit intermediation thus gave way, especially in the United States, to a system in which loans granted were rapidly transformed into other financial products having these loans as collateral and sold on the market: the so-called originate-to-distribute model. These instruments – intended in principle to reduce risk, by redistributing it among a multitude of investors, free up capital and hence boost banks' ability to lend – helped to finance the “new economy”, in parallel with the spread of new technologies. At the same time they made it possible to reduce the cost of loans, above all as a result of the compression of illiquidity premiums.

The complexity of structured instruments was coupled, however, with a lack of transparency, in particular as regards their valuation (in which a crucial role was played by rating agencies, without any particular control by regulatory authorities or information providers), by means of

statistical models and often carried out on the basis of incomplete and insufficient data. We can now say – unfortunately well into the financial crisis – that opportunistic behaviour by managers, fueled by a distorted system of incentives, especially with reference to executive compensation, led to the creation of unnecessarily complex and opaque financial assets, with the effect of preventing a correct assessment of creditworthiness and often causing excessive risk-taking.

### ***The unsustainable growth of external imbalances***

In this context more and more in recent years the model of growth of the world economy was based on a growing imbalance between a steadily declining US saving rate (negative for the household sector) and highly positive rates for China and other emerging countries (as well as Japan). This led to large external deficits for the United States and huge surpluses for the rapidly growing countries, which served to finance the twin (budget and external current account) deficits of the United States. This was soon recognized since the unsustainability of growing current account imbalances was evident, even though variations in the value of financial assets and liabilities contributed to reducing the explosive expansion of the country's net external position (Figure 1). The risks associated with such a growth model, in which the rapid expansion of the world's largest economy was financed with capital from the rest of the world, including, somewhat paradoxically, emerging and developing countries, had been stressed repeatedly and from many sides, although there was no lack of less alarmed observers and analyses suggesting that what appeared to be fundamental imbalances in the external accounts were the result of sustainable developments. At all events, the analyses produced by government and international institutions regularly pointed to the possibility that those imbalances might give rise to rapid and disorderly adjustments, with sudden realignments of the external value of the dollar and abrupt falls in US domestic demand, as the main threat to stable growth of the world economy.

In the end, the financial crisis was not provoked by a flight from the dollar but by the slump in the US housing market and the consequent depreciation of structured financial products. This initial spark found ideal tinder in the general vulnerability, and the crisis spread like wildfire, encountering no particular obstacles. For that matter, the US trade deficit was nothing but the counter-item to the insufficiency of saving, above all by American households, over-indebted and holding assets consisting largely of long-overvalued real estate that was itself used as collateral for financial derivatives. The sharp drop in demand in the United States is apparently being accompanied by an effective adjustment of these disequilibria, an exceedingly abrupt correction imposed by the crisis. However, for this adjustment to be carried through and the imbalances definitively rectified, there must be an expansion of final demand, consumer demand in particular, in the countries that are running large external current account surpluses. It is too early to conclude that this will actually be the outcome of the measures now being taken, but economic analysis had correctly discerned the dangers of the disequilibria and the inevitability of an adjustment – the longer postponed, the more traumatic.

Although they were discussed in a number of forums for international coordination, the corrective measures needed to remedy matters were never undertaken resolutely enough. The increase in final demand led by the US expansion was accompanied by the extraordinarily rapid growth of economic activity and exports in the large emerging economies (accentuated by policies that impeded exchange rate adjustments) and unprecedented strains in the markets for raw materials. In recent years, given the low price elasticity of energy demand and supply, this resulted in an equally extraordinary rise in energy prices and the steady increase in the trade surplus of oil-producing countries (Figure 1). This was an additional factor of global payments disequilibria and a source of finance for final demand in the United States.

## ***Monetary policy and financial and real asset prices***

In the absence of worrisome inflationary tensions, for over a decade monetary policies were kept very expansive. Low nominal and real interest rates ushered in not only the long period of exceptionally rapid and stable growth of global output but also a powerful expansion of monetary and credit aggregates. This was accompanied by a sharp increase in the liquidity of markets, which in its turn was connected with financial innovation and the strong growth of such institutional investors as pension funds and hedge funds. The upshot was a large, across-the-board reduction in risk premiums, which fell to extremely low levels by historical standards, in all markets (shares, corporate bonds, real estate). The most benevolent interpretations saw this as evidence that the world economy had entered a new phase, the “Great Moderation,” marked by rapid growth without significant fluctuations and by orderly price movements, anchored to low average levels of inflation. The advent of that phase, it was argued, was the result of economic policies effectively oriented to macroeconomic stability, and in particular of monetary policies credibly directed to containing inflationary pressures and preserving the value of money. The result, ran the argument, was a stable, certain outlook, conditions propitious to private initiative and hence to economic growth.

This interpretation (based on “good policy”, the standard term used in the literature, as well as on the supposed effects of positive structural changes with the spread of new technologies) was disputed by other analysts. These asserted that the protracted, orderly growth and modest fluctuations was actually the product of exceptionally favourable circumstances, in particular the absence of the sort of violent, repeated, adverse shocks that had marked previous periods (“good luck”). Sooner or later, they argued, in an environment that in a number of ways had not changed radically from the previous decades, this largely expansive monetary policy, by encouraging and in practice financing high risk-taking, would bring about the conditions for abrupt corrections as soon as risk perception and propensity changed. This danger was signalled by a good many observers, and starting in 2004 there were particular warnings that too casual an attitude towards risk-taking might be followed by a disorderly, traumatic reaction in the opposite direction. In the light of events, the optimistic interpretation of world economic trends in recent decades was clearly indulgent. While there is no denying the contribution of good policy, and especially its impact on medium-term inflation expectations, it is now evident that it would probably have been wiser to take greater precautions against the possibility of an erroneous, falsely reassuring reading of events.

On a number of occasions the fall in risk premiums pushed bond, stock and real-estate prices up to levels that were clearly unjustified by the fundamentals. The consensus view, in the framework generally known as “flexible inflation targeting” (which authoritative commentators have used, broadly, also to describe the policy of the Federal Reserve), is that monetary policymakers need not worry about countering speculative bubbles in asset prices. What matters is that they take them into account in their forecasts of the variables that are factors in determining the general level of prices, such as inflation expectations and the deviation of final demand from the “potential” level of economic activity (i.e. that corresponding to full use of productive resources). The sole tool at policymakers’ disposal (the interest rate) should accordingly be deployed in order to attain just one objective, namely flexibly preserving the value of money, since it cannot aim simultaneously at curbing the rise in the prices of financial and real assets. Obviously, in memory of lessons from long ago, in order to avoid the depressive effects of the bursting of an asset bubble monetary policy must react swiftly to cut interest rates and expand liquidity.

Actually, the impact of asset prices on the spending and investment decisions of households and firms also depends on their relative indebtedness, and all the more so insofar as the latter depends on the collateral represented by their capital goods (for households, mostly residential property). This applies above all to the anglo-saxon economies, and it is a potential factor of non-linear amplification of the effects of changes in real and financial asset values. In this case monetary policy, even under flexible inflation targeting, could be called on directly to counter very large variations in those prices, especially considering that a

tightening of bank credit becomes more likely as the level of indebtedness increases. In the long run, holding policy interest rates steady while share or house prices are soaring, in a context of heavy and growing household and corporate debt, could further fuel a speculative bubble that will eventually burst, at a potentially very severe cost to the economy as a whole.

Yet this, in practice, was the policy followed for decades by the Fed and the Bank of England, vis-à-vis both the stock market boom of the late 1990s (Figures 2, 3) and the housing boom (Figures 4, 5, 6). Admittedly, in the former case this benign neglect during the boom and the drastic lowering of interest rates during the subsequent market downswing had relatively limited consequences (especially by contrast with Japan's disheartening "lost decade" of deflation starting in the early 1990s). The case of house prices, however, is seemingly quite different. On the one hand the rise in prices, though strong and sustained (likely exceeding the levels justified by fundamentals), was probably less "explosive" in the United States than in some other countries, such as the United Kingdom and Sweden (but also Spain and the Netherlands) when gauged by the Federal Housing Finance Agency index (but equally so if measured by the Case-Shiller index).<sup>1</sup> On the other hand, however, the devastating repercussions on US financial markets and intermediaries (transmitted worldwide through structured financial products) stemmed precisely from the interaction with the levels of debt of American households, spurred by the possibility that rising house prices offered for mortgage equity withdrawal. In many cases their debt came to exceed their home equity.

In this way, the expansion of liquidity and so of credit was accompanied by the ratcheting up of financial leverage, prompted among other things by the emergence of new business models. In his re-examination of the Depression in 1933, Irving Fisher noted: "*Easy money is the great cause of overborrowing. When an investor thinks he can make over 100 per cent per annum by borrowing at 6 per cent, he will be tempted to borrow, and to invest or speculate with borrowed money. This was a prime cause leading to the over-indebtedness of 1929. Inventions and technological improvements created wonderful investment opportunities, and so caused big debts*" (Fisher, 1933, p. 348; emphasis added). In Fisher's view, that is, depressions stem from excessive debt exposures (inevitably accompanied, one might add, by excessive risk-taking); sooner or later, a correction is inevitable. Once the correction gets under way, the impellent necessity of rapidly reducing excessive leverage exacerbates the fall in asset prices, which is the more violent, the larger the original bubble. And the price collapse, in turn, amplifies financial leverage, making the de-leveraging all the more painful. This danger had long been known to economists.

### **3. From economists' diagnosis to pre-crisis policies**

If economic analysis had effectively pointed out some of the looming dangers, the potential sources of infection and the mechanisms of propagation, then why was economic policy action for so long hesitant, sluggish, lacking in international coordination? To some extent this may have been due to the generic nature of the alarms sounded by economists, their failure to pinpoint the origins and course of development of the crisis, or the very reiteration of warnings when their fears did not materialize, giving policymakers the idea that the risks were vague and remote. But we can also find causes not only in connection with economic analysis but also within the policy decision-making process itself.

In the first place, until the crisis was full-blown and the spectre was raised of dramatic, dire developments in the financial markets, there was a lack of international coordination and an inability to take measures to counter the increasingly rapid build-up of balance-of-payments

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<sup>1</sup> The Case-Shiller index is narrower in geographical coverage than the FHFA index, includes a wider variety of houses (among them, homes bought with subprime mortgages), and excludes the changes in prices estimated at the time of renegotiation.

disequilibria and the effects of a disproportionate rise in international liquidity. There was undoubtedly awareness of the paradox of industrialized countries being increasingly financed by the current account surpluses of developing countries. It was clear that for an unusually long time this had determined particularly low levels of interest rates and volatility in the prices of financial instruments. And with US monetary policy maintaining an expansionary stance (too) long after the brief recession of 2001-02, this had transmitted to the Chinese economy, given the prevailing exchange rate system, an impetus whose signs could be seen globally in the spiralling prices of raw materials. All of this was discussed repeatedly at academic conferences, central bank workshops, international consultations and official meetings of ministers and central bank governors. But only the sense of extreme urgency that spread last autumn following the failure of Lehman Brothers made it possible to begin to shape a coordinated response. In the future, it will be necessary to intensify efforts in this direction, including by finding appropriate ways of translating into action, in more binding forms, the interventions decided by the institutions responsible for overseeing the international economy.

The reassuring, understandable belief that a new world had emerged – one of Great Moderation – perhaps also led to overestimation of the economy's ability to absorb shocks. This belief was reinforced by the apparent ease and limited costs with which the global economy overcame the difficulties that loomed large at times in the course of recent years, from the financial crises of the countries of South-East Asia and Russia to the collapse of LTCM, the deflation of the stock market bubble in 2000-01 and the shock caused by the terrorist attacks of 11 September 2001. In particular, the bursting of the so-called dot-com bubble had seemed to be controlled with ease; given the seriousness of the concerns expressed beforehand and looking back on the modest scale of the damage and the remarkable effectiveness of the countermeasures adopted, the conclusion was drawn that the evolution of that crisis had confirmed both the advent of the Great Moderation and the merits of good policy.

However, as already observed, there was much debate then, and there still is today, about whether monetary policy should not pay more attention to financial and real asset price trends and to the pro-cyclical growth of credit and leverage, and in some instances respond decisively to seemingly “excessive” movements. Aside from the difficulty of defining what excessive means in practice, it is certainly useful to examine the factors that determine particularly large swings in these prices, just as it is necessary to shed light on the factors that tend to threaten financial stability and disproportionately amplify cyclical fluctuations. Many of these factors probably originate not so much in behaviour as in rules and incentives existing in the markets. In the case, for example, of the mortgage loans that triggered the current crisis due to excessive borrowing, two factors surely played a crucial role: (1) the assumption that the continuous rise in house prices would lower the amount of debt in relation to the value of the underlying asset over time, and (2) the possibility of obtaining mortgages with loan-to-value ratios of 100 per cent and more. In these cases, and as has long been acknowledged (for example, with reference to the sharp rise in house prices in the United Kingdom recorded in the early 2000s), it is obvious that it is necessary to resort not so much to monetary policy but to prudential instruments, with limits on the value of collateral that can be used in taking out a loan. The question is why steps of this kind were not taken, quite apart from the failure to use monetary policy (naturally as a possible second-best instrument).

In the same way, it is legitimate to wonder whether confidence in the ability of financial markets to regulate themselves was not excessive. What role was played, in particular, by the waiving of stricter supervision in many sectors of financial intermediation? This, even disregarding the strength of lobbies and instances of excessive proximity between the supervisors and the supervised. In any event, it is clear that the consequences of a change of trend in the perception and concentration of risks were seriously underestimated, notwithstanding the many analyses and signals that had become available in recent years.

Excessive deregulation of the financial sphere was also accompanied, as recalled earlier, by an unprecedented development of financial innovation. There was an enormous increase in the supply of complex instruments for hedging risk, structured products often very difficult to value if not using mathematical-statistical techniques whose application presupposed at least three conditions: (1) the availability of the basic information necessary to determine the quality of the products (securities or loans) underlying these instruments (in other words, the likelihood of the loans and bonds being honoured); (2) the validity, essentially over time and in the real world, of the arbitrage principle; and (3) a sufficiently high degree of liquidity in the markets. It is certainly open to doubt whether much thought was given to the soundness of these basic hypotheses, either by the regulators or by bankers and investors.

Much remains to be done then, in the process of reviewing the rules and institutions responsible – including at supranational level – for the proper functioning of the markets, the prudent management of financial intermediaries and the valuation of investment and risk-hedging instruments. The path of economic and financial development of the modern economies is, however, littered with episodes of excess, speculative bubbles and failures linked to highly imprudent if not criminal practices. If, on one level, the challenge lies in not falling into the opposite excess of exaggerated and obsessive regulation (bearing in mind that the hedging of risk, when properly identified and where possible, is right and proper), on another level I believe we must be aware of our position between the rock of market failures and the whirlpool of policy failures. The thesis I find most convincing is that the area where most errors were made, precisely because there was enough evidence at a macroeconomic level to act in time, was in the lack (beyond the declarations and press releases at G7 meetings), of sufficiently decisive policy reactions to the external imbalances that began to expand rapidly from the second half of the 1990s. Essentially these disequilibria reflected continuous and sustained growth in final demand, especially consumption demand, in the leading economic region of the planet, financed by over-borrowing, primarily from abroad; growth, in short, without the accumulation of savings.

To conclude on policies and to support my previous point, I believe that aside from a logical interpretation of what provoked the current crisis, it is useful to propose a chronological reconstruction of the sequence of events that have marked the last ten to fifteen years. I propose the following summary, which admittedly is perhaps a little too USA-centric:

1. The revolution in the new information and communication technologies halted the progressive decline of productivity growth in the United States, which returned to markedly high rates of expansion in the second half of the 1990s.
2. During the same period, following the financial crises that hit the countries of South-East Asia and Russia (1997-98) and the collapse of LTCM (autumn 1998), the Federal Reserve's policy remained essentially accommodating, with a strong expansion of liquidity also to counter the so-called millennium bug.
3. The "new economy" euphoria, beyond being compatible with objective interpretations of the increases in productivity linked to the introduction and spread of the new technologies, was reflected in US household consumption, with a rapid rise in debt and a sustained decline in savings, but with financial positions basically in balance thanks to the increase in net wealth due to capital gains, in part the result of soaring share prices during the dot-com bubble.
4. The powerful expansion in US final demand and imports was gradually accompanied by growth in the exports and output of the major emerging economies such as China and India, which had previously lagged behind, and an upwards trend in US inflation, dealt with by a tightening of monetary policy at the beginning of 2000.
5. Monetary tightening ended by bursting, late, the dot-com bubble in 2000-01. The recessionary effects of this were compounded by those of the severe shock of the September 2001 terrorist attacks.

6. Amid fears of recession and deflationary conditions of the kind that had prevailed in the previous decade in Japan, the Federal Reserve's response was again very accommodating. A drastic reduction in interest rates was accompanied by a strongly expansionary budgetary policy, which remained in place also in relation to the war operations in the Middle East.
7. Monetary policy also remained expansionary for a long time, facilitating a return to sustained growth in household consumption, not countering the trend towards a zero saving rate, and giving free rein to financial innovation, in conditions of abundant liquidity, especially with the repackaging in 2004-06 of mortgages – in a context of constantly rising house prices – into structured products that opened up new investment possibilities to banks.
8. The growing US current account deficit was accompanied by ever-larger surpluses in emerging countries and Japan, with a significant build-up of official reserves, in a context of a relatively sluggish rise in domestic consumption demand and saving rates even higher than the nonetheless elevated rates of investment. The oil-producing countries also recorded sharply higher trade surpluses, reflecting the rise in oil prices due to the expansion of global demand.
9. The increase in international liquidity connected with the growing payments imbalances and the Fed's accommodating monetary policy – which contributed, given the limited flexibility of emerging countries' currencies and the Chinese renminbi in particular, to the global economic expansion – led to a prolonged period, from 2004 to 2007, of low price volatility in financial markets and low nominal yields. This was also due to the large volume of investment in fixed income securities by international investors and countries that had accumulated high levels of reserves by running large and rising current account surpluses.
10. The upshot was the search by investors – including international banks and banks of other countries and financial vehicles they controlled – for investments with higher risk-return profiles and the attendant supply of structured financial instruments backed mainly, although not exclusively, by home mortgages granted with loan-to-value ratios exceeding even 100 per cent on the false premise that house prices could only increase.
11. The strong expansion of global demand engendered inflationary pressures, to which the monetary policy authorities responded, in part with a view to countering the possible impact on domestic prices of the expansion-driven increases in oil and raw material prices. The rise in interest rates was followed by the progressive deflation of the real-estate bubble, which had a domino effect, particularly on the structured products created using subprime mortgages, with their higher default risk.
12. In the summer of 2007 this triggered the financial crisis, which, despite central banks' prompt and massive response, has gradually turned into a global crisis affecting whole industries and economies.

In this context, a crucial role was played by financial regulation that was behind the curve, indeed entirely absent from some market segments. Speculative behaviour in the markets, the growth in leverage and the various kinds of pro-cyclicality operating at institutional level as well as in the decisions of market participants amplified the centrifugal tendencies. At the root, however, there remain the large trade and current account imbalances that the countries participating in the global economy built up unchecked.

#### **4. Aspects of the forecasting failure**

Macroeconomic forecasts – whether produced by private-sector analysts or by national and international research and policy institutions – are generally made using econometric



statistical models estimated on “time series”, data referring to the past behaviour of economic, financial and demographic variables that, on the basis of theory or statistical experience, are considered relevant for determining the variables of interest. In addition to the constraints suggested by their underlying theory, the different models incorporate to a varying degree the role of institutions, the rules prevailing in markets and the means and procedures of economic policy intervention. Although econometric model specifications often take into account the non-linearities that derive from accounting constraints, the fundamental non-linearities connected with genuine regime changes and that “are not found in the data” have to be addressed in an essentially discretionary manner. Forecasts are therefore conditional exercises conducted for given initial conditions of the endogenous variables “explained” by the model (the data observed at the time the forecast is made), “exogenous” variables (whose behaviour is considered to be basically independent of that of the endogenous variables), assumptions involving future policies and interventions taken to compensate for the basic “linearity” of the approaches used. Examining their performance, we find that errors in forecasting aggregates such as GDP tend to be relatively small, even if not negligible, and to grow with the forecasting horizon. This is shown with reference to Italy in Figure 7, which compares the average errors of several forecasters for the period 1999-2007.

Nevertheless, there is no doubt that forecasts were late to consider the consequences of the financial crisis for economic growth. In the early months of 2008, when strains in the interbank markets had already persisted for six months and were gradually spreading to other segments, the professional forecasters surveyed by Consensus Economics indicated on average that in 2009 GDP would grow by close to 3 per cent in the United States, 2 per cent in the euro area and 1.5 per cent in Italy. In the course of 2008, as negative signals repeatedly came in and the state of the world economy worsened systematically, the estimates were revised downwards, but only very slowly until the autumn; as late as October (the month following the failure of Lehman Brothers), forecasters expected that GDP would expand, even if only modestly, in the United States, the euro area and Italy. Now, at the end of February 2009 and more than a year and a half since the outbreak of the crisis, GDP is expected to contract in 2009 by approximately 2 per cent in all three of those economies. Within the span of one year, the GDP growth forecasts were revised downwards by 4-5 percentage points. These are adjustments of exceptional magnitude (Figures 8 and 9).

Looking back at the last 18 months, with the benefit of hindsight we see that the forecast-adjustment process was unable to keep pace with events, culpably endorsing, with obstinate short-sightedness until a few months ago, the view there would be a short and relatively mild economic slowdown.

Forecasting models have experienced episodes of acute difficulty in the past, especially in the presence of large and unprecedented shocks. Indeed, the effort to overcome the shortcomings that those episodes had revealed has been one of the main factors driving the development of forecasting instruments; aspects and mechanisms that had previously been neglected and whose importance was unexpectedly revealed have been gradually incorporated into successive generations of macroeconomic models. Furthermore, because forecasters are aware that all forecasting instruments are necessarily based on an incomplete and provisional knowledge of a continuously changing world, they have long recognized the advisability of adopting an approach based on a multiplicity of cross-checks. This constitutes a form of self-protection against the risk that the theoretical paradigms underlying the approximation of reality implicit in a model may prove particularly inadequate in certain situations. In addition, employing a battery of different instruments – from the grand econometric models in the tradition of Klein, Ando and Modigliani to the dynamic stochastic general equilibrium (DSGE) models, and including primarily statistical models such as vector autoregression (VAR) systems – makes it possible to filter and interpret more effectively the great mass of partial and fragmentary or even contradictory data that gradually become available.

However, to quote Herbert Simon: “Good predictions have two requisites that are often hard to come by. First, they require either a theoretical understanding of the phenomena to be predicted, as a basis for the prediction model, or phenomena that are sufficiently regular that they can simply be extrapolated. Since the latter condition is seldom satisfied by data about human affairs (or even about the weather), our predictions will generally be only as good as our theories” (Simon 1981, p. 170).

In effect, for a long time this crisis incubated in an environment that was beyond the ken of macroeconomic models and characterized by widespread opacity as to the actual soundness of the markets and individual participants. It was known that banks’ were holding toxic assets, but the total amount was unknown, let alone the distribution among intermediaries. Although macroeconomic repercussions appeared inevitable, it became possible to assess them more precisely only after the scale of the banking system’s difficulties became clear in the autumn of 2008, generating widespread panic and sudden, generalized increases in risk aversion. The global contours of the crisis also have only become clear relatively recently. At first the general view, with due exceptions, was that the crisis might be confined almost exclusively to the US domestic sphere and that the emerging economies might remain relatively immune (the so-called decoupling hypothesis, long considered plausible by some observers). Only of late has it become completely evident that this is not happening and that the whole world economy is deteriorating badly.

Nevertheless, the failure to anticipate the evolution of the crisis under way is undeniable. In my opinion, it primarily reflected limitations and shortcomings in three aspects of modeling and forecasting. In the first place, when there are exceptional developments that constitute a discontinuity with the past, the statistical regularity Simon was referring to no longer obtains. The models, estimated on data plainly belonging to a different population than that involved in the forecast, cease providing a reliable representation of the way the economy works, often without even producing indications serving to identify the adjustments that could lessen the deficiencies. Secondly, in the utilization of forecasts and even more in the way they are remembered, attention inevitably focuses on the numerical value (with its misleading appearance of precision) assigned to the result deemed most likely (the so-called point estimation), while the remarks concerning the forecasting uncertainty, the risks implied by scenarios other than the central scenario, which are nonetheless part of a systematic kit of forecasting analyses, are disregarded or at least rapidly forgotten. Lastly, the current generation of models of the economy has proved deficient above all in representing the aspects that are most important in the transmission of the current crisis, those involving the interrelations between financial markets and the real economy.

### ***Regularity and discontinuity***

As to the first of the three shortcomings I mention, economic systems constantly evolve and transform themselves under the influence of: changes in institutional arrangements, legislative provisions and market regulation; the introduction of new technological paradigms; and the revised objectives, strategies and methods of operation of policy-makers. The changes in the framework in which economic agents (consumers and businesses) make their decisions in turn lead to changes in their behaviour. When there is marked discontinuity with the past, such changes may be far-reaching and the past cease to provide a reliable guide. Models, by definition, reflect historical experience in the values of their parameters – which are estimated for behavioural relations and calibrated for institutional mechanisms – and are therefore reliable when it is “business as usual”, that is, as long as the system they describe is not subjected to unaccustomed pressure. However, in this case it can be argued that their contribution to making right decisions is limited. On the other hand, they become unreliable precisely when, following signs of structural discontinuity, the need to predict the future is most urgent and the benefits of correct forecasting greatest, yet that very discontinuity casts doubt on the use of models for fundamentally mechanical extrapolation.

To a large extent the inability of models to cope with changes in the systems they describe is due to the way in which economic phenomena are represented, that is, using statistical and econometric techniques designed to reproduce, from a necessarily small number of parameters, relations that are sufficiently stable over time. Anomalous observations that do not fit the main mechanisms at work in the historical period used for the econometric estimate are frequently put aside: their information content is neutralized and therefore the model cannot take account of them. And yet those very deviations from the norm could provide precious information about the economy's behaviour in conditions other than those usually prevailing. On the other hand, episodic observation of exceptional phenomena is inadequate to capture the often complex inter-relations between economic variables; it is only by building up a sufficient number of observations that we can obtain a statistically reliable estimate of a model's parameters. This limitation reflects a more general characteristic of quantitative analysis of economic phenomena: the difficulty of making statistical inferences from data that are not the result of experiments designed and controlled by the researcher. Exceptional conditions cannot be re-created at will, in the laboratory, for cognitive purposes; our experience will always be limited, partial and episodic. We must therefore make use of information outside the model, refer where possible to historical experience, and intervene on the basis of theory and good sense.

Another obstacle to detecting the emergence of stability problems, and thus to taking corrective measures, is the nature of economic information, which is fragmentary, available with varying lags, and often characterized by a marked degree of approximation, which will eventually be reduced, possibly much later. Without accurate, timely and reliable information about what is actually happening, an episode of structural discontinuity may not be recognised as such until long after it first appears. These considerations do not imply, however, that structural forecasting models (i.e. models in which the relations are not just a statistical reflection of the interaction between variables but are a quantitative representation, albeit approximate, of behavioural mechanisms) become completely unusable after a (real or apparent) break in their constituent relations.

Anomalies in the relations between variables can only be recognised (and counter-measures taken, adapting and updating available instruments or creating new ones) if we have an instrument that can reliably represent such relations in "normal" conditions. Indeed this is already a very important signalling role. Structural models also allow us to trace the web of causal links between particular variables of interest. Thus, they do not just signal the appearance of discontinuities, they also help to identify which specific behavioural relation in the causal chain described by the models has changed with respect to the past. We can thus circumscribe the area affected by discontinuity, identify the nature of that discontinuity more easily and rapidly, and focus efforts to overcome it more effectively.

Finally, once the type of discontinuity has been identified, the actual structure of the model may help to assess the consequences for forecasting by exploiting other relations which remain valid. In the present crisis not all the behavioural relations of the models currently in use have been affected to the same extent. The ones that remain generally reliable could perhaps, pending more systematic and radical solutions, suggest how to correct the answers obtained instead with the relations that have the greatest difficulty adapting to the new situation. In particular, it is worth trying to separate the forecasting errors, or revisions of forecasts, into their main determining factors: assumptions regarding policies (notably fiscal policies, but also market expectations regarding monetary policy); exogenous variables (for example, assumptions about the evolution of oil prices or the trend of world demand, on which, despite possible differences of opinion, the Bank of Italy, like the other national central banks, can only adhere to the evaluations agreed within the Eurosystem); and the changes in "initial conditions" underlined by Simon (see Figures 10 and 11).

To assess the importance of the initial conditions we may look at Figure 12, which shows the forecast for GDP growth in the Bank of Italy's January 2009 Economic Bulletin. As may be recalled, it showed a decline of 2 per cent in 2009 and a return to growth of 0.5 per cent in

2010. The pull exerted by the exceptionally negative estimate for the fourth quarter of 2008 had a considerable effect in this respect. In reality, Italian National Statistical Institute's figures for the quarter were even more negative, reflecting the underestimation in the model of the performance of world demand. Simply taking "mechanical" account of this and maintaining the gradual but constant exit from the crisis implicit in January's projections, we move from a 2 to a 2.6 per cent contraction in GDP for this year.

The key to tackling the problems created by discontinuity must lie in a better understanding of its nature and so in developing and specifying models in which the relations are based on parameters that remain stable in the long term. Research must therefore aim to identify sufficiently fundamental and reasonably dependable mechanisms that do not change over time.

### ***Communicating and exploiting forecasts***

One area that has shown evident shortcomings in the present crisis lies between the production of forecasts and their utilization: end users (policy-makers, professional forecasters and the public at large) focus on the numbers summarizing the central or "basic" scenario (i.e. the one judged most likely), even though the products of forecasting are often more complex and include an evaluation of the size and direction of the risks surrounding the specific estimate. Such an evaluation usually consists in reporting the results of projections based on alternative hypotheses, thought to be less likely but nonetheless worth examining, particularly considering the often high macroeconomic cost if they were to come about, however unlikely. Virtually all forecasts of recent years have systematically indicated a risk that economic performance might not be as good as outlined in the central projection and that the feared downward adjustments to demand and output might be sudden and dramatic. These dangers were ascribed above all to the unsustainable global imbalances and their tendency to be absorbed suddenly, entailing sharp fluctuations in output in the main economic areas and their reciprocal exchange rates.

When repeated warnings are issued about dangers that never seem to materialize, it is almost inevitable that they will eventually be ignored. The consequences of this very natural response may be particularly serious and disruptive, however: the long build-up of tension often culminates in an explosion, which will be all the more violent and dramatic the later it occurs. Perhaps the lesson to be learnt from recent experience is that a forecast should always be given and taken in its entirety: so, not only the central figure, but also the evaluations of the main risks, their size and the likelihood of their realization. When the dangers associated with alternative scenarios are extremely serious, even if not particularly likely, it may be better to adopt less than optimal policies with respect to the case in which the central forecast is realized, but ones that will safeguard against the occurrence of extreme events. When all is quiet, it may be unfortunate to have to renounce, as insurance as it were, part of the benefits of possibly more appropriate actions. But the crisis episodes remind us that the cost of not preparing for the worst may be very high. This means that not only must users of forecasts look more closely at the risk analysis, but that forecasters must learn to communicate their message with more determination and force, adapting their alarm signals to suit.

### ***Non-linear interaction between financial and real variables***

The crisis emerged in correspondence with a particularly weak and underdeveloped problem area in the macroeconomic models in use: the point of interaction between financial variables and the real sector. Simon's observation regarding the correspondence between a model's predictive capacity and the quality of the theory it contained is particularly relevant here. What is more, a critical re-examination of history suggests that financial crises – especially when, as at present, they have such a violent impact on the banking sector – have generally had profound and particularly long-lasting consequences for the real economy. While it is

reasonable to think that the influence of macroeconomic variables (prices, demand, output) on financial variables is captured sufficiently by the available forecasting tools, our understanding of the reverse effect is much more limited, indeed inadequate. In fact, the impact of financial on macroeconomic variables (i.e. the situation in the present crisis) is only crudely represented in many models.

Translating tensions in the interbank markets and banks' funding problems into an assessment of their presumed impact on corporate investment and household consumption decisions is no easy task given our current state of knowledge. Those who have attempted to quantify the effects of a crisis have immediately run up against the obvious limitations of the available tools: there is no way (or still only a very rudimentary way) to represent the links between loan rationing and changes in the value of assets that can be used as collateral on the one hand, and the real economic variables on the other. This problem can be addressed by adapting the tools we have, of necessity on an ad hoc basis, and this is what has been done to produce the forecast given in Figure 12, in which account is taken of the rapid loss of confidence following the collapse of Lehman Brothers. In particular, it is posited that intermediaries' greater fundraising costs may be reflected in an increase in average lending rates that is greater than that defined only as a function of policy rates and obtained by estimating the relation between financial operators' risk exposure gauged by the increase in bond spreads and household and business funding costs. The effect of credit supply-side tensions, such as those emerging from qualitative information derived from the Bank Lending Survey, was taken into account by an equation associating a synthetic index constructed on the basis of the survey results with the forecasting errors of the equation explaining the evolution of investments in machinery and equipment.

Obviously, recourse to ad hoc adjustments like this, even if they are necessary and possible using econometric models such as those considered here, cannot be the definitive answer. Many researchers both in research centres and in policy-making institutions have sought to overcome these limitations; and the efforts will multiply in the years to come. Above all there is an urgent need to improve our understanding of how the evolving macroeconomic framework may influence the stability of the financial system and the state of health of banks, especially in the presence of extreme events. Periodic evaluations of this kind have been conducted for years now, some as part of projects coordinated by international organisations; these checks also need to be made more systematic, more intense and more robust. But the serious difficulties encountered by econometric models in forecasting the effects of the financial crisis may necessitate a review of some of the theoretical paradigms related to the role of risk and uncertainty in agents' decision-making, and not only as regards financial decisions, in particular at times of marked deviations from normal conditions. Obviously this may require discussing very complex problems, such as the possibility of making use, to gauge the probability of a credit crunch (with its non-linear effects on investment and production), of the credit market data themselves.

## **5. Concluding remarks on models and forecasts**

The large and, worse, growing imbalances in current payments, the excessively low saving rates, the over-indebtedness of households in America and other countries, and the prolonged and overly buoyant growth of the world economy signalled the unsustainability of global market conditions and a risk of recession that could not be ignored even in the euro area, where the external payments are in balance and monetary conditions are stable. However, the severity of the ensuing crisis has gone far beyond the forecasts and its behaviour has highlighted vast information gaps, particularly as regards the workings of the financial structures and interactions between finance and the economy. Although there has been no lack of deeply pessimistic, and in some cases quite accurate, forecasts and evaluations regarding both the dynamics and the effects of the crisis that began in 2007, almost all of them have been presented – and perhaps it could not have been otherwise – as greater or lesser risks of deviation from a core trend that is certainly negative but not

dramatically so. The economic policy response, though rapid in its monetary component, wide-ranging in its revision of the rules and governance of financial markets and institutions, and impressive overall in terms of present and future budgets has nevertheless not yet succeeded in countering a steady loss of confidence that has spread from the financial sector to the real economy. It is too soon though, not only to evaluate the effects of these policies, but even to draw any profound lessons from the features and course of the current global crisis. In any event, there is a fairly high risk that we will only emerge from the crisis slowly and with a basically modest rate of recovery.

In general, the effects of economic policy actions are not immediate; on the contrary, they often arrive a considerable time after the decisions are taken. Prudent policy choices can only be made on the basis of evaluations of future conditions and trends. Economic policy necessarily requires models that can produce reasonably reliable forecasts; that can aggregate and organize large, diverse quantities of data; and that can promptly signal any deviation from the behaviour that prevailed in the past. In this regard, I am still convinced that an econometric model, if used intelligently and not mechanically, constitutes a precious tool for making quantitative evaluations.

Simply because one forecasting tool proves unreliable, this does not mean that economic policy should no longer make use of models: there is actually no practical alternative to refining those that exist to surmount their shortcomings. This calls for an understanding of the origin and nature of the errors and then developing new ways of interpretation and innovative techniques, which in turn will have to be set aside when, in the future, unprecedented shocks show the limits of the new generation of models.

The imperfections of analytical forecasting tools are clear; to some extent the solutions can already be outlined; it is necessary that efforts along the lines indicated be prompt and effective. Economic policy management cannot very long do without reliable quantitative information, especially in troubled and uncertain times; such information can only be obtained using models that have been adjusted on the basis of past experience. Obviously, in order to be useful for economic policy-making, these forecasts, though they may be conditional, must factor in data that are not included in the present models and also allow for judgment based on experience and theory; as I have already said, they must not be “mechanical”. The time has not yet come when we can consider the “economic problem” as a “matter for specialists – like dentistry”, as Keynes, in 1930, would have liked. Unfortunately, that “splendid” time is still to come, as is amply demonstrated by the present crisis, in which economists will manage “to get themselves thought of as humble, competent people, on a level with dentists” (Keynes, 1933 p. 373).

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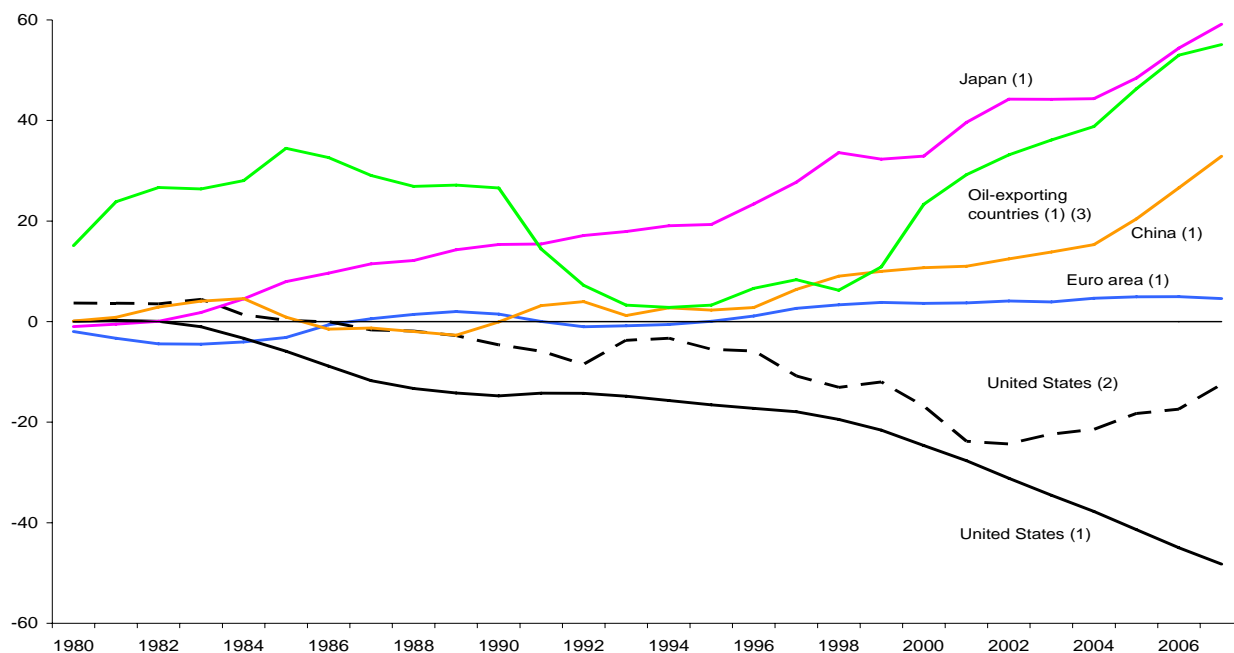
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**Figure 1: Cumulative current account balances**

(as a percentage of GDP)

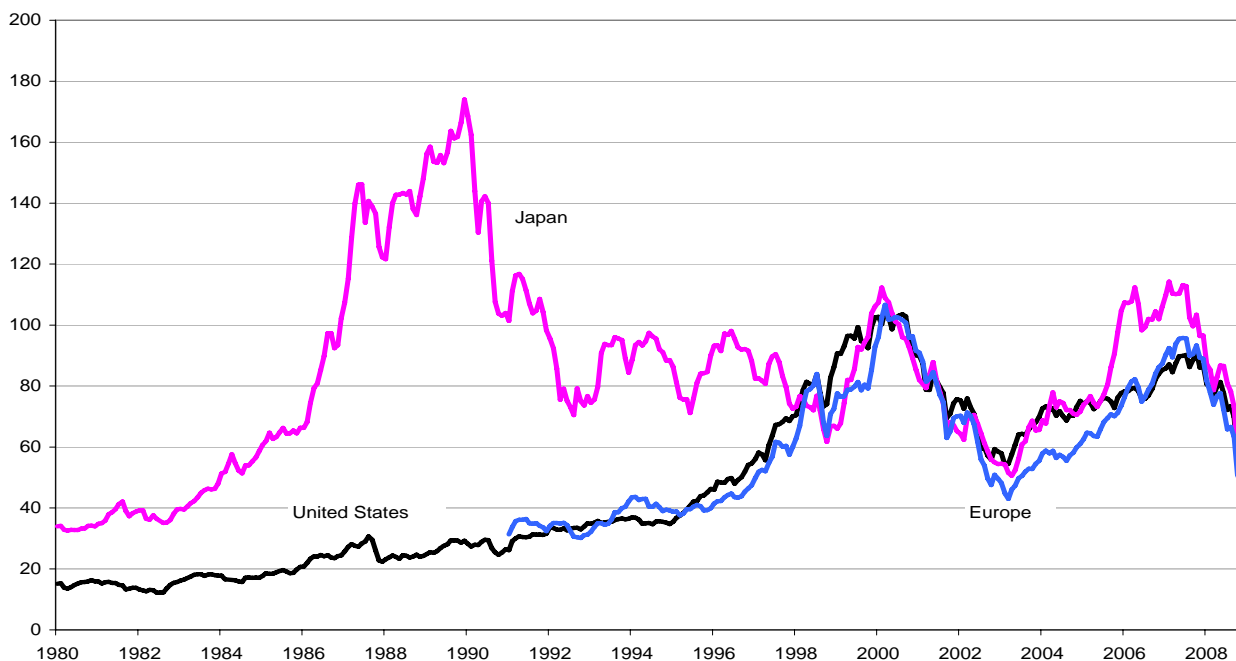


Sources: National statistics; IMF, *World Economic Outlook* 2008; Lane, P. and Milesi-Ferretti, G.M., "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970-2004", *Journal of International Economics*, no. 73, 2007.

Notes: (1) Cumulative current account balance starting from 1980. – (2) Net external position. – (3) Includes only emerging and developing economies.

**Figure 2: Stock market indices in real terms**

(2000 = 100)

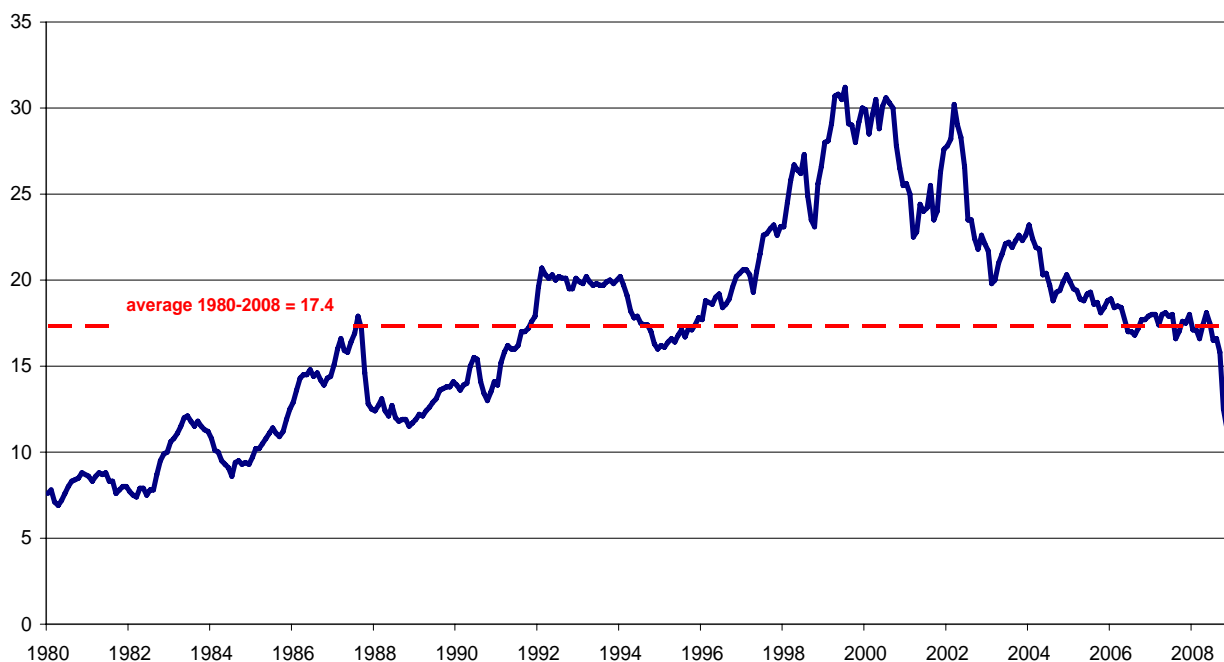


Source: Thomson Financial Datastream.



**Figure 3: Price/earnings ratio of the US stock market**

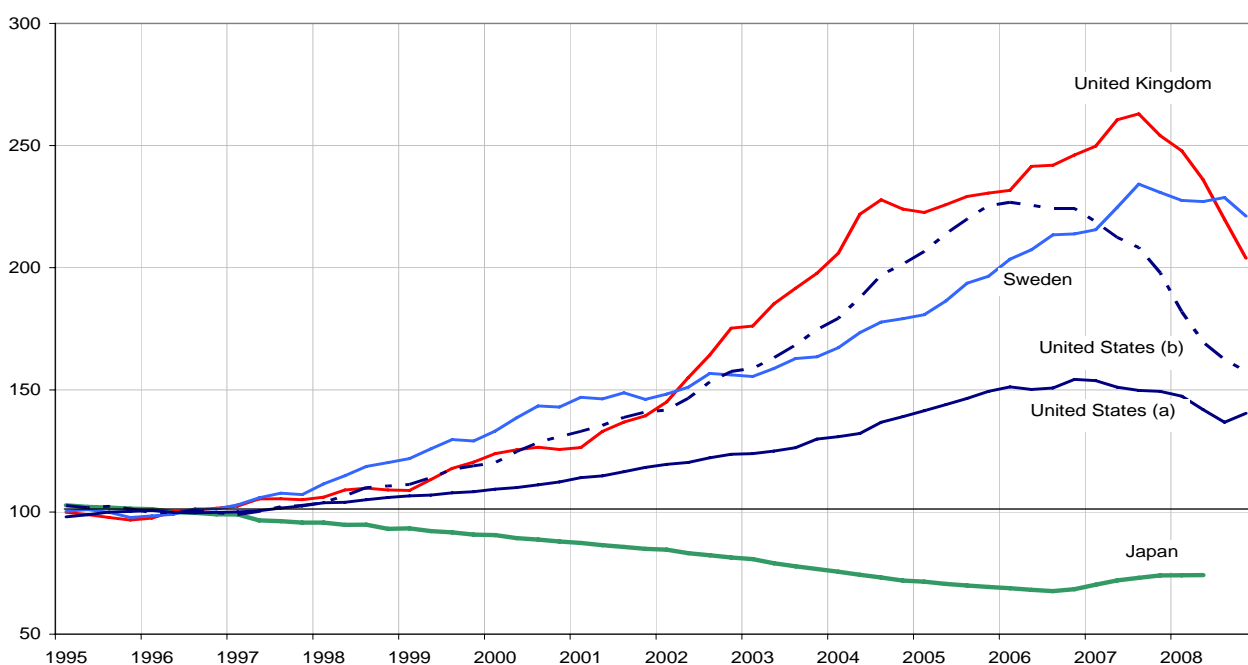
(percentages)



Source: Thomson Financial Datastream.

**Figure 4: House prices in real terms (1)**

(quarterly data; 1996 = 100)

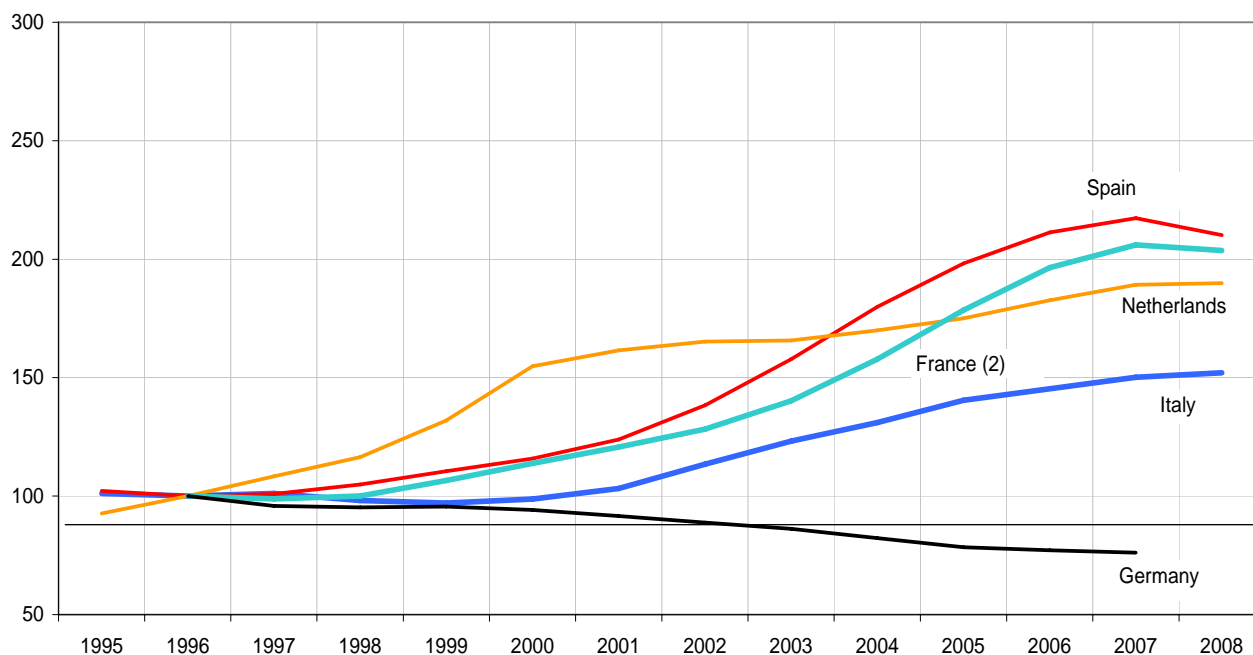


Sources: Japan: Ministry of Land, Infrastructure, Transport and Tourism; United Kingdom: Nationwide; United States (a): FHFA and (b) Standard and Poor's Case-Shiller 10-City Home Price Composite Index; and Sweden: Statistics Sweden.

Note: Deflated using consumer price indices.

**Figure 5: House prices in real terms (1)**

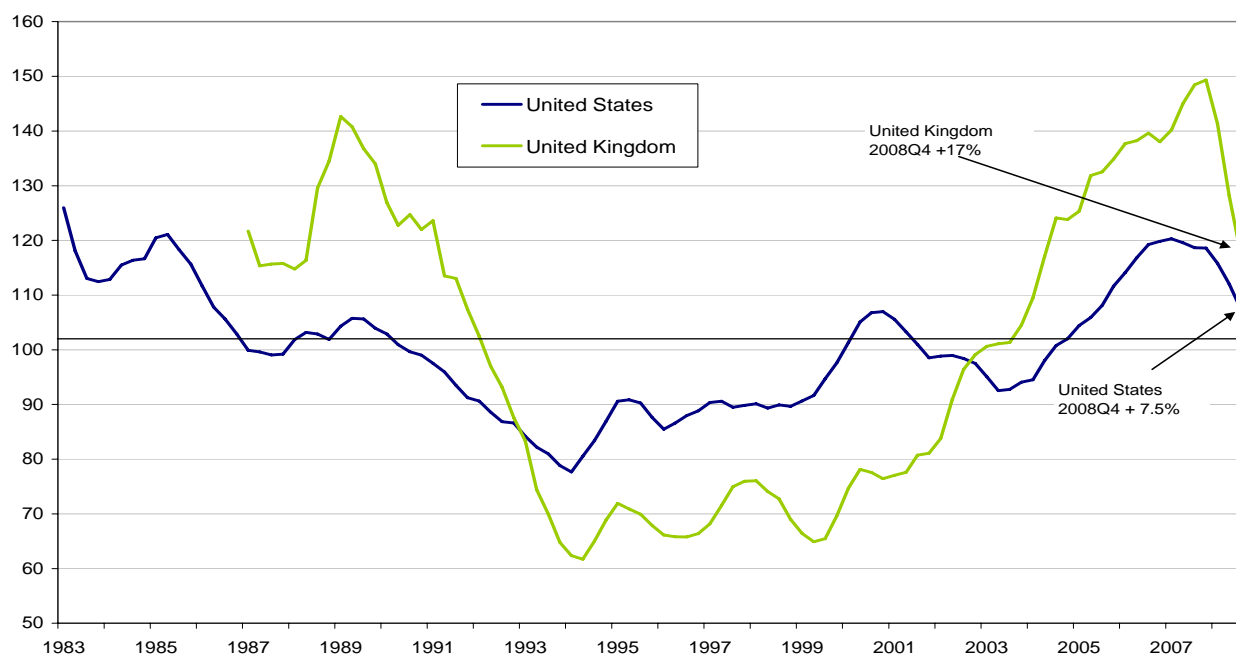
(annual data; 1996 = 100)



Sources: France: INSEE; Germany: Deutsche Bundesbank; Netherlands: Nederlandsche Bank; Spain: Ministerio de la Vivienda; and Italy: based on "Il consulente immobiliare" and Istat data.

Notes: (1) Deflated using consumer price indices. – (2) For 2008, average of the first three quarters.

**Figure 6: Difference between observed and theoretical house prices (1)**

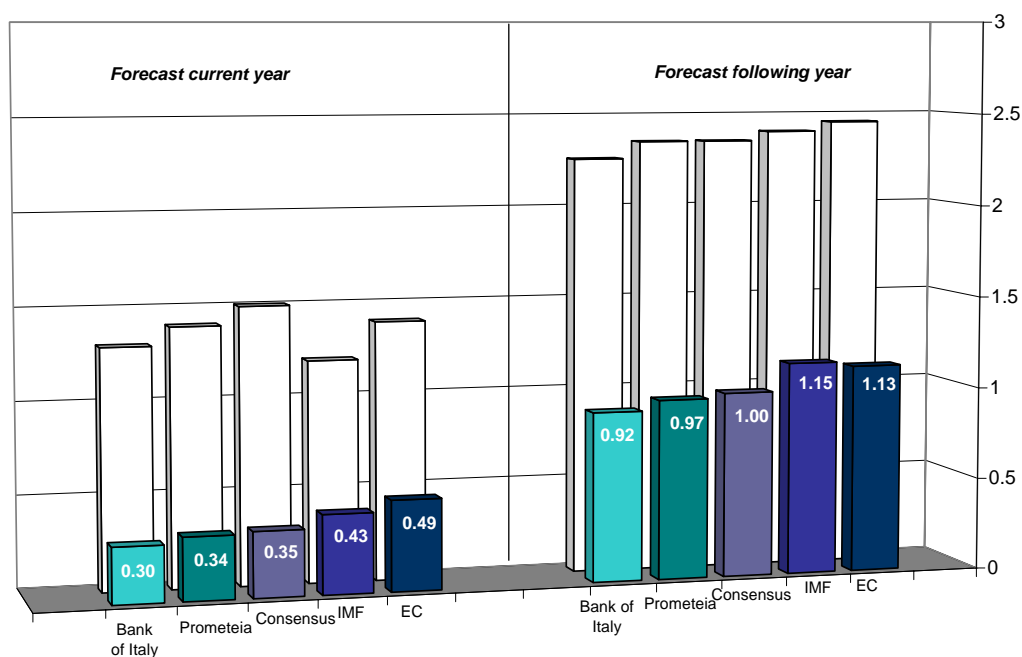


Sources: Based on FHFA, Nationwide and national statistics. For the methodology, see Finicelli, A., "House price developments and fundamentals in the United States, Banca d'Italia, Questioni di Economia e Finanza, no. 7, 2007.

Note: (1) Equilibrium level = 100. The theoretical level of house prices is equal to the ratio of rents to the user cost. The latter is given by the sum of interest payments on mortgage loans, maintenance costs and property taxes, net of the expected increase in house prices.

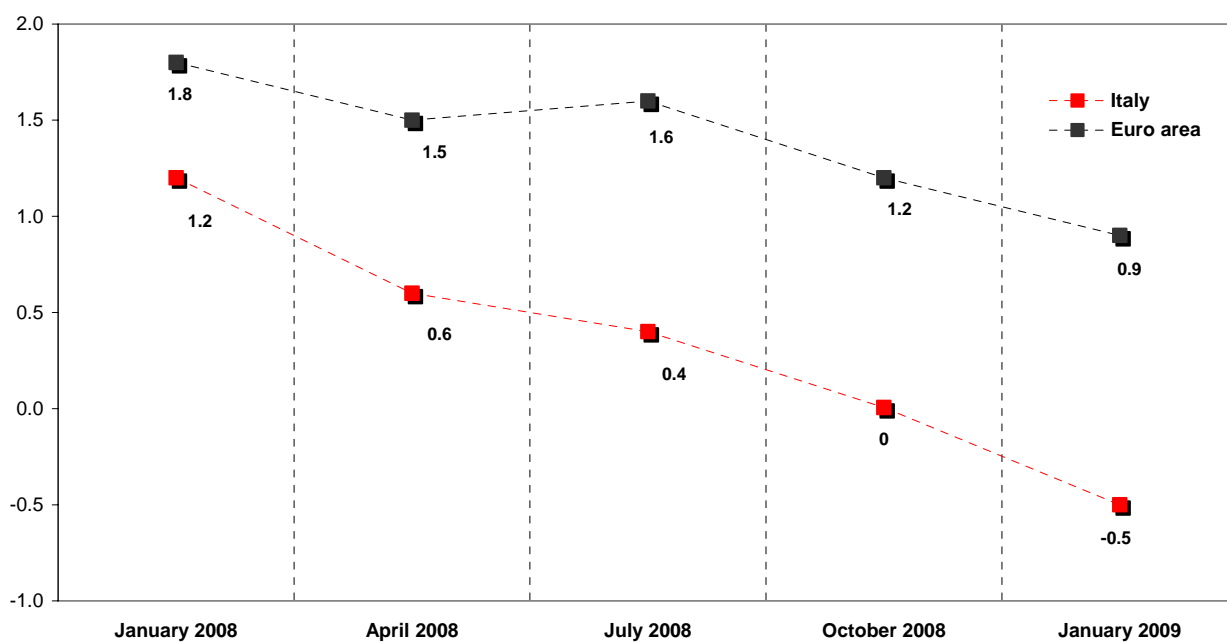
**Figure 7: Average absolute error in the GDP growth rate in the period 1999-2007: comparison between the main forecasters**

(percentage points; the transparent histogram refers to the error made in the forecast for 2008)



Note: Average of the forecasts made in the spring and autumn of each year by the Bank of Italy, Prometeia, Consensus Economics, the International Monetary Fund and the European Commission.

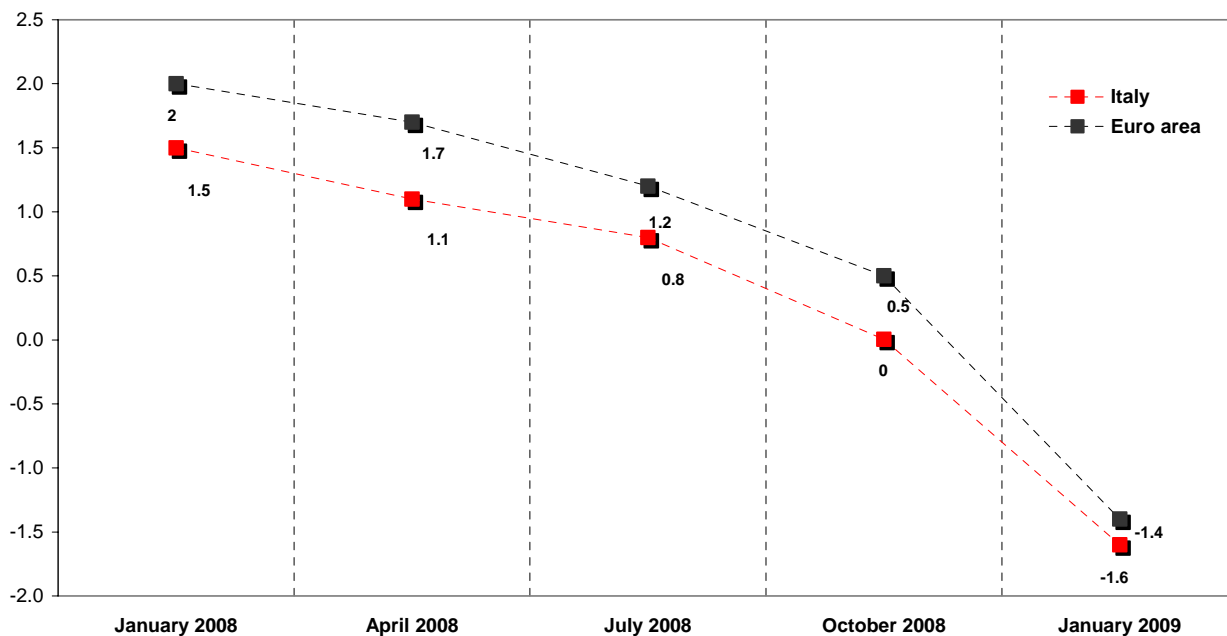
**Figure 8: Revision of the GDP growth estimates for 2008: Italy and the euro area**



Source: Consensus Economics.

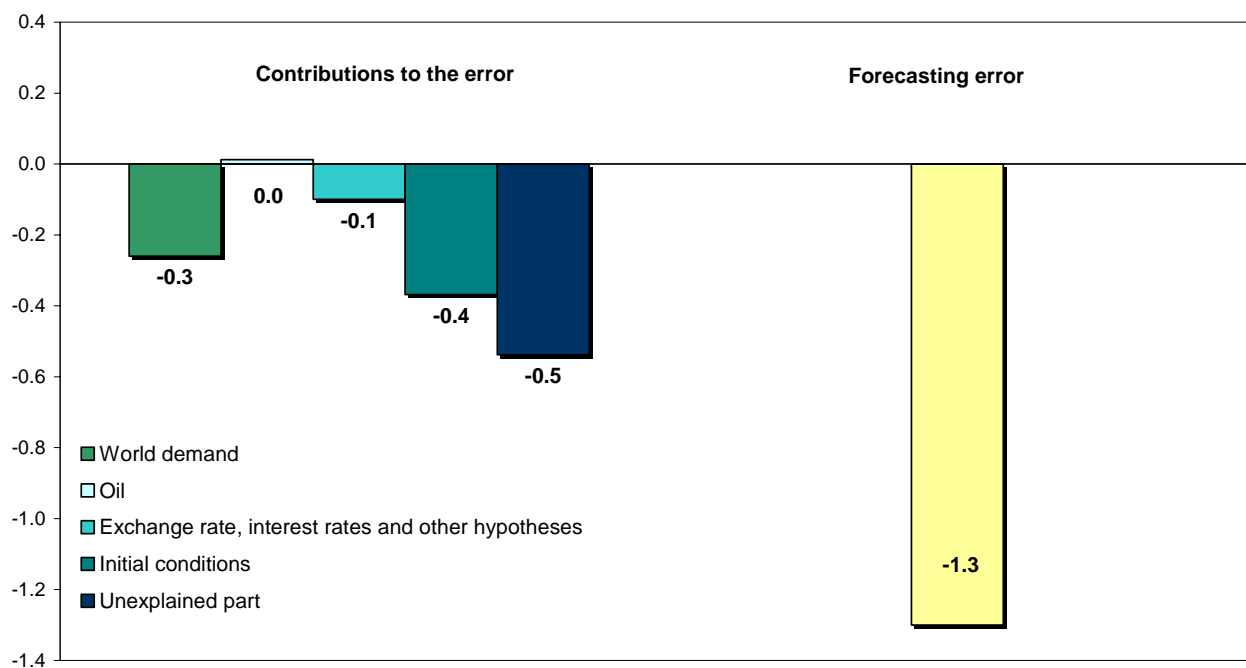
Note: The GDP growth rate in 2008 for Italy was -1 per cent and for the euro area it was 0.7 per cent.

**Figure 9: Revision of the GDP growth estimates for 2009: Italy and the euro area**



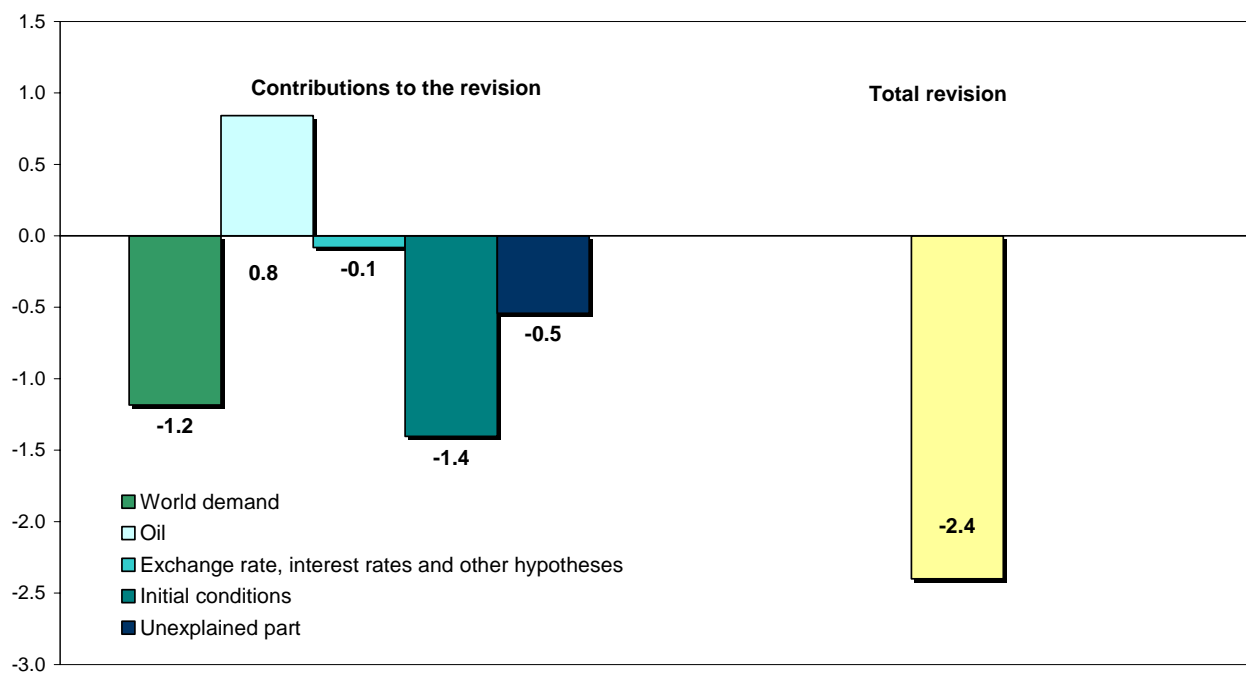
Source: Consensus Economics.

**Figure 10: Breakdown of the GDP forecasting error for Italy in 2008**



Note: Forecast for 2008 published in Banca d'Italia, *Economic Bulletin*, no. 49, July 2008. Contributions to the forecasting error due to the divergence of the hypotheses regarding the main exogenous variables with respect to the actual results and the revisions of the initial conditions.

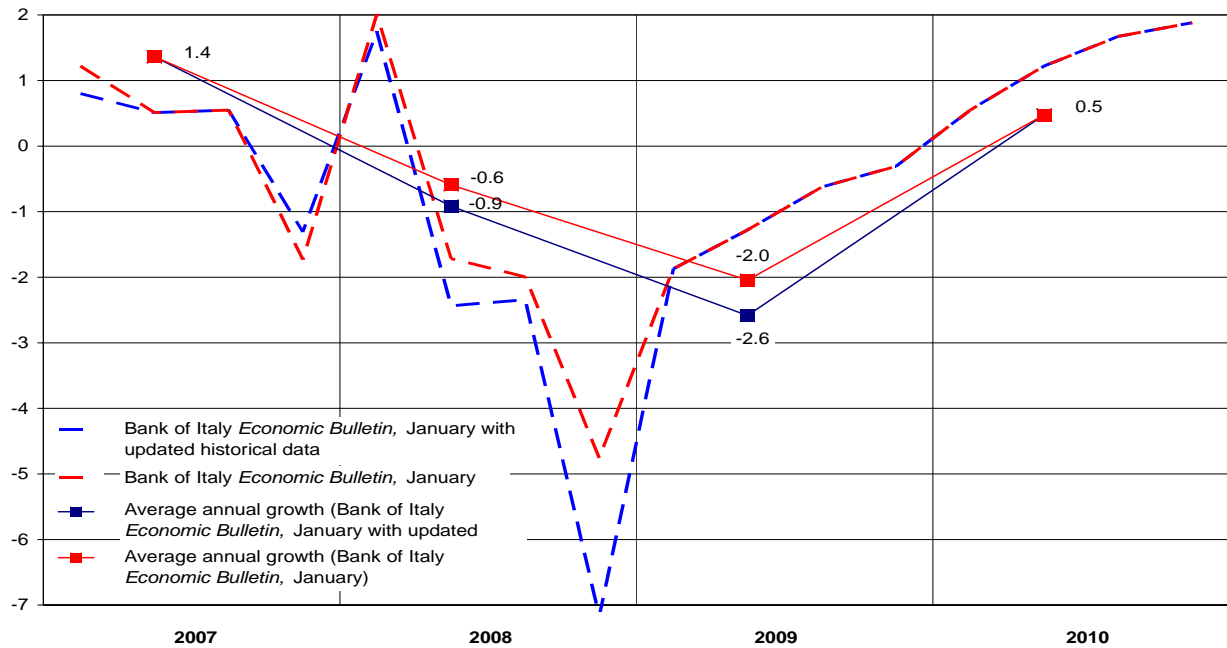
**Figure 11: Contributions to the revision of the 2009 GDP forecast for Italy**



Note: Forecasts for 2009 published in Banca d'Italia, *Economic Bulletin*, nos. 49, July 2008 and 51, January 2009. Contributions to the difference of the GDP growth estimate due to the revision of the hypotheses regarding the main exogenous variables and of the initial conditions.

**Figure 12: Estimates and forecasts of GDP growth rates**

(annualized quarterly and annual data)



Sources: Banca d'Italia, *Economic Bulletin*, no. 51, January 2009 and revisions of national accounts data.

Note: The GDP growth estimate for 2008 not adjusted for the number of working days is equal to -1 per cent.