

# Subprimes: from the financial crisis to the economic crisis

Between 3 and 7 percentage points off growth in the advanced economies in 2009

Jean-Charles Bricongne

Vincent Lapègue  
Olivier Monso

**Divisions:**

**- Short-Term Economic Analysis**

**- Growth and Macroeconomic Policy**

*The financial crisis started in the United States in 2007, on the market for home mortgages granted to the highest-risk borrowers (subprime mortgages). It gradually spread to all the financial markets and ended up reaching the real economy in late 2008.*

*The crisis has its roots in the early 2000s, when there was a fundamental underestimation of risk by the financial institutions, investors, regulators and rating agencies. This underestimation was fuelled by the apparently greater stability of macroeconomic trends (growth and inflation), by the development of new financial products designed to spread risk better within the financial system as a whole but ultimately leading to all trace of this risk being lost, and by fragmented regulation, both internationally and within States, notably in the United States. This underestimation of risk led to a general rise in debt that was increasingly focused on high-risk borrowers, to increasingly lax regulation, and to self-sustaining rises in the prices of financial and real-estate assets. On no other market were these excesses as pronounced as they were on the subprime market: it therefore comes as no surprise that the first cracks should have appeared there, serving as a trigger for the crisis.*

*The financial crisis spread to the real economy through three main channels. First, the financial crisis brought about a confidence crisis which affected all the economic players: the banks were reluctant to lend to each other, while households, fearing unemployment, bolstered their savings. Next, access to credit became costlier and more difficult: faced with a higher risk of defaults, lenders made borrowers pay more for credit or even refused to lend at all. Credit restrictions and the confidence crisis had a particularly negative impact on household and corporate investment. Finally, the drop in demand caused a slowdown in world trade, spreading the crisis to the world economy as a whole.*

*In return, the deterioration of the real economy has kept the financial crisis going. This is particularly true of the fall in house prices, which contributed to the subprime crisis.*

*In total, the crisis could cost 3 to 7 growth percentage points in 2009 in the various advanced economies. The United States and the United Kingdom, both of which were at the source of the crisis, should be strongly affected. Japan and Germany are less directly affected by the financial crisis but are likely to suffer from a clear slowdown in business owing to their particular exposure to world trade. France, hit less directly by the financial crisis and less sensitive to the decline in world trade, should suffer from a slightly less marked contraction in activity.*

*A financial crisis which led to an almost worldwide recession*

The financial crisis triggered in summer 2007 led to an almost worldwide recession by late 2008, one which has spared none of the major industrialised countries and very few of the emerging ones. This special analysis attempts to describe and evaluate the chain of events which led to this recession.

First we look back at the sequence of events in the financial crisis in order to understand how it evolved from being, on the face of things, restricted to a specific area of the American mortgage market, to a global financial crisis. Then we address the mechanisms by which the crisis was transmitted to the “real” economy and propose a quantification of it using the NiGEM multinational model.

### I A massive underestimation of risk behind the current financial crisis

*Risk premiums had dropped to excessively low levels prior to the crisis*

The financial crisis was fuelled by the conjunction of three sets of factors. First, a favourable macroeconomic environment characterised by reduced volatility in growth and inflation - what economists called the “Great Moderation” (see, for example, Blanchard and Simon, 2001) - led people to believe that macroeconomic risk had virtually disappeared. The result was an excessive drop in risk premiums on a wide range of securities. This led to rises in asset prices which, by a classic mechanism, heightened expectations of future price rises, bringing about the formation of “bubbles”. To provide investors with high returns, fund managers were encouraged to turn to increasingly risky assets. The abundance of cash worldwide and low interest levels also favoured “the leverage effect”, meaning the use of borrowing to finance the purchase of these assets.

*Sophisticated financial products were developed without satisfactory evaluation or control*

Second, financial innovations led to the creation of new, sophisticated products (securitisation, securitisation of securitisation, derivatives, etc.), the commonly recognised advantage of which was that they shared the risk between the largest possible number of agents, and provided greater stability to the financial system. However, the drawbacks of such risk dispersion, leading to a great opacity in the financial products created, were not correctly perceived in the absence of any longer-term view and of appropriate incentives in terms of quality control.

Third, the financial regulation instruments themselves had major shortcomings in relation to these developments: shortcomings in appraising risks that had disappeared from bank balance sheets via securitisation, derivatives, etc., and a lack of coordination between regulators at national and international level, particularly in the United States where regulation is shared between a number of different players (the Fed, the SEC<sup>(1)</sup>, specialist institutions regulating the Fannie Mae and Freddie Mac mortgage underwriting firms, and the individual States responsible for regulation of local financial institutions, etc.).

*In particular, subprime loans became commonplace in the USA*

The American subprime mortgage market provides the most striking illustration of these excesses. American households that had previously had very limited access to credit because of their insufficient guarantees in terms of income, employment or assets were now offered the possibility of taking out home loans that were better adapted to their needs. The expansion of these loans got out of control over the years, however. The total number of these subprime loans increased considerably, from 2.4% to 13% of all outstanding mortgage lending in the USA between 1998 and 2007, and even 40% of new loans taken out in 2007.<sup>(2)</sup>

(1) The Securities and Exchange Commission, the agency in charge of regulating American financial markets.

(2) Speech by Ben Bernanke to the Jackson Hole Symposium on 31 August 2007.

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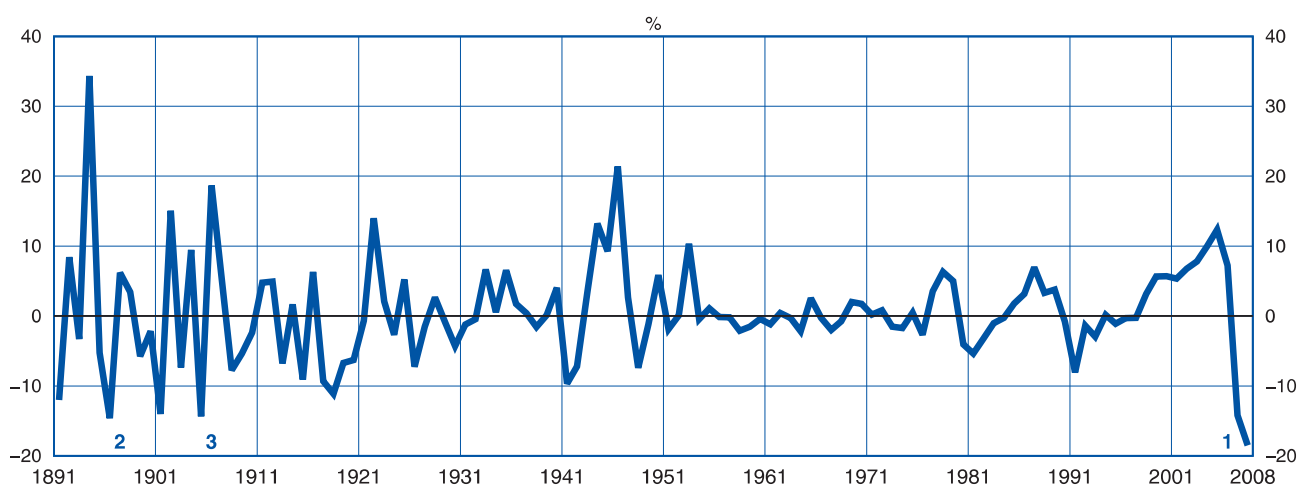
These loans were guaranteed by the value of the house as collateral (mortgage), and the risks taken by lenders increased during the period of continuous rises in house prices. The lenders even allowed borrowers to take out new loans guaranteed by their unrealised capital gains, among other things to finance the purchase of durables.

*Spreading loans out between bank balance sheets diminished their transparency and legibility*

A substantial part of the housing loans granted to households were proposed by brokers often operating on behalf of poorly-regulated or little-regulated non-banking institutions. These high-risk mortgage debts were spread out among the balance sheets of a large number of financial institutions via the securitisation mechanism: financial securities were generated by assembling housing loans. The banks did not always buy and sell these securities themselves, but went through conduits ("special purpose vehicles"), allowing them not to include these securities in their balance sheets. At each stage the asset was not only transformed into another asset, but it was also often diluted in a portfolio in order to pool the risks, which also tended to make it even more opaque.

The inherent dangers of these financial instruments were underestimated by investors and rating agencies, as can be seen in the downgrading of ratings since April 2007. In the first place, the correlation between default risks increases historically when there is a slump in the American real-estate market. Assessing repayment default risks using observations made in a period of continuous house price rises therefore led to an underestimation of the risk correlation. Secondly, the multiplication of middlemen made risk exposure less transparent. Thirdly, the transfer of risk increased the probability of default as it reduced the incentive for lenders to check the solvency of borrowers, because the lenders did not bear the majority of the default risk themselves, and the entities that had taken on the risk had not checked thoroughly enough that the borrowers were able to repay the loans. The apparent security provided by risk-sharing paradoxically led people to take greater risks. Fourth, since a significant proportion of the business came from local players, the regulation of these protagonists was the responsibility of the States, who generally had neither the skills nor the incentive to conduct strict monitoring.

### 1 - United States: annual property price growth rate



Note: the last point corresponds to the year 2008. The three main falls since 1891 are indicated on the graph.  
Source: DataInsight and R. Shiller (2000) (This index is available on the webpage of Robert Shiller:  
<http://www.econ.yale.edu/~shiller/data.htm>)

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### *The subprime crisis was the trigger*

It is therefore no surprise that subprime loans were those through which the crisis first manifested itself. The limits on debt levels, the downturn of the real-estate market and the rise in base rates finally invalidated the assumptions upon which the development of subprime credit was built. First, American household debt reached a level such that housing demand could no longer continue to grow at such a sustained rate. House prices levelled off and then, starting in mid-2006, experienced the most spectacular drop in more than a century (see *Graph 1*), with a clear housing supply surplus (stocks of new houses, which represented around four months of sales until 2005, grew continuously to 13 months of sales at the end of 2008). This slump in prices made the situation untenable for households, particularly as in many cases their repayments were growing over time. At the same time, the Fed continued to raise its base rates as it had done since 2004, adding an extra burden to people paying monthly instalments on floating-rate loans.

With the rise in interest rates and the continuing drop in the value of real-estate, repayment defaults became increasingly common on both subprime and prime loans (prime loans differing from subprime loans in that they are for borrowers who are initially supposed to be less risky), particularly on adjustable-rate mortgages, and a rise in the number of repossessions ensued (see *Graphs 2 and 3*).

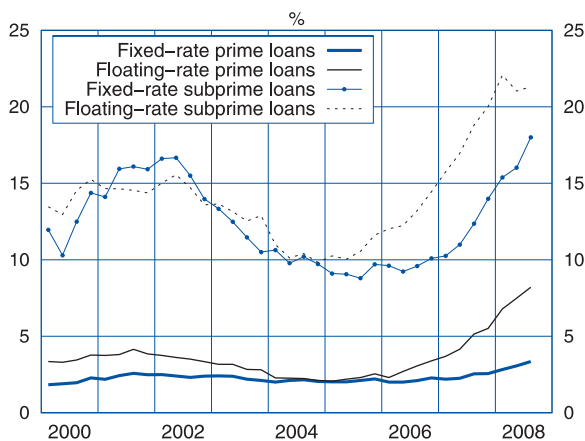
### **The financial crisis has sustained itself and has spread against a backdrop of generalised mistrust**

### *The crisis has spread to all the financial markets and the real economy*

Although it initially seemed to concern only the subprime market in the United States, the crisis gradually spread to all the financial markets and the real economy via a number of mechanisms (see *diagram next page*).

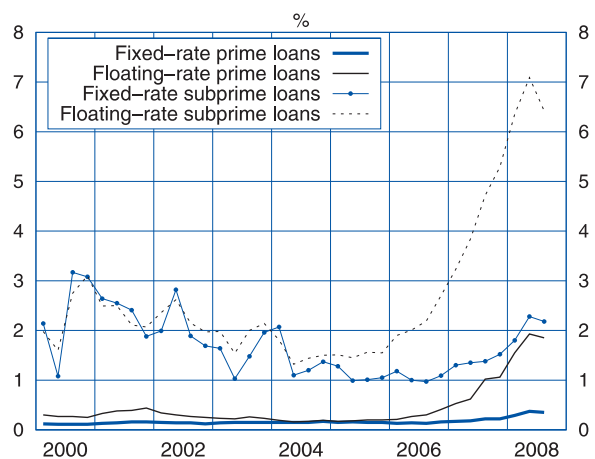
The defaults among American borrowers created a self-sustaining drop in house prices. When the debt of an American household is higher than the value of its real-estate, it has the option of cancelling repayment of the debt and having the house repossessed. The house is then put up for sale by the creditor. By increasing the quantity of homes on sale, this mechanism brought about a drop in house prices and increased the number of households that stopped their repayments, thereby causing a downward spiral. Home-loan defaults and repossessions multiplied in the United States.

**2 - United States: default rates for the main categories of loans**



Source: DataInsight. The last point corresponds to Q3 2008.

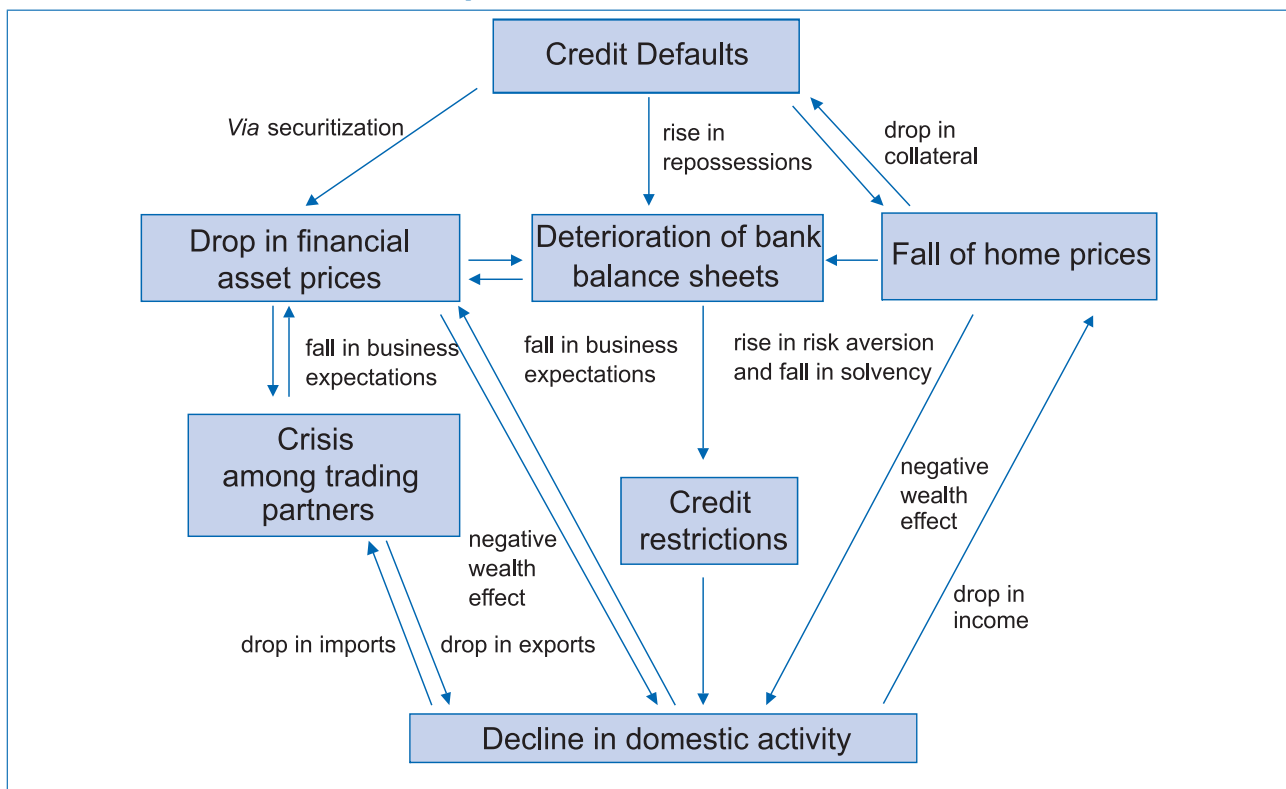
**3 - United States: share of loans entering foreclosure proceedings, by category as a %**



Source: DataInsight. The last point corresponds to Q3 2008.

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### Sequence of events in the crisis



#### *Mistrust between banks grew and risk premiums increased*

The financial crisis gradually spread to all the financial markets, starting with the United States. Risk premiums, i.e. the supplementary charges demanded by lenders to cover the risk of default, increased on securitisation products, as the probabilities of default were revised upwards and lenders had less appetite for risk. The lack of transparency due to the multiplication of middlemen between the lender and the borrower rapidly caused a confidence crisis: as they could not discriminate between good and bad assets, economic players turned their backs on whole categories of assets. Mortgage-backed securities in particular could no longer find buyers, as their valuation was deemed to be too uncertain.

#### *Depreciation of assets affected the prudential ratios of banks*

Mark-to-market accounting (except for assets explicitly acquired to be kept until their term) forced banks to register the drop in asset value immediately. From summer 2007, the banks therefore had to post asset write-downs in their accounts each quarter. However, the banks are obliged to comply with prudential (or solvency) ratios, defined as the ratio of their equity to their assets, with the latter being given a greater weighting as the associated risk increases, in accordance with the so-called "Basel" solvency criteria. Additionally, the use by the banks of special purpose vehicles had allowed them to get round this regulation by excluding certain assets from their balance sheets. But as the loss in value of the assets was threatening the survival of these vehicles, the banks were forced to re-integrate them into their own balance sheets, thereby making those balance sheets that much worse. In order to restore the prudential ratios, the banks sold off part of their assets whilst making capital increases, thereby increasing the supply of securities and further contributing to the slide in the markets.

As the existence of these special purpose vehicles was a source of opacity and uncertainty, a climate of mistrust set in between the banks, which among other things refused to exchange cash<sup>(3)</sup> with each other. This can be seen in the large, persistent spreads between the base rates and the interbank interest rates (Euribor and Libor, see the 'Financial markets' note).<sup>(4)</sup>

*The worldwide financial crisis paralysed certain markets*

The worldwide nature of the crisis is one of its most distinctive features, with the majority of countries being affected. Subprime loans mainly exist in the United States (and to a lesser degree in a few other countries such as the United Kingdom) and the loans mainly came from American banks. The crisis nonetheless spread quickly owing to the interdependence of financial institutions, to securitisation which gave investors access to foreign real-estate markets, and to the re-evaluation of the price of risk. The drop in the price of risky assets in the United States affected the European banks which had such assets, thereby diminishing their demand and fuelling the slide of the European stock exchanges. After the United States, the European money markets were therefore hit by the confidence crisis.

*Increased prudence led to a "flight to quality"*

Conversely, other assets enjoyed a return to favour, due to greater prudence among investors. This prudence resulted in investors switching to public bond markets as they preferred to invest in public bonds, renowned for being safer (a phenomenon known as a "flight to quality").

*The central banks brought down their interest rates and provided the banks with cash*

As the banks were facing balance sheet difficulties, notably in their refinancing operations with each other or with the central bank, the central banks were therefore obliged to intervene massively and repeatedly from summer 2007. They reacted by increasing the quantities of cash lent to the banks and by lowering the base interest rates, sometimes both at the same time.

*The bankruptcy of Lehman Brothers brought new tensions...*

After a period of relative stabilisation in 2008, tensions on the financial markets once again took a turn for the worse in September 2008 with, among others, the bankruptcy of the merchant bank Lehman Brothers. Its creditors found themselves in difficulty. The investment funds that directly or indirectly owned Lehman Brothers securities found themselves short of cash and had to sell off assets, mainly shares, in order to repay their clients, thereby aggravating the drops in prices. Additionally, as Lehman Brothers was known to be a counterparty in many over-the-counter contracts, the risk of disorderly closing out of these contracts endangering the financial institutions involved paralysed interbank markets. The bankruptcy of such a high-profile bank also caused investors to revise the probabilities of other banks going bankrupt upwards, as revealed by the increase in rate spreads between interbank loans and loans granted to States.

*... which did not disappear altogether after public intervention*

This renewed risk aversion sparked new tensions on the world equity and money markets. Although the plans that were quickly implemented in the United States and Europe and the action of the central banks significantly diminished tensions on the money markets over the following weeks (see below), the equity markets have remained highly unstable ever since. In the United States, Standard & Poor's composite index of December 2008 saw its third-biggest drop since 1872, after the episodes of 1932 and 1938 (see Graph 4).

(3) This cash corresponds to short-term refinancing for banks, enabling them to meet their immediate obligations.

(4) The base rate corresponds to the lowest cost at which commercial banks may borrow from the central bank. When the spread between the market rate between commercial banks and this reference rate becomes too great, it is a sign that the quantities being traded are declining and/or that the lending terms on these trades are becoming stricter.

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### Large-scale losses for financial institutions

To begin with, the banks suffered the consequences of their direct exposure to subprime loans and to repayment defaults by households. The reported or anticipated losses on loans also led them to write down subprime-related assets<sup>(5)</sup> (credit derivatives, notably), forcing the banks to raise equity. Share prices also fell sharply from December 2007 in the United States, dragged down by bank shares and realty, among others.<sup>(6)</sup>

Most calculations of financial institutions' losses caused strictly by the financial crisis focus on those linked either directly or otherwise (securitisation) to the credit market and do not include, for example, the losses in value of the other assets they hold (shares, notably). The most recent evaluations vary between \$2,200 billion and \$2,800 billion worldwide (IMF and Bank of England, respectively). From summer 2007 to summer 2008, these write-downs caused the equity of banks to fall accordingly.

*Subprime-related write-downs have required recapitalisation*

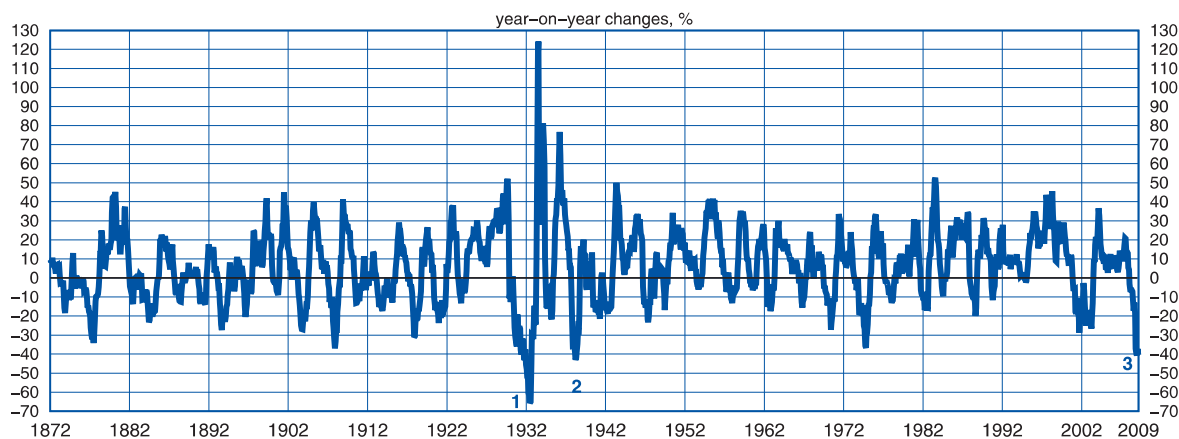
According to the IMF (2009), up to January 2009, around \$792 billion of write-downs were recorded by banks around the world. To cope with this, the banks have raised \$826 billion in capital, including \$380 billion of public money, with the rest provided by the private sector (other financial institutions, enterprises, households...). The future write-downs of American and European banks for 2009 and 2010, net of anticipated income, would imply a net capital requirement of around \$500 billion more to remain solvent, according to the IMF.

Non-banking financial corporations (insurance companies, funds, etc.) have also recorded substantial losses on the assets they manage, thereby reducing the liquidity of the markets on which these investors are active.

(5) In particular, these are Asset-Backed Securities (ABS), securities offering returns based on an asset or an asset portfolio. They include Mortgage-Backed Securities (MBS), securities based on mortgage loans.

(6) This fall did not immediately follow the outbreak of the financial crisis. In fact, the Dow Jones reached its record level in October 2007 when the crisis was already underway in the United States.

### 4 - United States: annual growth rate of the S&P 500 composite index



Note: The last point corresponds to February 2009. The three main falls since 1872 are indicated on the graph.

Source: Standard & Poor's index. This index includes 500 stocks selected from among the largest market capitalisations in the United States. It is available over a long period on the website <http://www.econ.yale.edu/~shiller/data.htm>.

### Massive intervention by the States and central banks

*The States and central banks have used various types of instruments*

Faced with the limits of private initiatives and the usual recovery mechanisms, public intervention has been necessary to safeguard the stability of the financial system and thus limit the effects of the financial crisis on the rest of the economy. The States and central banks have implemented several actions (see box) - traditional (recapitalisation, nationalisation) and less traditional (guaranteeing financing).

*The main central banks have reduced their base rates to very low levels*

As soon as the subprime crisis was triggered in August 2007, the central banks injected huge sums of cash, partly replacing the refinancing between private banks which had gradually diminished.<sup>(7)</sup> They also brought their base rates down sharply. The base rates of the main central banks (Fed, ECB, Bank of England) reached nominal levels never seen before in the history of these institutions: between 0% and 1/4% for the Fed, 1.5% for the ECB and 0.5% for the Bank of England since March.

*The central banks bought securities directly from borrowers*

Alongside these drops in rates, the central banks, notably the Fed, have used three main levers. They have increased the amounts of cash allocated to the banks and relaxed the conditions for supplying this cash. They have also adopted measures targeted to specific markets: purchases of short-term securities such as commercial papers in order to provide liquidities directly to borrowers, provision of liquidities to money market funds, and loans in exchange for the transfer of securities backed by loans to households and SMEs.<sup>(8)</sup> The third lever has

(7) On this subject, see for example, the focus on "money markets strained but not necessarily short of liquidities" in the INSEE *Conjoncture* in France in December 2008.

(8) This programme is called the Term Asset-backed securities Loan Facility (TALF).

### Box - Government plans to support the financial sector

Faced with the crisis and the difficulties encountered by financial institutions, the States are intervening using several levers. To avoid the risk of a chain of bankruptcies of financial institutions and to allow them to bolster their equity, the States have injected capital into the banks in different forms (preferred shares, subordinated securities...), even going as far as de facto nationalisation. The terms of recapitalisation vary, as the capital injection is likely to have a "stigmatising" effect in the eyes of the beneficiaries. One possible solution announced in late 2008 in several States, including France, consists in recapitalising the main banks according to criteria without a direct link to the crisis (market capitalisation, size of balance sheet...), even if this means some banks refuse to benefit from it. The capital injection may also be subject to conditions, with, for example, the banks undertaking to provide a given amount of loans to companies. These recapitalisations are "traditional" measures with a number of precedents in the past.

More original are the guarantees provided by the States to enable the banks to raise equity. These measures appear to be a complement to the action of the central banks, implemented in order to guarantee interbank refinancing. The sums at stake are large, but only imply the use of public money if a bank encounters repayment difficulties. These guarantees may also serve to re-stimulate certain markets such as the securitisation market. Also, the commitment by the government to guarantee full repayment of deposits seems to be a further, indispensable guarantee of the existing measures bearing in mind the amounts at stake.

Buying up the banks' doubtful assets to shore up their balance sheets and re-establish confidence in the solvency of financial institutions has also been envisaged in the United States. This solution is difficult to implement owing to the difficulties in defining the purchase price for the assets that are at the heart of the crisis. If it is too high, this price is an extra cost to the taxpayer; if it is too low, it is of little help to the beneficiary banks and may even aggravate the situation of all the banks if it forces them to depreciate assets once again.

The creation of a structure for the transfer of toxic assets (a "bad bank") is also a possible solution. It opens up the possibility of deferring the moment when any losses are posted and re-establishes confidence in the assets remaining on the balance sheet. Nevertheless, this operation may bring about costs in terms of reputation and cause major legal problems. Last, the States may broaden the scope of action of the central banks, in particular by diversifying the type of financial assets that they can buy. For example, in January 2009 the British Treasury gave the Bank of England the means to increase the cash available to banks and businesses by buying assets from them directly, which it has started to do (a policy known as "quantitative easing").

State intervention in order to guarantee the stability of the financial system aims to avoid the collapse of the economic system and, once this is achieved, to support business activity. The reinforcement of banks' equity allows them to stick to the prudential ratios, and reassures customers as to their soundness. It thereby prevents them from excessively reducing the volume of loans granted and penalising investment and consumption. ■



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consisted in directly buying long-term securities: these securities are therefore destined to remain longer among the assets of the central banks than the securities under repurchase agreements with the commercial banks which refinance themselves with the issuing institution. Taking on this type of asset involves risks of losses for the central banks and raises the issue of refinancing them.

These measures have helped reduce the tensions on the money markets that had peaked after the bankruptcy of Lehman Brothers. They have also to a certain extent limited the negative impact of the crisis on the granting of loans. However, this has not been visible as regards the volumes granted, which are still slowing in most developed countries, notably because there is a dip in demand itself.

### II The financial crisis is likely to cost 3 to 7 growth percentage points in the main advanced economies in 2009

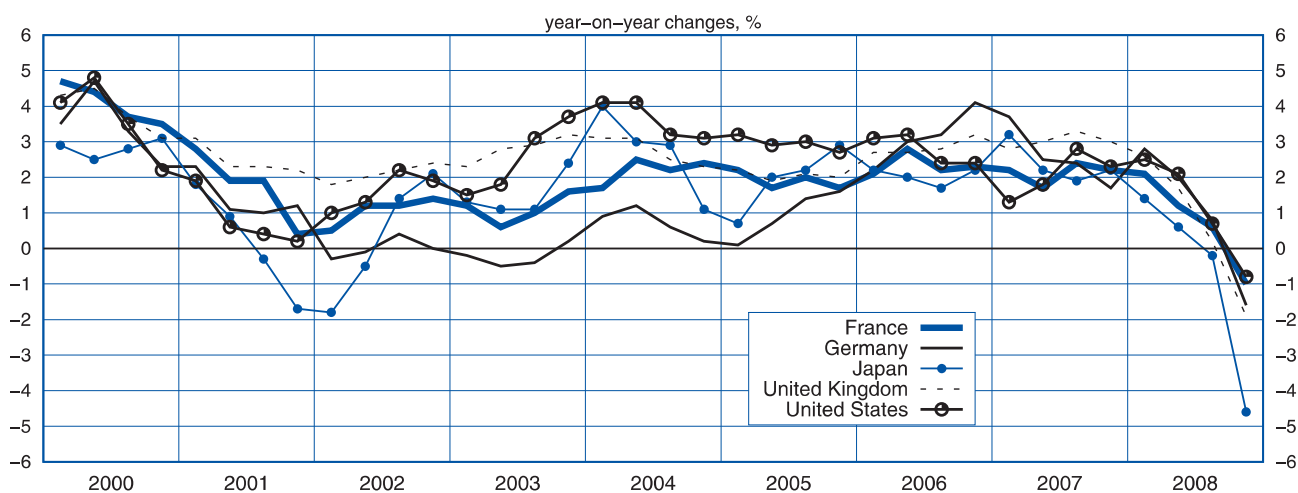
*In 2008, the advanced economies were hit in an extremely synchronised way*

The intensification of the financial crisis after the fall of Lehman Brothers caused the world economy to stall suddenly, affecting the advanced and emerging economies alike. All the countries were hit in a highly synchronised way, as has been demonstrated both by business and consumer surveys and by the GDP trends in the fourth quarter of 2008 (see Graph 5).

The financial crisis spread to business activity through three main channels. First, the sharp decline in household assets incited them to restrict their expenditure. Second, in order to restore their solvency ratio, the banks restricted access to loans, a factor which has weighed heavily on household consumption and investment and has put a brake on corporate investment. For companies, these restrictions have come on top of a higher cost of financing through the rise in the cost of bank loans, the rise in risk premiums demanded by investors to subscribe to corporate bond issues, and the rise in the cost of equity owing to the stock market slide. Last, the crisis has even spread to countries that should not have been so directly affected by international trade and the adjustments to exchange rates which may be more or less attributed to the crisis (the appreciation of the yen in particular may be attributed to the unwinding of carry-trade operations<sup>(9)</sup>).

(9) These are operations in which investors borrow in one currency with low interest rates and invest what they borrow in another currency with higher interest rates.

### 5 - GDP growth rate in the main OECD countries



Source: DataInsight. The last point corresponds to Q4 2008.

Although this latter mechanism spreading the crisis internationally does not in principle change the weight of the global adjustment, it does distribute it differently between countries and must be taken into account in explaining, for example, the extent of the drop in GDP in Germany or Japan.

### **A global macroeconomic model allows the crisis-transmission channels to be taken into account**

*Quantification is based on use of the NiGEM multinational model...*

A multinational model is needed to take all these inter-dependencies fully into consideration. We use the NiGEM model by the National Institute of Economic and Social Research (NIESR). This model serves to quantify the wealth effect and the rise in the cost of financing, whilst taking account of the effects of transmission by world trade. For these purposes, we compare two scenarios: the first includes the macroeconomic figures that have been observed, extended by the forecasts in this *Conjoncture* in France; the second simulates the trajectory of the economy under the assumption that the variables involved (household wealth, cost of financing, oil prices, exchange rates, etc.) remain at their pre-crisis level or trajectory. We evaluate the effects of the crisis on the years 2008 and 2009, when they caused significant effects on the real economy. We assume in particular a start date for the crisis and estimate how the variables concerned would have been modified if there had been no crisis. A comparison of these two scenarios then provides an estimation of the macroeconomic effects of the crisis.

*... with some of the effects of the crisis coming through "non-model" behaviour*

This stage alone is insufficient, however. The usual economists' tools are limited when exceptional situations are analysed. On the one hand, the diagnostic of macroeconomic models is flimsy in a crisis period because the econometric relationships that they take into account between the key aggregates can only reproduce the average behaviour of agents in a "quiet" period. On the other hand, these models do not integrate all the mechanisms at work in times of crisis. The NiGEM model does not fully capture the difficulties of obtaining loans from banks, for example: it only takes them into account insofar as they are combined with a rise in the cost of loans. Additionally, it only imperfectly takes account of the deterioration in the confidence of households and businesses. In a second stage, we therefore attempt to analyse the effects not taken into account by the model, examining how consumption and investment behaviours have themselves been altered since the crisis. Indeed, consumption and investment are the demand components upon which the phenomena under study weigh the heaviest. The second stage serves to attribute to the crisis the recent trends in these variables that the model cannot explain. This approach offers two advantages: it serves to pinpoint the countries in which the effects of credit rationing probably come most into play, and to supply an evaluation of the international spread of this type of shock.

### **"Wealth effects" and worsening unemployment affect household consumption**

*In the United States, household consumption has suffered from the depreciation of assets*

Household assets, be they financial or real-estate, have been affected by the fall in asset prices. In particular, the assets of American households have suffered a large drop in value (see *Graph 6*), falling by around 10% between Q3 2007 and Q3 2008. This loss of household wealth reduced their ability to borrow and weighed heavily on consumption from Q1 2008, owing to a negative "wealth effect" (Aviat et al., 2007). This is confirmed when growth in consumption is broken down into its usual determinants using the NiGEM model (see *Graph 7*). In Q1 and Q2 2008, the wealth effect was however compensated for, first by the disposable income of households being maintained, then by a sharp rise in this disposable income, as the US government brought in tax cuts which sustained income.

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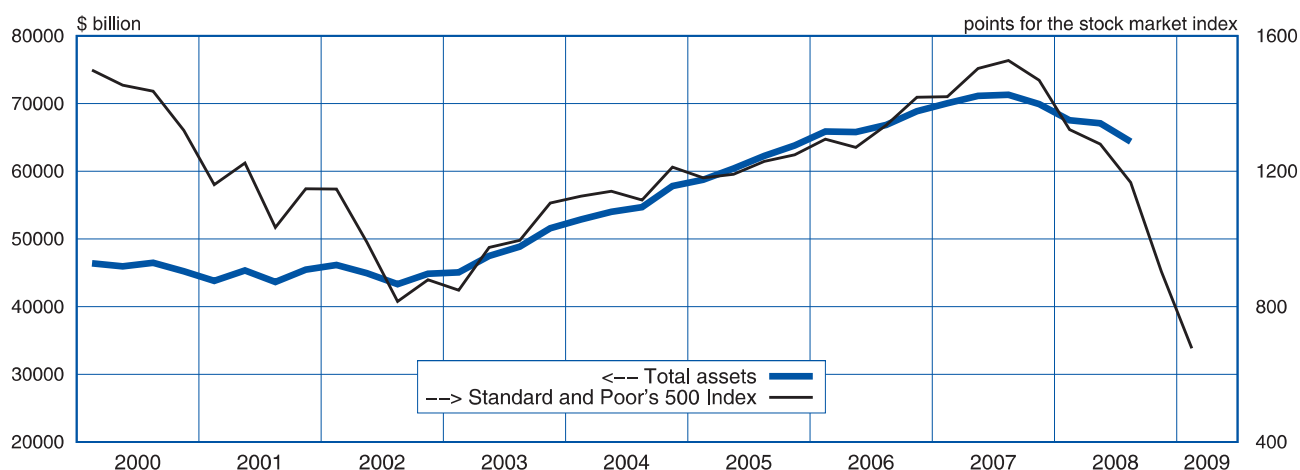
In Q3 2008, American consumption fell sharply because of the depreciation of household assets. However, the drop observed was far greater than what the wealth and spending power effects could possibly explain. This drop can probably be put down to new restrictions on the granting of consumer loans and to deteriorating confidence in the face of rising unemployment and the financial crisis, which are not taken into account by the model.

*In France, consumption has suffered more from stagnating income than the depreciation of assets*

In France, the drop in household wealth seems to have had no effect on household consumption in 2008 (see Graph 8). First, the depreciation of their assets has been limited. Second, French consumption is far less sensitive to variations in household assets than American consumption (Aviat et al., 2007).<sup>(10)</sup> In 2008, the effect of the crisis was nonetheless felt in terms of activity and the disposable income of households (see Graph 8), with the latter stagnating in Q1

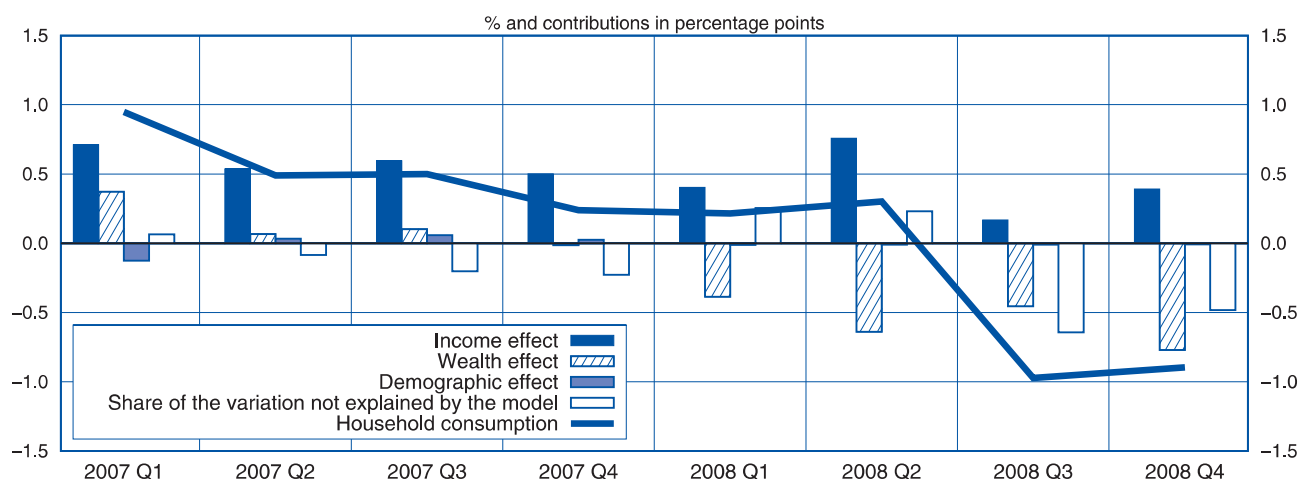
(10) In the United States, a variation of one dollar in wealth implies a variation of 5.8 cents in consumption, according to the study mentioned here. In France, the same calculation gives a result of de 0.4 centimes per euro.

### 6 - United States: household assets in sharp decline



Note: for total assets, the last point corresponds to Q3. For the stock index, the last point corresponds to 9 March 2009. The decline in assets resulting from the stock market slide and the continuing fall in property prices is probably large in Q4.  
Source: Flows of Funds, Federal Reserve

### 7 - United States: household consumption and the contributions of its main determinants



Source: calculations by the authors using the NiGEM model

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then diminishing in Q2. This effect on income was compensated for in Q4 by the drop in consumer prices, itself closely linked to the fall in oil prices. For H2, we do not find a notable unexplained component, unlike for American consumption.

*The stock market and property crises should affect consumption in all advanced countries in 2009*

A measurement of the wealth effects by the NiGEM model (see Table 1 and Appendix) indicates that the drop in share prices at the end of 2008 should bring about a negative impact on GDP which is estimated to be far greater in 2009 than in 2008. The United States and the United Kingdom stand out by a very negative effect, notably due to the extent of the property crisis in these countries. Household consumption is likely to be visibly affected by the crisis through the drop in activity and the wealth effects. Greater caution among households and the tightening of consumer credit conditions will also come into play, but are more difficult to quantify here: they are only imperfectly taken into account by the NiGEM model and are therefore partially to be found among the elements that are not explained by the model of changes in consumption.

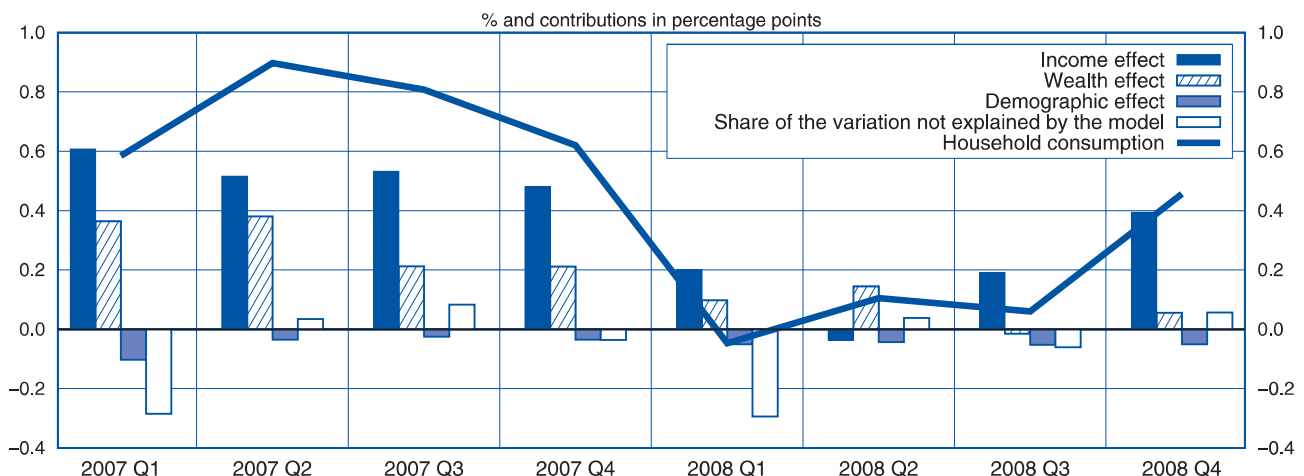
**Table 1**  
**Estimated impact of the financial crisis on growth via wealth effects in several advanced economies**

*Impact on growth in GDP percentage points*

	2008	2009
France	0.0	-0.9
Germany	0.0	-0.8
Italy	0.0	-0.5
Spain	-0.1	-0.8
United States	-0.2	-1.9
United Kingdom	-0.1	-1.6
Japan	0.0	-0.9

Source: calculations by the authors using the NiGEM model and INSEE forecasts

### 8 - France: household consumption and the contributions of its main determinants



Source: calculations by the authors using the NiGEM model

## Subprimes: from the financial crisis to the economic crisis

### Credit restrictions, shrinking outlets and corporate caution affect investment

The financial crisis is affecting household and corporate investment via the credit channel. These agents are faced both with higher financing costs and tougher conditions on granting loans.

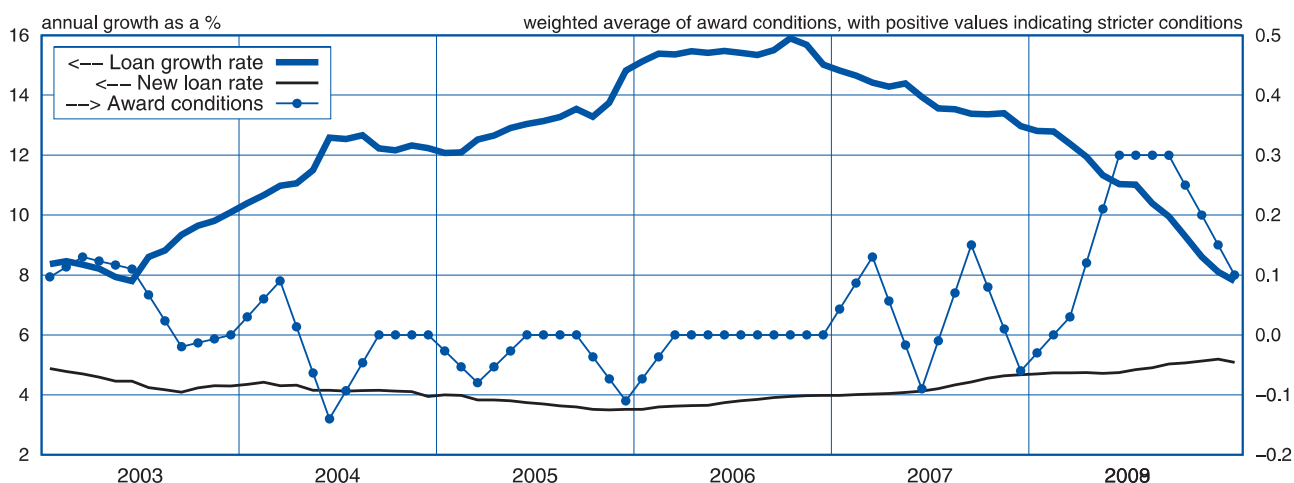
*Housing investment is penalised by credit restrictions and the reversal of price expectations*

In France, access to investment credit became harder in 2008, whether to invest in capital goods or to buy a home. This effect was particularly visible in home loans (see Graph 9), where this tightening of loan conditions came hand-in-hand with a rise in interest rates. Furthermore, the reversal of price expectations brought down demand. The amount of loans granted thus continued to grow but at a much slower rate, as in most developed countries.

*Businesses struggling to finance their investments*

Businesses saw their financing conditions on financial markets deteriorate, in particular owing to the rise in risk premiums demanded by lenders. In France, net issues of debt securities (bonds and negotiable debt securities) fell to a level close

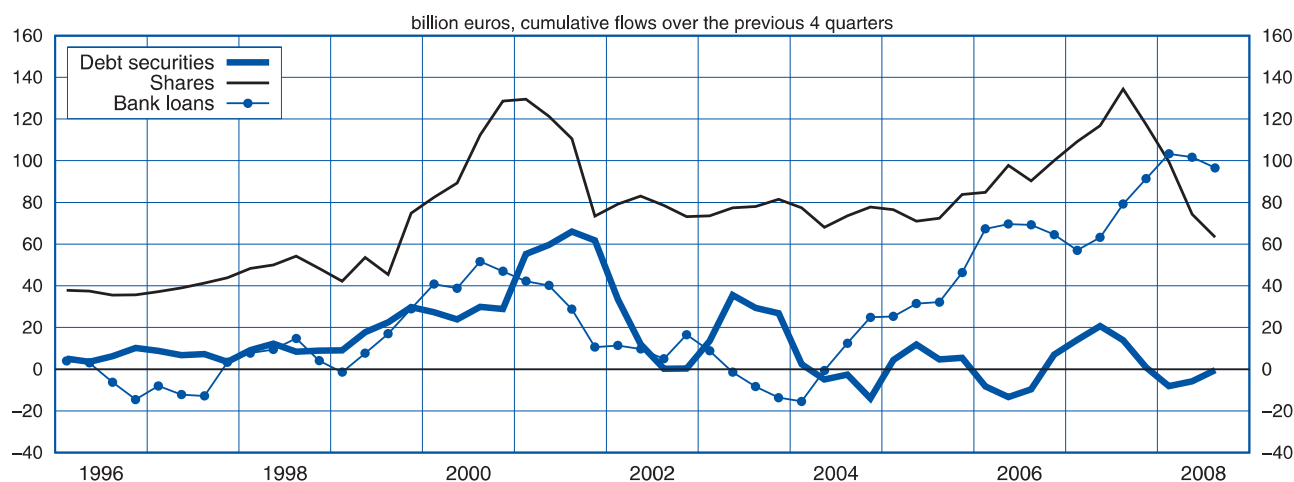
### 9 - France: growth, conditions and cost of home loans for households



Note: the last point corresponds to January 2009. The award conditions are defined by the net balance of the responses given by the banks on their loan award conditions (tighter or easier), weighted by the amounts of loans granted.

Source: Banque de France, survey of banks on credit distribution

### 10 - France: financing sources of non-financial corporations



Note: The last point corresponds to Q3 2008. The flows are net, and correspond to the differences between issues and repayments.

Source: quarterly national financial accounts

## Subprimes: from the financial crisis to the economic crisis

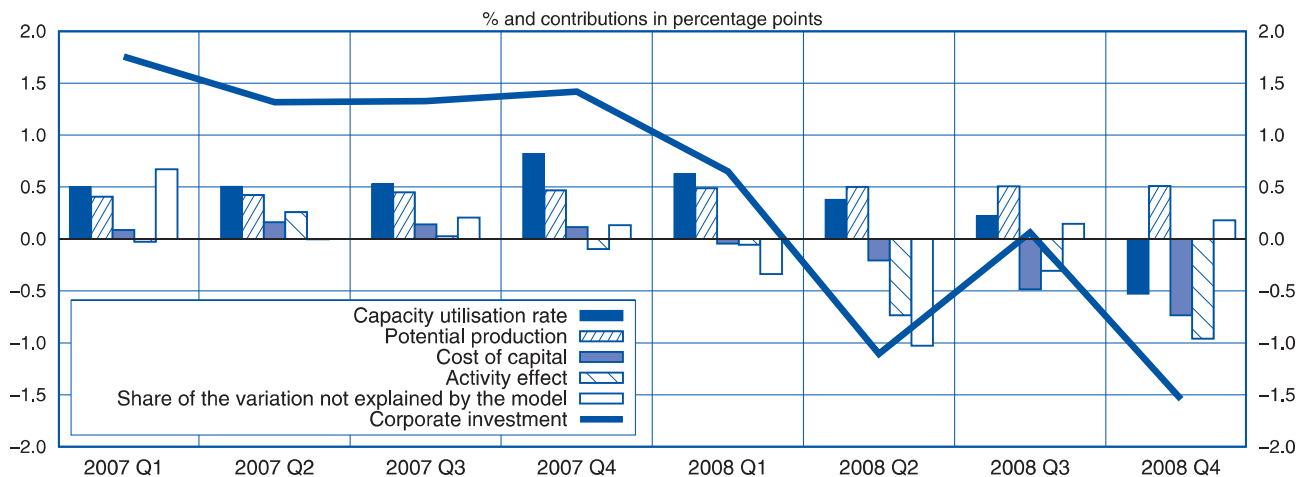
to zero at the end of 2007 and stayed there until Q3 2008 (see Graph 10). Share issues fell sharply over the same period. Recourse to bank loans only partially compensated for the reduction in other types of financing and net credit flows have diminished since Q1 2008.

The NiGEM macroeconomic model can evaluate the effect of the rise in financing costs as well as the slowdown in trade outlets. However, it cannot explicitly evaluate either the impact of credit restrictions or that of the increased caution of agents in times of crisis.

*A limited impact of tighter credit conditions on corporate investment in France...*

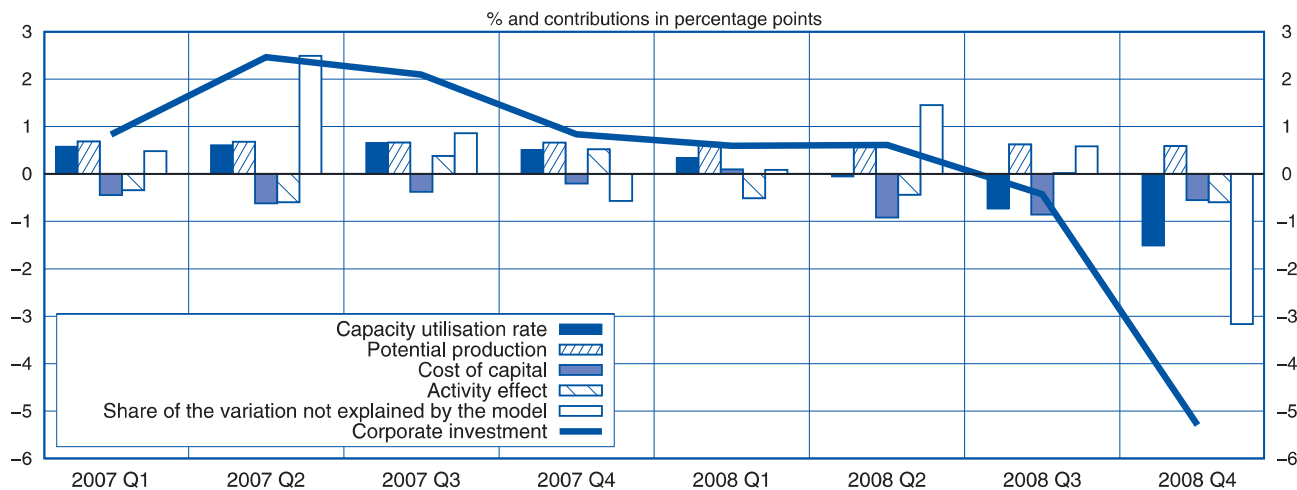
In France, according to the NiGEM model, the rise in the cost of credit and the drop in trade outlets nonetheless explain the main part of the fall in investment compared with Q1 2008: these are the "cost of capital" and "activity" effects in Graph 11. Q2 2008 is, however, an exception: the unexplained part plays the biggest role. In total in France, there does not yet seem to have been any significant impact of restrictions on credit to enterprises.

**11 - France: corporate investment and the contributions of its main determinants**



Source: calculations by the authors using the NiGEM model

**12 - United States: corporate investment and the contributions of its main determinants**



Source: calculations by the authors using the NiGEM model

*... but more significant in the United States*

In the United States unlike in France, the rise in the cost of credit seems to have played a minor role in the drop in investment in Q4 2008 (see Graph 12). The tightening of credit conditions reported since Q2 seems to have come fully into play at that moment, suggesting that there is a major unexplained part.

*The re-evaluation of risk should have more notable effects in 2009*

The interest-rate and risk-premium variables, which are present in the NiGEM model, serve to take account of the increased cost of access to financing (see Table 2 and Appendix). They provide the possibility of a very partial evaluation of the effect of this channel in the seven countries studied. Spain, the United States and France appear to be the countries in which this effect is the most notable. Here once again, the rise in the cost of financing should mainly be felt in 2009, following the heightened financial and bank tensions at the end of 2008. Conversely, this effect seems not to have been pronounced in Japan, where the banking system has been largely spared by the financial crisis.

To obtain the total effect of restricted access to financing, it is necessary to add the effect of tighter credit conditions, which is not identifiable with the NiGEM model. In particular, the slide in world stock markets has caused the financial situation of banks to deteriorate, leading them to grant loans more selectively. An estimation using a macroeconomic model by Bayoumi and Melander (2008) suggests that the successive shocks on the balance sheets of the American banks starting from Q2 2007 should lead to a further decline in GDP in the United States of 0.3 to 0.4 points in 2009.<sup>(11)</sup>

### Oil prices and exchange rates play an important role

*In 2009, the fall in oil prices since summer 2008 should play a protective role for the advanced economies*

The fall in oil prices which started in July 2008, largely linked to lower demand because of the crisis, has been a favourable factor for importing countries, after weighing heavily on the economic outlook in H1 2008.

The crisis also resulted in changes to the exchange rates which would not otherwise have happened, suddenly modifying movements of capital. The role of these exchange rate adjustments is, in principle, more difficult to specify. A measurement of these effects with the NiGEM model consisted in stabilising the

(11) The scale of this effect is less than the total of the effects that are unexplained by the model (see below), which is consistent with the fact that these unexplained variations include other effects that are not taken into account in the model (expectations and changes in behaviour).

**Table 2**  
**Estimated impact of the financial crisis on growth via the rise in the cost of financing**

*Impact on growth in GDP percentage points*

	<b>2008</b>	<b>2009</b>
France	-0.4	-1.0
Germany	-0.3	-0.9
Italy	-0.2	-0.8
Spain	-0.4	-1.6
United States	-0.3	-1.0
United Kingdom	-0.3	-0.7
Japan	0.0	-0.3

Source: calculations by the authors using the NiGEM model and INSEE forecasts

**Table 3**  
**Estimated impact of the financial crisis on growth via oil price and exchange rate variations**

*Impact on growth in GDP percentage points*

	<b>2008</b>	<b>2009</b>
France	0.0	0.7
Germany	0.0	0.8
Italy	0.0	0.1
Spain	0.0	0.1
United States	0.0	0.7
United Kingdom	0.1	1.6
Japan	0.0	-0.6

Source: calculations by the authors using the NiGEM model and INSEE forecasts

## Subprimes: from the financial crisis to the economic crisis

oil-price and exchange-rate variables in such a way that their trends correspond more plausibly to what they would have been if there had not been a crisis (see *Table 3 and Appendix*). As these hypotheses started in Q4 2008, the effects on 2008 growth would have been virtually nil. In 2009, the industrialised countries should benefit overall from the drop in oil prices. The United Kingdom should benefit even further thanks to the large drop in the value of the pound at the end of 2008. Precisely the opposite should happen in Japan, which is suffering from the appreciation of the yen over the same period.

### World trade is spreading the crisis to all countries

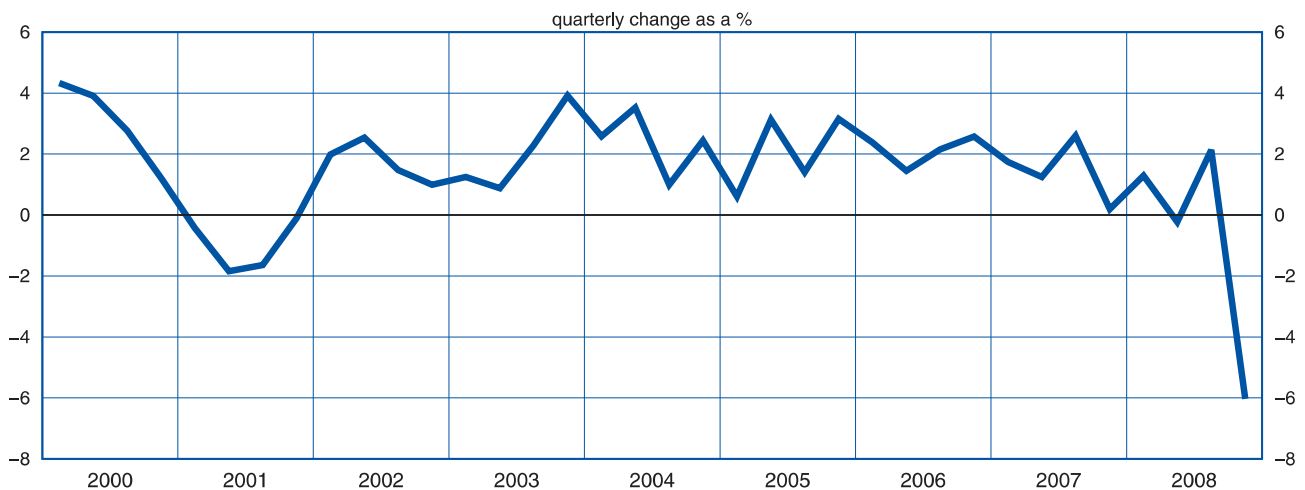
*Germany and Japan are likely to be hit by the decline in international trade...*

The negative impact of the crisis on business activity has led to lower demand for imports and a decline in international trade, perceptible from the end of 2008 (see *Graph 13*).

This decline in trading is contributing to spreading the crisis by the “foreign trade multiplier” mechanism. A drop in activity in one country causes a decline in its imports, thereby reducing the exports and, by the same token, the activity of its trading partners. Imports in these countries diminish in turn, thereby reducing the trade outlets of the other countries and fuelling a downward spiral. Through this mechanism the countries at the origin of the crisis export the crisis, all of which modifies the distribution of the weight of the adjustment between countries.

The countries hardest hit by the downturn in world trade are by some distance Germany and Japan, owing to the dominant contribution of exports to their growth, although this factor may also be an asset during an upswing period. The share of exports in German GDP was 47%, against 27% for France, in 2007. Additionally, German exports are largely made up of capital goods, worldwide demand for which has fallen because of credit restrictions and the decline in trade outlets. Despite a share of only 1.6% of exports in GDP, Japan bore the full brunt of the fall in Chinese imports - which include a large number of Japanese products - from Q4 2008. Japan has also been heavily penalised by the rise in the value of the yen since summer 2008; this appreciation has benefited competing exporting countries.

13 - World: growth in goods trade by value



Source: CPB. The last point corresponds to Q4 2008.



### All in all, the United States, Japan, Germany and the United Kingdom are likely to be most affected by the crisis

*... and the crisis will take a heavy toll there, as in the United States and United Kingdom*

A quantification of the total impact of the crisis on the advanced economies is obtained by aggregating the various transmission channels outlined earlier. This quantification also includes the effects that are not measured directly, such as those of credit restrictions. The countries hardest hit by the crisis should be Japan, Germany, the United Kingdom and the United States (see *Table 4*). While the first two countries should suffer above all from the drop in their exports, the United Kingdom and the United States are likely to be hit by the reversal of their property markets, which was at the origin of the subprime crisis. The devaluation of financial and property assets in these two countries should therefore contribute to more negative wealth effects than in other countries, in the region of 1.5 to 2 GDP points. The devaluation of the pound sterling combined with the fall in oil prices should nonetheless constitute a significant stabilising element in business activity in the United Kingdom, of 1.6 GDP points.

*France should be slightly less affected but the impact of the crisis will still be great*

In France, the drop in the prices of financial assets observed in Q4 2008 and the sluggishness of the real-estate market both mean that the depreciation of household assets should weigh on household consumption in 2009, whereas these effects were not perceptible in 2008. France is also likely to be penalised by the difficulties for households and enterprises to gain access to financing, whether these difficulties are due to the rise in risk premiums or the tightening of credit conditions. These two factors - depreciation of household assets and credit restrictions - will probably affect French growth fairly equally in 2009. This impact should also be amplified by a reduction in trade outlets for enterprises. These companies, anticipating lower demand, are likely to prefer to sell off their stocks rather than produce. The cost of the crisis in terms of growth should therefore be over 4 GDP points in 2009.

*Two uncertainties affect this quantification, one linked to the tools and the other to the hypotheses required for the quantification*

Two key uncertainties surround this quantification. The first relates to the relative fragility of the modeling tools used in this particular context. The second has a bearing on the forecasts or hypotheses for 2009 (see *Appendix*), bearing in mind the extremely unstable present environment. Another difficulty relates to the estimation of the impact of the crisis on oil prices and exchange rates. If there had not been a crisis, the world economy could have suffered from the oil prices staying at a high level. ■

**Table 4**  
**Estimated impact of the crisis on the main advanced economies**

*Impact on growth in GDP percentage points*

	<b>2008</b>	<b>2009</b>
France	-0.8	-4.3
Germany	-1.4	-5.5
Italy	-0.8	-3.1
Spain	-0.7	-4.2
United States	-0.6	-5.5
United Kingdom	-1.6	-5.8
Japan	-1.5	-7.0

Source: calculations by the authors using the NiGEM model and INSEE forecasts

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### Appendix - Quantification of the crisis using the NiGEM model

#### Hypotheses on the model variables that have been affected by the crisis

In order to estimate the effects of the crisis on the growth of the principal advanced economies, we define what a "crisis-free" world would have been and compare this with the observed or forecast actual world. This comparison serves to quantify the effects of the crisis, and distinguishes between the roles of the various transmission channels. The first stage in quantification consists in pinpointing the effects that can be taken into account using the NiGEM<sup>(1)</sup> model (for example, the interest-rate variables to represent the rise-in-credit channel) in order to describe the different channels.

#### Variables related to the devaluation of assets

In the forecasts for 2009, **share prices** stabilised at their value of Monday 2 March for the whole year. **Housing prices** are stable or following a downward trend, depending on the country. For example, the forecast is of a fall of 1% per quarter in France and 2.5% in the United States and the United Kingdom starting from Q1 2009.

In the crisis-free scenario, **share prices** are stable from Q2 2008, that is, before the crash of September 2008. The date on which **house prices** are stabilised is not the same for the different countries. Indeed, this choice takes account of the moment when property prices started to fall in each country.

#### Variables related to the rise in the cost of credit

In the forecasts for 2009, the **base rates** and **ten-year interest rates** follow the hypotheses of *Conjoncture* in France. The **external financing premiums applied to investment and housing loans** are assumed to decrease at the same speed as that observed in the United States over the first two months of 2009.

In the crisis-free scenario, the **base rates** are all stable from Q3 2007. From then on, the main central banks started to lower their rates in response to the crisis, notably the Fed which took account of the financial and property crisis as early as the end of summer 2007. The **ten-year interest rates** on government bonds are also stabilised from Q3 2007. These rates started to fall then, probably under the effect of a "flight to quality". Last, the **external financing premiums applied to investment and housing loans** are stable from Q3 2007. Indeed, these premiums increased massively thereafter under the effect of the subprime crisis.

#### Oil prices and exchange rates

In the forecasts for 2009, the **oil barrel price** and **exchange rates** follow the hypotheses of *Conjoncture* in France for Q1 and Q2 2009. These values are stabilised at their Q2 value for the following two quarters.

In the crisis-free scenario, the **price of the oil barrel** is stable from Q4 2008, at the last price available before the bankruptcy of Lehman Brothers (Friday 12 September, \$101 a barrel). The entire decrease that ensued is thus attributed to the noted or anticipated decline in world demand for oil owing to the crisis. Similarly, the **exchange rates** between the euro, dollar, yen and pound sterling are stabilised at the rates of 12 September (\$1 for €0.72, 108 yen and £0.56). In particular, the sharp fall in the value of the pound sterling and the appreciation of the yen which followed are assumed to be linked to the crisis. The precision concerning the date on which these parity values are set is justified by the fact that these currencies directly concern the countries under study in this report. The other exchange rates are stabilised at their mean value of Q3 2008.

(1) Further information about the NiGEM model can be downloaded from the NIESR site: <http://nimodel.niesr.ac.uk/advert/niesr2nigem.php>.

### **The other variables**

In the forecasts for 2009, the inventory changes are assumed to follow the forecasts of *Conjoncture* in France in the course of Q1 and Q2 2009. Their contribution to growth in the following two quarters is assumed to be equal to that forecast for Q2. Labour market participation rates are assumed to diminish by 0.25 points per quarter, in order to take account of the fact that in a period of crisis and rising unemployment, part of the working population will withdraw from the labour market.

In the crisis-free scenario, the inventory changes are stabilised from Q4 2008. The quarter selected corresponds to the start of major running-down of stocks under the effect of the crisis, observed in France notably. Under the crisis-free scenario, we therefore suppose that this reduction in stocks would not have taken place.

Labour market participation rates are stable from the moment when these rates started to drop, with the corresponding quarter varying according to the country. This stabilisation in the crisis-free scenario is to neutralise the labour market withdrawal effect.

These assumptions are used to make two forecasts with the NiGEM model: the first with these variables at their observed or forecast value, and the second with the hypotheses modified as described above, in order to eliminate all the crisis effects coming through these channels. The global effect of these hypotheses on activity is defined as the difference between the two scenarios. Nonetheless, this effect is too small in relation to the slump in activity worldwide: part of this slump therefore relates to factors unexplained by the model.

### **Pinpointing and quantifying the effects not taken into account by the model...**

For each of the countries considered in this second stage of the quantification (United Kingdom, United States, Germany, Spain, Italy, Japan, France), we consider each of the three components in private domestic demand excluding inventory (household consumption, household and corporate investment), which are most likely to be affected by the mechanisms not taken into account in the model. For each of these components, equations from the NiGEM model define them according to their usual determinants. These determinants are set at their observed or forecast values, consistent with all the data presented in this report.

### **... on consumption and investment...**

The consumption and investment modelled via the NiGEM equations may differ from the observations or forecasts. So there still remains an unexplained component, notably because some factors are not taken into account by the model. For 2009, this difference also reflects the margin of uncertainty surrounding the forecasts. The crisis may increase this unexplained part, for example by generating new behaviours or introducing financing restrictions. The unobserved effects for a quarter are taken into account and added together from the moment when they can be reasonably attributed to the financial crisis: this is the case if, from a given date, the unexplained effect becomes strongly negative. For the last two quarters of 2009, which go beyond the forecast period of this report, the unexplained part is prolonged at its value of Q2. This corresponds to a scenario in which the effects of the crisis estimated in Q2 are maintained until the end of 2009.

### **... and foreign trade**

Both imports and exports also differ from what the NiGEM model led us to expect. In order to quantify the total impact of the crisis, they are therefore taken into account in each of the seven countries studied.

The variations in imports of each country are determined using the import equations in the NiGEM model, which link these variations to those in domestic demand. We thus define the variation in world demand for the products of each country as the sum of the variation in imports of each of the six others (as a logarithm, weighted by their share in the exports of this country) and the variation of imports in the rest of the world, assumed to evolve like those of the six partners. This last assumption, which is inevitable given the lack of information about the imports in the rest of the world, is flimsy, notably because foreign trade in the emerging countries could turn out quite differently.

The variation in exports is obtained by using the export equations defined in the NiGEM model, which link the volume of exports of a country to worldwide demand. This method has to be completed, however, because the variation in world demand calculated in this way is insufficient to explain the variation in exports, as verified by breaking down the trends in exports in 2008 according to their determinants in NiGEM. For all seven countries, the unexplained variation in exports is therefore added to the measured effect.

The total non-model effects on gross domestic product are obtained as the aggregation of these impacts on domestic demand and the balance between exports and imports. ■