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**Research Report**

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**OCCASIONAL PAPER SERIES**

**NO 106 / AUGUST 2009**

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**MONETARY POLICY  
STRATEGY IN A  
GLOBAL ENVIRONMENT**

by Philippe Moutot  
and Giovanni Vitale



EUROPEAN CENTRAL BANK

EUROSYSTEM



## OCCASIONAL PAPER SERIES

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# MONETARY POLICY STRATEGY IN A GLOBAL ENVIRONMENT

by Philippe Moutot and  
Giovanni Vitale<sup>1</sup>



In 2009 all ECB publications feature a motif taken from the €200 banknote.

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## ABSTRACT

This paper discusses the structural implications of real and financial globalisation, with the aim of drawing lessons for the conduct of monetary policy and, in particular, for the assessment of risks to price stability.

The first conclusion of the paper is that globalisation may have played only a limited role in reducing inflation and output volatility in developed economies. Central banks should remain focused on their mandate to preserve price stability.

However, the globalisation of financial markets over the last 25 years has had major implications for the conduct of monetary policy. Four elements characterise the new financial landscape: the decline in the “home bias”; the increase in the size of international financial transactions relative to transactions in goods and services; the increase in the number of countries adopting inflation targeting and currency peg monetary regimes; and the transformation of financial market microstructure. The paper argues that in this new environment monetary policy should systematically incorporate financial analysis into its assessment of the risks to price stability. Monetary policy should “lean against the wind” of asset price bubbles that could burst at a high cost and hinder the maintenance of macroeconomic and financial stability. Further, in view of the interlinkages among financial markets worldwide, macro-financial surveillance at the international level needs to be strengthened and monetary policymakers need to cooperate and exchange information on a wider scale and at a deeper level with financial supervisors.

Finally, the paper reviews the rationale for a central bank to act (in concert with other central banks) as the ultimate provider of liquidity to financial markets in situations of extreme instability and market malfunctioning. A sudden and sharp liquidity drought in the market should be tackled with appropriate measures that could even go beyond the extraordinary refinancing

of monetary and financial institutions. In these circumstances, the central bank should clearly communicate that the aim of its liquidity provision measures is to support the proper functioning of financial markets, and that they do not indicate a change in the monetary policy stance (“separation principle”).

Key Words: Globalisation, Monetary policy, Asset prices, Financial markets.

JEL Classification numbers: E44, E58, F33, F42

## SUMMARY

Since the mid-1980s the world economy has undergone profound transformations, the sources and effects of which are probably not yet completely understood. The process of continuous integration in trade, production and financial markets across countries and economic regions (which is what is generally defined as “globalisation”) directly affects the conduct of monetary policy in a variety of respects. The aim of this paper is to present an overview of the structural implications of globalisation for the domestic economies of developed countries and to draw lessons from these implications for the conduct of monetary policy, and in particular for the assessment of risks to price stability.

The most prominent stylised fact in the last 25 years is, from the point of view of the economic literature, that the level of inflation and its variability around this level have declined in both developed and, at a later stage, developing economies, leading several scholars and professionals to refer to this phenomenon as the “Great Moderation”.<sup>1</sup> But other developments have gradually been adding to one another and also need to be taken into account. They include global imbalances that have emerged in the current accounts of some large countries, as well as the recurrence of booms and busts with global consequences over the last decade and the acceleration in commodity prices that ended, or at least interrupted, the “Great Moderation” in the mid-2000s.

The first part of the paper discusses the changes in the adjustment mechanism of the national economies (to exogenous shocks and monetary policy actions), which may help explain inflation developments. Their implications for the conduct of monetary policy are spelled out.

The second part of the paper analyses, within a unifying framework, the impact that the globalisation of financial markets has on macro and financial stability. The paper argues that the

decrease in the home bias in the last 25 years, in combination with a simultaneous increase (over the last ten years) in dollar pegs and currency boards linked to the euro, on one hand, and in central banks targeting inflation, on the other, may have played a role in fostering asset price bubbles. Further, the emergence of countries with large economies, but relatively underdeveloped financial systems, not only changes the impact of capital flows, but also affects the dynamics of exchange rates and more generally of international adjustments, including in response to global imbalances and financial crises. Central banks need to adapt the conduct of their monetary policy in order to preserve their ability to anticipate and react to international crises.

The most important implication of globalisation for monetary policy is that developments in financial asset markets cannot be benignly neglected. Financial market innovation, the emergence of new financial institutions and the increasing globalisation of financial markets pose challenges to monetary policy in two spheres. First, asset price dynamics and their possible departure from fundamentals-based valuation must be taken into account when the risks to domestic price stability are assessed. Second, given the global dimension of financial intermediation, multilateral surveillance procedures must be enhanced with a view to incorporating analysis of the international transmission of shocks (including economic policy) which originate in one economy and are propagated to others through financial market linkages.

Finally, the paper briefly mentions the issues raised by the need for central banks, in periods of severe financial instability leading to paralysis of the financial system, to contemplate the possibility of “non-standard” measures.

<sup>1</sup> See, among others, McConnell and Perez-Quiros (2000) and Blanchard and Simon (2001).

## I INTRODUCTION

Since the mid-1980s the world economy has undergone profound transformations, the sources and effects of which are probably not yet completely understood. The process of continuous integration in trade, production and financial markets across countries and economic regions (which is what is generally defined as “globalisation”) directly affects the conduct of monetary policy in a variety of respects. The aim of this paper is to present an overview of the structural implications of globalisation for the domestic economies of developed countries and to draw lessons from these implications for the conduct of monetary policy, and in particular for the assessment of risks to price stability.

The most prominent stylised fact in the last 25 years is, from the point of view of the economic literature, that the level of inflation and its variability around this level have declined in both developed and, at a later stage, developing economies, leading several scholars and professionals to refer to this phenomenon as the “Great Moderation”.<sup>2</sup> But other developments have gradually added to one another and also need to be taken into account. They include global imbalances that have appeared in the current accounts of some large countries, as well as the recurrence of booms and busts with global consequences over the last decade and the more recent acceleration and fall in commodity prices, which has ended, or at least interrupted, the “Great Moderation”.

The debate has long focused on three possible interpretations of what lies behind the Great Moderation: structural change, more able policymakers or simply good luck. Increasing globalisation and its initial impact on import prices in particular, may have played a role in the first and the latter explanation, either by changing the structure of the domestic economies involved in international trade or by somehow exerting a “mechanical” downward pressure on inflation trends. This paper reviews the theoretical arguments and the empirical evidence supporting each of these hypotheses, without presuming

that they are mutually exclusive. In doing so, the paper investigates the wider implications of the associated changes in the mechanism of adjustment by national economies to exogenous shocks and monetary policy actions. We will argue that the three explanations above are inter-related and that, in the future, they may have different implications from those experienced lately. In particular, the recent increase in oil and other commodity prices constitute important, different and immediate tests for monetary policy, which may have to take into account some of the above-mentioned lessons.

The paper also refers to another less studied stylised fact, the decrease of the “home bias” over the same period, and to other associated characteristics of financial flows, including the high recurrence of asset price bubbles. Another feature of globalisation over the last ten years has been a simultaneous increase in, on the one hand, pegs to the dollar and currency boards linked to the euro and, on the other hand, of central banks targeting inflation. A related feature of globalisation is the change in the relative size and financial power of emerging countries and developed countries. While the US economy dwarfed both European and developing economies after the Second World War and until the 1990s, the end of the last century witnessed the emergence of large countries like India, China, Russia and Brazil. This decrease of the “home bias”, the spread of monetary policy strategies targeting inflation or involving a peg to a major currency and the new distribution of financial power not only change the impact of capital flows, but also affect the dynamics of exchange rates and more generally of international adjustments, including in response to global imbalances and financial crises. These elements also have consequences for the conduct of monetary policy, its ability to anticipate and react to international crises and the nature of international surveillance.

<sup>2</sup> See, among others, McConnell and Perez-Quiros (2000) and Blanchard and Simon (2001).



The paper is organised as follows: the next section briefly reviews the literature on the impact on inflation of the integration of new, low-wage countries into the global market. The main conclusion of this literature is that at least part of the decline in inflation in the developed economies up to 2007 can be explained by the downward pressure exerted by lower import prices on domestic inflation, which has recently been offset by the upward pressure of high commodity prices. Section 3 reviews the possible structural changes in the real sector that could, along with the relative decline in import prices, have been responsible for a more structural decline in domestic inflation across the world. Section 4 extends the discussion of the structural implications of globalisation to the financial sector. In particular, the section distinguishes between the possible change in the “home bias” and in the allocation of domestic savings and, more generally, the macroeconomic implications of the high level of integration of worldwide financial markets. Section 5 brings together various implications of globalisation for monetary policy. Section 6 draws the main messages. First, national monetary policy strategies must include a structural analysis of economic developments, in order to disentangle possible shocks to the economy. In particular, the role of financial markets in the transmission of such shocks needs to be taken into account as their evolution and global integration is likely to play a significant role in the creation and distribution of liquidity across countries. Indeed, the increased role of financial markets in the transmission mechanism provides further justification for “leaning against the wind” of possible asset price bubbles. Second, the interdependence of financial markets across the globe strengthens the case for a new, more refined multilateral cooperation policy that integrates financial markets and international capital flows with economic developments and policy stances.

## 2 GLOBALISATION AS A NEGATIVE THEN POSITIVE SHOCK TO INFLATION

The first possible explanation of the link between globalisation and inflation is that the former has, at least to start with, generated a persistently negative shock to the inflation process in the developed economies, without altering the structure of the process itself. The argument would start from one significant aspect of globalisation: the size of the increase in the global supply of labour which, with the integration of China, India and Eastern Europe into the global economy, has increased from 1.5 billion to 3.0 billion.<sup>3</sup> Owing to the relatively low level of development of those countries, the increase in global labour supply has increased the ratio of unskilled labour to skilled labour. Hence, the wages of unskilled workers in the industrialised countries have declined relative to the wages of skilled workers and the rate of return on capital has increased. Moreover, due to the secular decline in transport and communication costs, firms have also relocated the production of goods (and services) with a low skilled labour content towards the newly emerging countries, while the production of goods (and services) with a high skilled labour content has been shifted towards industrialised countries. In fact, technological developments have run so fast that for many goods and services it is now possible to allocate different stages of the production chain to different parts of the globe, according to their relative skilled and unskilled labour content. As a result, in all major OECD economies import prices have declined relative to domestic producer prices over the last 20 years. Pain et al. (2006) (PKS) calculate that over the period 1996-2005, the increasing integration into world trade of non-OECD economies – China and other Asian economies in particular – reduced annual domestic inflation by 0.2 percentage points, on average, in both the United States and the euro area.<sup>4</sup> The dampening of inflation dynamics in the United States and the euro area is due to both high import penetration from those low-cost producing countries and the relatively lower growth of Asian export prices compared to US and euro area producer prices.<sup>5</sup> Isolating the

effect of higher import penetration, which closely measures the impact of globalisation, PKS (2006) estimates that the increasing share of imports from China and other Asian economies accounts for most of the total disinflationary effect in the euro area (0.2% per annum, on average) over the period 1996-2005, but only half of the total effect in the United States (0.1% per annum, on average).

Recent analysis undertaken at the ECB<sup>6</sup> focuses on euro area external trade sector data in order to assess the impact of the increase in the share of external trade with China and the new EU Member States on euro area prices. The *input-output* analysis reveals that, over the period 1996-2004, the increasing share of external trade with China and the new EU Member States can account for a roughly 1.5% per annum average reduction in import price inflation<sup>7</sup> and for a 0.1% reduction in manufacturing producer prices in the euro area. The average effect on consumer price inflation is estimated to be around 0.05% per annum. Using the results of a VAR model for the euro area production chain,<sup>8</sup> which incorporates the “static” import price shock attributable to the “share” effect, the impact on consumer inflation is around 0.3% per annum, on average, which is closer to the estimates reported in PKS (2006).

Furthermore, globalisation seems to have reduced the impact of exchange rate changes on euro area prices.<sup>9</sup> The gradual and persistent decline of the US share in euro area imports may lead

3 Bean (2006).

4 PKS (2006) show that while in the United States the impact is evenly distributed over the decade in question, in the euro area the disinflationary effect is mainly concentrated in the period 2001-2005.

5 In theory, a change in the share of external trade can affect domestic inflation through a “share” effect and a “price” effect. The share effect is defined as the change in euro area import prices due to the change in the import share of low-cost countries, while the price effect designates the contribution to total import prices due to import price inflation differentials between low-cost countries and high cost countries.

6 ECB (2006).

7 The price effect (see Footnote 5) would reduce import price inflation by another 0.5% per annum, on average.

8 Pula and Skudelny (2007).

9 Anderton (2007).

to an automatic decline in import price exchange rate pass-through (ERPT) simply because US exports to the euro area have a high ERPT of around 90%. However, the decline in the overall ERPT observed over the last 15-20 years may prove to be temporary and reverse once the price level of euro area imports from China and other developing economies catches up with that in other euro area import suppliers.

Overall, it is fair to say that since the mid-1990s globalisation has had a sizeable direct effect on domestic price inflation in the developed economies, which in the euro area has become more evident in the last five years. This direct effect can be expected to persist as long as cost differentials persist between the developed economies and the newly emerging economies, which could lead to further import penetration from these latter countries into the former.

This raises the question of how lasting the impact of such cost differentials will be. Will the decline in inflation prevail? Will its recent reversal last? Indeed, the increase in the supply of labour has been accompanied by an increase in the global consumption of food, oil, and other commodities: the prices of the latter have recently increased strongly and tangible counterbalancing effects on domestic inflation are already visible. This seems to be clearly the case already for oil and metal prices and is increasingly relevant for staples. Globalisation has not only led to a decline in the relative price of imports of manufactured goods and services but also – especially in the last 5 years – to an increase in oil and commodity prices largely due to higher global demand originating, *inter alia*, from China and other Asian countries. Hence, in oil importing countries, like the United States and the euro area, the decline in the relative price of imported goods and services has been, at least partially, offset by the increase in commodity prices that is likely to dampen over a long period the beneficial effect of the decline in the prices of imported manufacturing goods and services on workers' real wages. OECD-FAO (2008) argue that, beyond temporary climatic factors, the significant increase in commodity prices over the

last two years stems from more permanent causes directly related to globalisation. First, there is the rapid income growth and dietary changes in developing markets, especially Asian, where demand for protein-rich products is rising and thus putting upward pressure on the prices of meat and of foodstuffs needed to raise farm animals. Second, the direct effect of higher oil prices – which are, in turn, attributable to the higher demand for energy arising in newly developing countries (especially Asian) – which increase transport and production costs. Third, the indirect effect of high oil prices, which stems from the diversion of land and feedstuffs away from food and into biofuels. Fourth, a counterbalancing effect on the price competitiveness of developed countries, which are more energy efficient than emerging countries, and a lower impact on their potential output, which may end up decreasing the potential output growth differentials across these two categories of countries.

These developments would have at least two impacts of relevance to central bankers. First, they undermine the use and indicator value of core inflation. This is because if the trends in items included in such concept become directly correlated with the trends in items excluded, the notion of core inflation loses its meaning. Second, the increase in oil and commodity prices (including food) may lower the real income of lower wage workers and increase their inflation perceptions, making the benefits of globalisation uneven, even when abstracting from production and competitiveness considerations. Moreover, by concentrating price increases on frequently purchased products, it may at least temporarily distort consumers' perceptions of their real income. To the extent that such perceptions may have an impact on the tendency to consume or save, on the support of the public for monetary policy and on the credibility of the central bank, this may also seriously affect the conduct of monetary policy. Furthermore, the acceleration in the oil price increased at the beginning of 2008, as did its impact on headline price indices in many economies, confirming some recent empirical evidence<sup>10</sup> on the crucial role played

<sup>10</sup> Blanchard and Gali (2007).

by both monetary policies focused on the maintenance of price stability and by real-wage flexibility in facilitating the absorption of the oil price shock. Central banks may therefore have to recall the lessons of the 1970's oil price increases: the need to prevent second round effects; the need for wages to quickly absorb the corresponding real income loss; and the need for special communication in order to minimise gaps between perceived and actual inflation.

### 3 GLOBALISATION CHANGES THE STRUCTURE OF THE REAL ECONOMY

The decline in global inflation may have been related not only to the direct cyclical effect of globalisation on the relative price of imports (described in the previous section) but also to a permanent effect that globalisation may have had on the structure of the real economy, in particular on the price and wage formation mechanisms, in the developed economies.

#### 3.1 IS THERE A PERMANENT EFFECT ON THE LEVEL OF OUTPUT?

At first, globalisation may have permanently increased the level of output that an economy can produce, without generating inflationary pressures. The argument runs from the decline in the relative price of imported goods, which increases workers' real wages without increasing firms' nominal costs. Hence, for any nominal wage, the labour supply in the economy would increase because workers would be willing to work more for the same nominal wage and because new workers would be willing to work for lower nominal wages. This process entails a rightward shift of the "long-run" Phillips curve, which delivers both higher output growth and lower inflation.

However, this approach does not take into account the effect of oil and commodity prices mentioned above. Also, in countries with low productivity growth, the effect of oil and commodity prices on potential output may be significant. Ultimately, the net impact of globalisation is an empirical issue. Insofar as the euro area is concerned, the latest developments in nominal wages and labour costs suggest that wage negotiations are only now starting to generate second round effects arising from past oil price increases. Moreover, the approach in the previous paragraph may not give sufficient weight to competitiveness considerations. In fact, it is most valid for countries which have the benefit of a level of product and services specialisation that is sufficiently high for them to be able to employ mostly skilled workers.

And even in that case, this does not take into account the adjustment dynamics required for use to be made of such skills in new fields when technology and telecommunications make it possible to use low-skilled workers for traditional products or services.

Indeed, in those countries endowed with potentially skilled workers, the adjustment needed to compete with new emerging countries entails an increase in the import content of domestic production, including in those sectors which sell their products in the global marketplace. Hence, in developed countries the export sector has to go through a phase of significant transitional unemployment and persistent lower consumption by workers. Thus, the economy may take quite some time to return to its medium-term potential output. The increase in firms' investment needed to maintain competitiveness is, to start with, associated with diminishing production and only at a later stage do employment and consumption catch up. The example of Germany, and more generally the euro area, in this respect is particularly notable.

Finally, the increase in oil and other commodity prices may, if it is substantial and permanent, have an impact on the production function of many economies. It may thus counterbalance the positive effect of cheaper prices for other imports, at least for countries that are not specialised or energy-efficient enough to take sufficient advantage of the latter. This may also lengthen the transitional process described above. In any case, the negative impact on the production function would reduce the output gap, thereby influencing inflation dynamics.

These adjustment dynamics also have consequences for monetary policy. First, indicators such as the "output gap" and the "NAIRU" may be biased, to the extent that the usual statistical methods for their measurement are based on previous, normally shorter cycles, which may result in a spurious amplification of both the decline and subsequent acceleration in trend dynamics. Second, the conduct of monetary policy may need to take into account

the possibly prolonged adjustment in the export sector, generally maintaining lower interest rates during the downturn, but also increasing them in the recovery at higher speeds and to higher levels than normal. This may explain, along with more traditional arguments, the observation since the start of this century of a substantial deviation of observed policy rates in the major developed economies from the normative rate prescribed by standard Taylor rules estimated on historical data.

### 3.2 A PERMANENT EFFECT ON THE SHAPE OF THE PHILLIPS CURVE?

A different structural explanation of the observed trend decline in inflation over the last 20 years focuses on the impact of globalisation on the mechanism of adjustment to demand shocks. In particular, it is argued that globalisation has increased the incentives for firms to absorb changes in demand by adjusting employment rather than the price of final products. In other words, the short-run Phillips curve, which maps excess demand<sup>11</sup> onto inflation, has flattened due to the increase in trade and production specialisation across countries.<sup>12</sup>

Admittedly, the empirical evidence concerning possible flattening of the Phillips curve remains rather controversial. Research conducted at the IMF and the BIS<sup>13</sup> lends support to the hypothesis that the increase in international trade and production specialisation has increased the importance of global indicators of economic slack and inflation relative to domestic indicators. However, Calza (2007) cannot find significant evidence of the impact of foreign variables on domestic inflation while Ihrig et al. (2007) show that the empirical estimates depend on the specification of the estimated Phillips curve.

In a recent paper Benati (2007) provides another possible explanation for the flattening of the Phillips curve, which is rooted in the main thrust of the New Keynesian framework. In the standard firm pricing rule assumed in such models, higher (lower) trend inflation increases (decreases) the frequency of firms' price adjustments – this being a “deep” parameter in

the reduced-form coefficient of the output gap in the Phillips curve – thus increasing (reducing) the sensitivity of domestic inflation to cyclical output fluctuations. Benati (2007) shows that historically, and across a large set of countries including the euro area, the time-varying slope of the Phillips curve is positively correlated to the trend rate of inflation. Hence, according to his interpretation, the decline in the coefficients of the estimated reduced-form Phillips curve for many OECD countries, including the euro area over the last two-three decades, is due to the progressive confirmation of a low-inflation environment. The standard New Keynesian Phillips curve models inflation as a function of past and expected inflation plus some driving variable, which is normally the output gap or firms' marginal costs. Hence, assuming rational expectations and forward-looking behaviour, the trend in inflation is affected by the trend in the driving variable. This would imply that globalisation may have contributed to flattening the short-term Phillips curve by influencing the trend of the driving variable – for example by affecting the trend of domestic wage dynamics – rather than through integration of the production process and increasing international trade.<sup>14</sup>

An alternative explanation of the apparent flattening of the short-run Phillips curve is the reduced ability of firms to increase their mark-up in the presence of aggregate demand shocks.<sup>15</sup> In the New Keynesian framework the link between fluctuations in aggregate demand and prices is provided by profit margins, or “mark-ups”.

11 And, in standard forward-looking macroeconomic models, inflation expectations.

12 Gali and Monacelli (2005) model a small open economy trading with an infinite number of other foreign economies. They show that the more open the economy is and the less substitutable domestic goods are with respect to foreign goods, the lower is the coefficient of the domestic output gap in the model's Phillips curve.

13 IMF (2006) and Borio and Filardo (2007), respectively. Ciccarelli, M. and B. Mojon (2005) also argue that, in a sample of OECD economies, domestic inflation is driven by a global inflation process, which at short horizons is a function of global real developments.

14 Benati (2007) estimates that output gap coefficients, while being much lower than during the 1970s, are far from being zero, thus confirming that there still exists a short-run trade off between inflation and output in the sample of countries considered.

15 Batini et al. (2005).

The theory says that whenever firms experience an unexpected increase in the demand for their product, their cost of production goes up and thus they increase prices in order to leave their margins unaltered. The competition from labour-abundant economies reduces the ability of firms to pass the increase in costs through to final product prices, because if they did so they would lose market share.<sup>16</sup> It is fair to argue that this explanation conflicts with the developments up to 2007 in the profit share (and rising employment) in all the major developed economies, which took it to historical highs. This suggests that rather than squeezing profit margins, global competitive forces have exerted downward pressures on wage dynamics in developed economies, thereby directly reducing the effect of demand fluctuations on the cost of production. Furthermore, the fact that inflationary pressures arising from the sharp increase in oil prices over the past 2-3 years have had a relatively limited effect also suggests that shocks to the cost of production have until now been absorbed through a moderation of wage dynamics, rather than through an increase in final prices.

Overall, it seems to be true that the Phillips Curve has flattened. Although this may be a source of comfort to central bankers, they also need to be aware that the slope of such a Phillips curve may rapidly change when the public learns about it. In such a context, the consequences in terms of output of accepting inflation creep and thereafter having to combat it – the so-called “sacrifice ratio” – are also growing.<sup>17</sup>

However, the role of globalisation does not imply that global slack should be a major consideration, at least for large economies. Also, the impact of globalisation on import prices, which is a very relevant concern for small and medium-size economies, is less relevant for large economies. Moreover, the flattening of the Phillips Curve is also attributable to a combination of credibility and good luck. Indeed, globalisation may also have influenced the price-setting behaviour of firms as mentioned by Benati. Finally, even if the flattening of the

yield curve is purely connected to the increased credibility of central banks, some stroke of “bad luck” in the future cannot be ruled out.<sup>18</sup> Higher commodity prices, particularly if they affect agents’ inflation perceptions, could lead to a steepening of the Phillips curve.

16 Rogoff (2003) argues that globalisation may in fact have had the opposite effect on firms’ pricing behaviour: the increase in competitive pressures arising from globalisation makes the cost for firms of setting the price at the wrong level much higher than in a situation of relatively low competition. Hence, globalisation leads firms to revise their prices more frequently, and thus increases the sensitivity of inflation to demand fluctuations (and steepens the Phillips curve).

17 Viñals, J. (2000).

18 This is particularly true in view of the empirical evidence in favour of the hypothesis that the flattening of the Phillips curve has been due to “good luck” (Primiceri (2005), Sims and Zha (2006) – and references therein – and JEEA (2007)).

## 4 THE GLOBALISATION OF FINANCIAL MARKETS

The progressive liberalisation of capital accounts that started in the 1980s in the developed economies and thereafter gradually spread to some of the more advanced emerging markets has, over the years, spurred the integration of world financial markets. The higher interdependence of financial markets and the accompanying financial innovation have changed the monetary transmission mechanism. It thus poses new challenges to central banks, which must interpret the developments in the domestic economy and assess their monetary policy stance.

Such challenges can be viewed as being the result of interaction among four main factors that characterise the latest developments in the globalisation of financial markets. First, the “home bias” of investors has decreased, although unevenly across the main countries. Second, the weight of global financial transactions relative to trade and services transactions has increased. At least in the short to medium term, this makes financial determinants relatively more important in driving the dynamics of exchange and interest rates. Third, such dynamics have been influenced by the diffusion across central banks of inflation targeting and currency board or pegging strategies. Fourth, the development of financial markets has spurred financial innovation and its diffusion, multiplying the techniques for the transfer of risks and thereby strengthening the channels of dissemination and transmission of financial shocks across sectors and countries.

In the following discussion, we first analyse these stylised facts. Then we explain how their interaction may be at the source of a number of recent developments. Afterwards, we describe how the assessments of global and national liquidity help in the understanding in due time of such mechanisms, both at the global and national levels. Finally, we describe how high volatility in global financial markets, possibly exacerbated by the bursting of asset price bubbles, affects the transmission of economic shocks and poses peculiar challenges to the conduct of monetary policy.

The purpose of the discussion is to propose an analytical framework that allows useful lessons for monetary policy-makers to be drawn. The focus of this section is on the effect of the combination of the four stylised facts we highlight, rather than on their characterisation as “new” developments in economic history.<sup>19</sup> In particular we are interested in discussing their implications for the principles underpinning the monetary policy strategy and its implementation.

### 4.1 FOUR STYLISED FACTS OF RELEVANCE TO THE FUNCTIONING OF GLOBAL FINANCIAL MARKETS

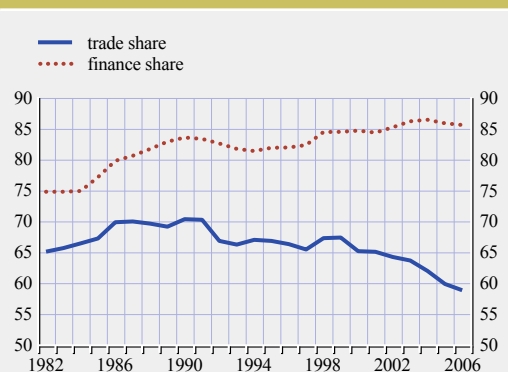
#### The uneven reduction in the “home bias”

Chart 1 below shows that over the period 1985-2004 the sum of foreign assets and liabilities relative to GDP in industrialised countries and in the emerging and developing countries increased by a factor of more than 3 and more than 1.5, respectively.

The rapid increase in cross-border investment flows fostered by the liberalisation of national financial markets, in combination with the decline in communication costs and vibrant financial innovation, has certainly contributed to reducing the so-called “home bias” of domestic investors over the last two decades.

<sup>19</sup> The paper does not enter into this discussion. For an interesting reading on this topic, see Reinhart and Rogoff (2009).

Chart 1 Ratio of sum of foreign assets and liabilities to GDP



Source: Lane and Milesi-Ferretti (2007).



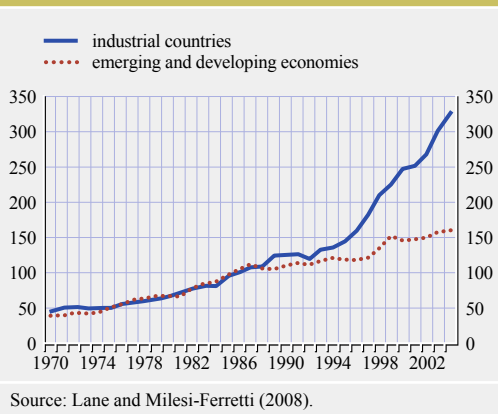
Admittedly, the process has not been homogeneous across countries, the result being an increased heterogeneity of participants in international financial markets. For instance, in the United States, the diversification of residents' investments into foreign assets peaked in around the mid-1990s.<sup>20</sup> In the rest of the industrialised countries and in those more advanced emerging economies that have opened up to global capital markets the process started in the early 1990s and peaked around the beginning of the new decade when the correction in the US stock market led to a reversal of the financial flows from the rest of world into the United States.<sup>21</sup> Therefore, it is fair to say that since the mid-1990s the decline in the "home bias" at a global level has decelerated significantly.<sup>22</sup>

However, important structural factors remain that justify the persistence of financial flows from emerging and newly industrialised countries towards countries with more developed and deeper financial markets. First, private investors from emerging countries who do not benefit in their home country from sufficiently liquid and safe financial markets may find it convenient to invest their funds in lower-return foreign assets, either because they are less risky or because these assets are simply not available in their home country. Second, official investors, like the central banks of Asian countries that peg their currency to the dollar, may also invest in developed countries' financial assets (not necessarily dollar-denominated) as a result of having sufficient reserves to guarantee the stability of such pegs. In particular, countries with excess savings and still-embryonic financial markets have accumulated large amounts of official reserves, which are not necessarily managed in the same way as assets held by private investors. Hence, the relative size of players in global financial markets and their degree of risk aversion has become strongly heterogeneous, as shown by the attention given in the media as well as by the OECD and the IMF to sovereign wealth funds.

#### Financial versus trade and services transactions

Another related stylised fact concerning global markets is that, in developed economies, the size of financial transactions has grown strongly relative to the size of trade and services transactions.

**Chart 2 Share of advanced countries in world trade and cross-border financial positions**



This is the result of the continued deepening of developed financial markets and of relentless financial innovation, as manifested by the significant growth in the size of their derivative markets. As a consequence, the role of global financial markets and their linkages in the transmission of economic shocks, both domestically and internationally, has increased substantially in the last decade and even exchange rate movements across currencies with deep financial markets may now be driven more than in the past by global private and official portfolio reshuffling, rather than current account positions.<sup>23</sup>

#### The spread of inflation targeting and currency pegs in the world of central banking

Since the mid 1990s, currency boards and inflation targeting techniques have spread rapidly across central banks.<sup>24</sup>

In the early 1990s, currency boards were viewed as miracle solutions to the problem of how

<sup>20</sup> Greenspan (2003).

<sup>21</sup> Insofar as the euro area is concerned, the introduction of the euro gave a further boost to diversification by domestic investors. In fact, the elimination of the intra-area exchange rate risk spurred foreign investment in debt instruments across euro area countries. Foreign investment in equities has been less pronounced as national stock markets remain rather segmented.

<sup>22</sup> Greenspan (2003).

<sup>23</sup> Brender and Pisani (2007).

<sup>24</sup> The data in Table I should be interpreted with caution as it is difficult to categorise exchange rate and monetary regimes, owing to possible differences between the *de jure* regime and the *de facto* regime implemented by the policy authorities.

**Table 1 The spread of inflation targeting and currency pegs**

Exchange rate regime	Exchange rate anchor	Monetary policy framework			
		Monetary target	Inflation targeting	IMF Supported	Other
Other currency as legal tender	10 (14)				
Currency board	13 (8)				
Other fixed peg (single currency)	63 (21)	2			1
Other fixed peg (composite)	7 (30)				
Peg with horizontal bands	5 (7)		2		
Crawling pegs	6 (13)	1			
Crawling bands	1 (3)				
Managed floating	48	17	9	7	15
Independently floating	35 (42)	2	16		17
Fixed	105 (96)				
Floating	83 (42)	19	25 {7}		17

Sources: IMF (2007). Pétursson (2000, 2004).

Notes: Numbers in the table refer to April 2007. In brackets to 1991. In curly brackets to 1997.

to achieve monetary stability at low cost in emerging economies. As a result, currency boards pegging to the dollar and to the euro proliferated. However, it has soon become apparent that they were sometimes attracting capital inflows invested in real estate or in low productivity projects financed in foreign currencies, thereby creating financial risks that would materialise in the event of appreciation of such currencies.

Inflation targeting has been successfully adopted by a number of central banks in developed and emerging countries. This monetary policy strategy (recommended by the IMF) is now used by a majority of central banks. However, until now, such inflation targeting has concentrated on the pursuit of price stability at horizons of two to three years, generally giving low weight to the need to monitor and possibly react to asset price developments.

Moreover, the spread of inflation targeting techniques has coincided with a debate on the need to “lean against the wind” in response to asset price bubbles which, until mid-2007, mostly tilted in the direction of “inaction” under the influence of the Federal Reserve’s and particularly of A. Greenspan’s views. Indeed, it was believed that asset price disequilibria were impossible to identify at an early stage and that any action by the central bank would either be unsuccessful or harmful and, ultimately, generate moral hazard.

However, as shown by Christiano et al. (2008) in a closed economy context, the very application of inflation targeting in the presence of an expanding bubble might lead to a policy stance that actually encourages the persistent deviation of asset prices from their fundamental value.<sup>25</sup> This may explain why, as remarked by a number of observers, the occurrence of asset price bubbles appears to have increased in a low-inflation context, in which inflation targeting central banks are usually not monitoring money and credit sufficiently.

#### Financial innovation and the transfer of risks

Finally, over the last 20 years, the integration of global financial markets has been accompanied by increasing financial development and liberalisation. In theory, financial innovation, by deepening and completing financial markets is supportive of economic growth and improves the allocation of savings. New computing and information processing technologies have favoured the rise of new – often esoteric – financial instruments explicitly designed to un-bundle and re-package the payments and risks associated with more primitive and more

<sup>25</sup> The logic of the argument relies on the stickiness of nominal wages, which prevents them from increasing sufficiently in response to an expected productivity shock. Hence, the required increase in the real wage can only occur through a decline in the inflation rate. But this would prompt the inflation targeting central bank to lower interest rates so reinforcing the stimulus arising from the expected increase in productivity. The decline in the interest rate would also trigger a credit boom.

conventional financial products and securities. Chart 3 below shows the rampant growth, first in the United States and then in the euro area, of asset-backed securities (ABSs) and mortgage-backed securities (MBSs) issuance (in millions of USD) over the past 10 years.<sup>26</sup>

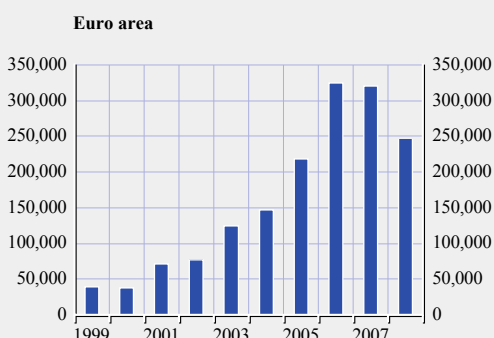
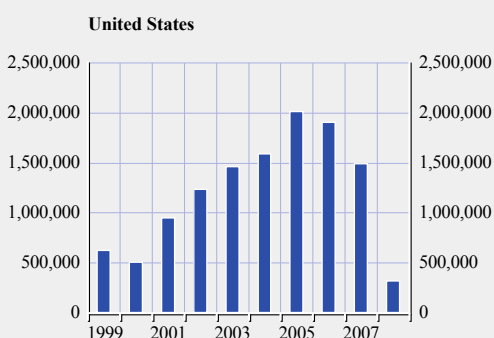
This phenomenon – originally intended to improve the distribution of risk across savers – was later boosted by lending institutions in search of higher returns. That led to exponential growth of credit derivatives, such as credit default swaps (CDSs) and collateralised debt obligations (CDOs). Chart 4 documents the sudden and sharp increase in global CDS and CDO issuance over the last three years. In the first half of 2008 its notional value is estimated to have reached USD 54 trillion.<sup>27</sup>

Along with many benefits, like a better way for intermediaries to diversify risk, thereby reducing the transaction costs of investing and expanding

access to capital, these developments went hand-in-hand with two side effects: a great increase in leverage and an unprecedented expansion of marketing of financial instruments.

The shift in banks' balance sheets away from holdings of relatively illiquid assets (e.g. mortgage loans) to a business model in which banks originate an underlying loan that is then made tradable and negotiated in the open market (the so-called “originate-and-distribute model”) has made it harder to draw clear distinctions between previously distinct categories of financial players. New investors – notably hedge funds – have been born out of the need for market-makers in previously unknown types of securities. But, more importantly perhaps, by allowing credit risk to be transferred across agents from different countries, these developments have also given rise to the uncontrolled transfer of liquidity risk across countries and continents.

**Chart 3 ABS and MBS total issuance: United States versus euro area**

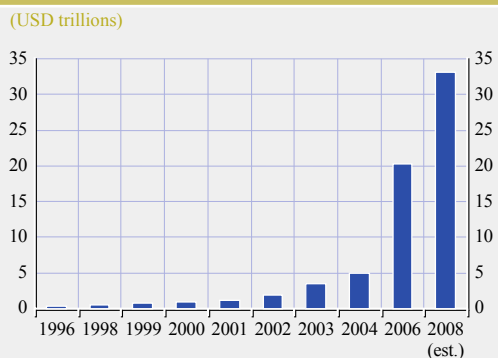


Source: Poloni and Reynaud (2008).

26 This figure is based on a new dataset developed at the European Central Bank (see Poloni and Reynaud (2008)). The European Securitisation Forum (ESF (2008), Tables 2.1 and 2.2, page 5) calculates the total amount outstanding at the end of the first quarter of 2008 of ABSs and MBSs in the United States as €6.3 trillion. As of the same quarter, the total amount outstanding in Europe was €1.2 trillion. Data for the euro area are not available.

27 The International Swaps and Derivatives Association (2008). The data in Chart 4 for 2008 are estimates calculated in 2006.

**Chart 4 Global credit derivatives market**



Source: British Bankers Association (2006).

## 4.2 HOW THESE FOUR FACTORS HAVE INTERACTED OVER THE RECENT PAST

The four stylised facts discussed above – and their interaction – provide one possible key for interpreting both the overall increase in inter-linkages across financial markets and the recent history of economic and financial tensions across large countries.

### 4.2.1 THE EMPIRICAL EVIDENCE ON THE INTER-LINKAGES IN GLOBAL FINANCIAL MARKETS

The liberalisation of cross-border capital flows and the vibrant developments in innovative financial markets over the last two decades, combined with the increased readability of monetary policies aimed at price stability, have facilitated and thereby increased the linkages between financial markets across the globe, thus making the adjustment mechanism of domestic economies – and the monetary policy transmission mechanism – more prone to be affected by developments in foreign economies. The sheer size of global cross-border capital flows certainly influences the price of assets in any economy by contributing to determining both the supply and demand and the premiums that investors require for holding certain assets.<sup>28</sup> There is a flourishing literature supporting the view that the transmission of financial market developments across the world has increased in recent years. Domestic markets increasingly react to economic news expected to change the path of policy rates in some “centre” country, which is normally the United States.

Ehrmann *et al.* (2005)<sup>29</sup> underline the importance of international spillovers, both within asset classes and across financial markets. Although the strongest international transmission of shocks takes place within asset classes, they find evidence that international cross-market spillovers are significant, both statistically and economically. For instance, shocks to US short-term interest rates exert a substantial influence on euro area bond yields and equity markets: over the period 1989-2004, they explain as much as 10% of overall euro area bond market movements. But the transmission of shocks also runs in the opposite direction; in particular, short-term

interest rates in the euro area have a significant impact on US bond and equity markets. Furthermore, they show that in almost all cases the direct transmission of financial shocks within asset classes is magnified substantially, mostly by more than 50%, via indirect spillovers through other asset prices. In a more recent contribution, Ehrmann and Fratzscher (2006) focus on the link between US monetary policy and the stock market in foreign countries and show that US monetary policy shocks have significant and in some cases sizable effects on foreign stock prices. Moreover, they provide evidence that US monetary policy shocks affect foreign stock markets through foreign short-term interest rates and exchange rate changes. Finally, they show that the sensitivity to US monetary policy shocks is higher in those countries that are more integrated globally – rather than only with the United States – in real and financial terms. This latter result suggests that the domestic financial conditions in any given country do not necessarily depend solely on the financial conditions in the US market, which is the most developed and liquid in the world, but also on second-round effects arising from the complex web of global financial and real linkages.<sup>30</sup>

### 4.2.2 THE STYLISED FACTS ALSO HELP EXPLAIN RECENT FINANCIAL TENSIONS AT THE GLOBAL LEVEL

The above-mentioned four stylised facts can help explain some of the recent economic

28 Bernanke (2007).

29 The authors argue that an important part of the behaviour of financial markets is explained by foreign asset prices. On average, about 26% of movements in European financial assets are attributable to developments in US financial markets, while about 8% of US financial market shifts are caused by European developments. The larger importance of US markets is found to be particularly strong in the case of equity markets; for instance, movements in US stock prices trigger corresponding change in the euro area, with more than 50% of the US market developments being reflected in euro area stock prices. By contrast, European equities have an insignificant impact on their American counterparts.

30 More recently, Bayoumi and Swinston (2007) analyse the transmission of movements between real bond yields and inflation expectations across a number of countries. Based on high frequency data for inflation-indexed bonds they find that the causation in real bond yields runs unequivocally from the United States to the other countries in the panel. The spillover in inflation expectations appears to be less important and the direction of causation is less clear.

developments that have occurred both in individual countries and at the global level. First, as explained above, the decrease in “home bias” implies, in principle, that domestic investors are able to reduce the risk of their portfolio without foregoing expected returns.<sup>31</sup> Hence, the propagation of shocks to the economy through the financial system is likely to be smoother than it would be with a lower level of country-diversification. Also, the stability of the financial system itself in the face of financial shocks or changes in investors’ attitude to risk is, in principle, higher. However, many elements may also make the benefits of the decrease in “home bias” volatile and also mean that it actually generates costs. The benefits should be contrasted with the cost of the speculative bubbles which are inherent to the functioning of capital markets.<sup>32</sup> A case in point is the bursting of the 2001 bubble in the US stock market, which coincided with a slowdown in growth in many countries. Another is the Asian crisis in 1998, which did not affect regional stock markets only but also local bond, debt and currency markets. The size of its costs for local economies led a number of affected countries in the region to switch to economic and financial policies aimed at accumulating substantial foreign exchange reserves. As to the current financial turmoil, which started as a localised real estate crisis, it affects the United States, the euro area and other European countries as a result of the recently developed risk transfer techniques, not only as a consequence of the dynamics of their respective exchange rates, but also through its impact on the money, bond and stock markets in both economic areas.

Second, the growing importance of international financial transactions over the last 25 years may mean that investors’ behaviour and portfolio reshuffling could affect asset and foreign exchange markets in a novel way. Instead of reflecting fundamentals and their prospects, global asset and foreign exchange markets may in some instances be less volatile than normal over extended periods and thereafter exhibit disorderly behaviour. This implies that several regimes of financial and foreign exchange

market volatility may successively prevail. Chart 5 shows the standard deviation of asset and foreign exchange prices in selected markets.<sup>33</sup> In both US and euro area stock markets the evidence of a “regime shift” occurring in around the mid-1980s is quite evident. By contrast, frequent switches in “volatility regime” are apparent in the exchange rate graphs.

If exchange rates are less driven by current account deficits or surpluses and more by capital flows and financial developments, the definition of their equilibrium levels becomes less precise. In particular, regimes of low exchange rate and financial market volatility and regimes of high volatility can be at once more lasting and alternate more swiftly. On the one hand, low exchange rate volatility seems to further encourage the decrease in “home bias” (ECB 2006) and therefore the apparent disconnection between traditional fundamentals and exchange rates, prolonging low-volatility periods. The period 2004–2007 offers an example of such a regime between large currencies, with low exchange – rate volatility prevailing despite strong current-account imbalances, and even in the presence of large and non-fundamentals based exchange rate movements (euro/yen). At the same time, switches to high volatility regimes happen whenever unexpected financial developments lead to financial instability, which itself prompts exchange rate instability and a pause or a reversal in the decrease in the “home bias”. The periods between the US stock market crash and 2004 and also the developments since late 2007 offer such an example.

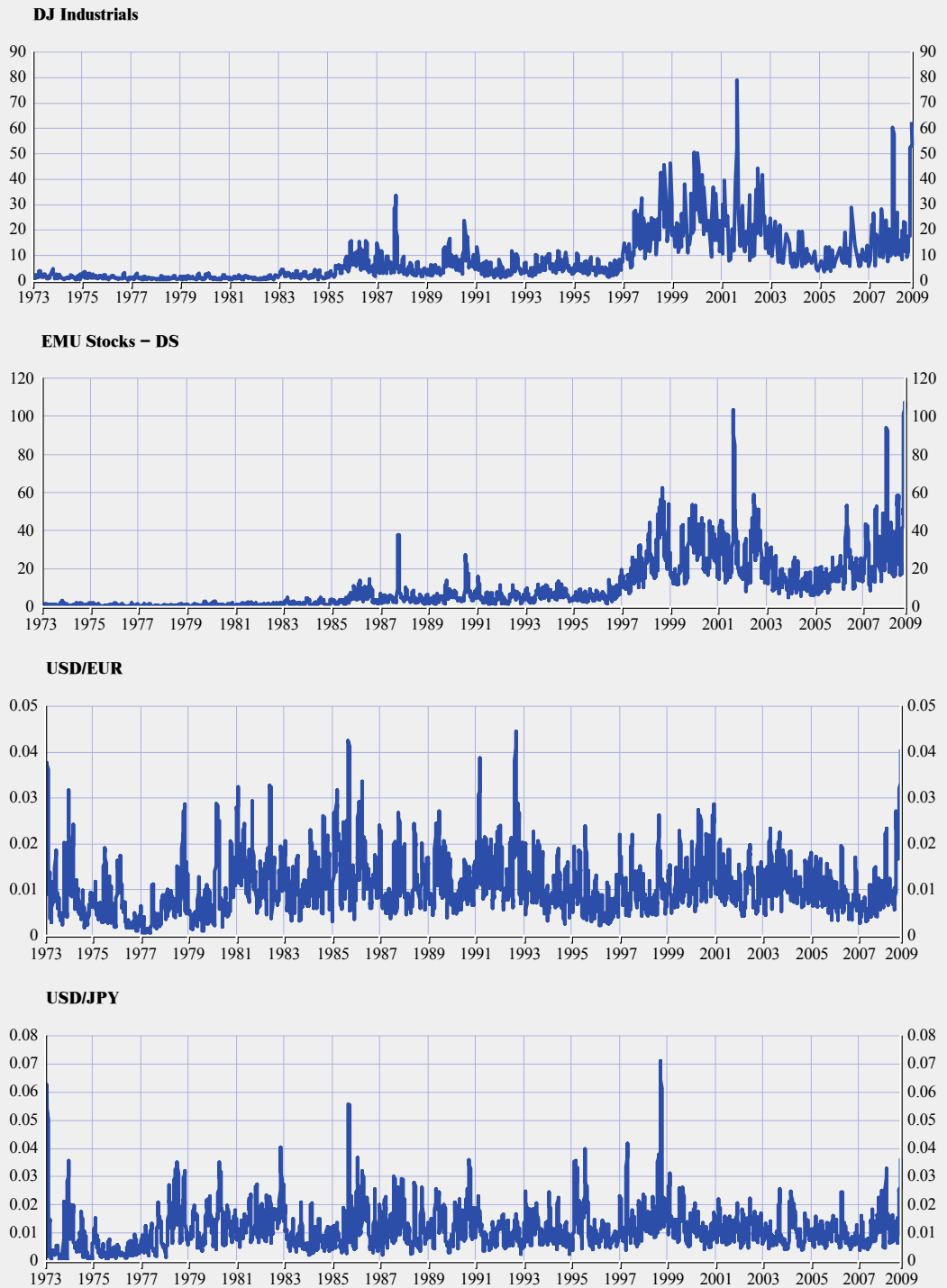
Third, speculative bubbles and strong financial flows accompanied by low exchange rate

31 The seminal contribution is Markowitz (1952), who shows how the variance of a portfolio with the same mean return decreases when the correlation of the assets composing the portfolio declines. Grubel (1968) and Solnik (1974) were the first papers to illustrate how investing in foreign assets represents a possible diversification strategy that lowers the variance of a portfolio.

32 This paper takes an agnostic view as to whether the formation of asset price bubbles is rational or irrational. The aim is to discuss the effects of disequilibrium capital flows on domestic monetary policy, irrespective of the nature of asset price bubbles.

33 The standard deviation plotted in the charts is computed over a 30-day moving window.

**Chart 5 The volatility of the US and the euro area stock markets and of the USD/EUR and USD/JPY exchange rates**



Sources: Financial Thompson Datastream and authors' calculation.

volatility may develop and amplify large current-account disequilibria (or “global imbalances”) and make them more persistent than would usually be expected. The US example is well known. Low exchange rate volatility combined with the desire of foreign governments in Asia and OPEC to invest their reserves in dollars led to an extremely low yield curve, especially at its long end. This allowed for easy financing of a real estate boom, leading in turn to an increase in US household wealth, which raised private consumption growth and household leverage at the cost of a continuous decline in savings.

These developments are not dissimilar in their fundamental characteristics from what had already happened in the second half of the 1990s, when the high-tech bubble in the United States was substantially financed by speculative investments flows originating in Europe, where financial institutions and private investors used the opportunity provided by low interest rates to borrow in euro and invest in the technological sector of the US stock market. In other words, the issue of global imbalances arises from a situation with the following characteristics: a combination of countries with excess savings and a country with low savings but an attractive financial centre leads to the development of an asset price movement. The latter gives rise to an increase in consumers’ wealth, which in turn justifies and perpetuates the lower savings – and increasing leverage – of the low savings country.

Fourth, those countries experiencing low inflation and low exchange rate volatility are also more likely to be originators of capital flows that may ultimately fuel an asset price bubble in the destination country. For example, the US stock market bubble that developed in the second half of the 1990s was partly financed, close to its apex, by Europe-based investors driven by the expectation of a protracted period of productivity growth in the United States. At the time, the continuous depreciation of the euro against the dollar provided further incentives for capital to flow from Europe into the United States. Moreover, in the euro area interest rates were low and inflation developments were

moderate and smooth, while US interest rates were relatively higher despite subdued price developments.

Low inflation volatility periods may also facilitate large capital movements through so-called “carry trades”, which may ultimately lead to large deviations of exchange rates from equilibrium. A recent and much discussed example is the carry trade organised by global financial investors by borrowing in Japanese yen and investing the proceeds in many other countries that were either following a successful inflation targeting strategy or had a currency board or a peg to a major currency. Once again, the low inflation and interest-rate environment in Japan – and the expectation that it would endure – fostered large capital outflows from Japan into high-yielding markets, until the eruption of the financial crisis in June 2007 and the consequent increase in asset price volatility. The apparently lasting profitability of such carry-trade activities, combined with a sustained depreciation of the yen over protracted periods, raised questions that only ceased to be asked when the financial crisis erupted and reversed the depreciation of the yen.

These events suggest that the initial success of monetary policy and exchange rate regimes, like inflation targeting and currency pegs, could have contributed to the development of large capital flows from one country to another. For example, the spread of inflation targeting strategies across central banks in both developed and developing economies may have increased the recent intensity of carry trades. Indeed, if an inflation-targeting central bank in a country with low interest rates does not lean against excess credit creation, the corresponding liquidity, if not used to finance local assets, may fund carry trades towards other higher-inflation or higher-expected-return countries. This may reflect underdeveloped financial markets or the lack of equilibrating investment opportunities in the source country. If the recipient country is a credible inflation fighter, its bilateral exchange rate will tend to appreciate because the capital inflows will increase its asset prices. As a

consequence, wealth effects will increase consumption growth while inflation remains subdued, at least for some time. In such circumstances, investors in the originating country will see their expectation of higher returns validated and may be encouraged to continue pouring capital into the high-yielding assets. This is probably the story that can be told about the developments observed from 2005 until mid-2007 between the yen and the New Zealand and Australian dollar (as well as many Eastern European currencies),<sup>34</sup> but it also characterises the dynamics of the euro/dollar exchange rate between 1999 and 2001.

Finally, past and more recent financial crisis episodes show a common element: the bursting of the asset price bubble causes investors to abandon their optimistic and self-fulfilling expectations and capital flows unravel. It is at this point in time that many factors, including the nature of the actual investors – i.e. households, financial institutions, pension and trust funds – and the positions taken on derivative markets by operators to cover and transfer risks, affect the way the capital inflow reversal impacts on economic developments and the transmission of monetary policy in both the country receiving and the one originating the capital flows. As apparent in the recent financial turmoil, the uncertainty about the identity of economic agents participating in the sharing of risk may also create liquidity risk in many markets. Hence, it is increasingly likely that asset price bubbles will have an international impact and make it more difficult to gauge in real time the location of such impact. Under such circumstances the time needed to identify such risks may be part of the crisis dynamics themselves.

The bursting of a bubble may not be the end of the story however, as the way this burst is managed by monetary and fiscal authorities may itself give rise to other bubbles. In the US case, the decision to keep interest rates low for a long period after 2001 may have encouraged the subsequent real-estate bubble. In the Japanese case, one may argue that once the balance sheets of banks had been repaired, the lack of sufficient

measures to curtail the growing size of the public debt caused Japanese private agents to search for higher returns abroad. Indeed, their substantial savings might have been accompanied by a reluctance to invest in a country where the perspective of increasing tax rates is a natural consequence of the level of public debt. This also leads to delays in interest-rate increases by the central bank, which is concentrating on low inflation forecasts, thereby encouraging and facilitating the development of carry trades.

#### **4.3 GLOBALISATION AND ITS REFLECTION THROUGH MONETARY AGGREGATES**

Overall, not only the faster transmission of shocks across asset classes and across countries, but also the dynamics of asset price developments, of the associated flows of capital and of boom-bust movements need to be understood in order to explain the monetary and financial impact of globalisation, including global imbalances. This implies that, apart from the real economy developments described in Sections 2 and 3, monetary policy assessments now need to take into account the developments arising from the interplay of the four above-mentioned stylised facts. This task is somewhat facilitated by having recourse to the concept of global liquidity. However, another useful approach is to develop the analysis of monetary aggregates and financial flows to complement the usual economic analysis. This approach also helps take into account the specific phenomena underlying the successive development of risk-taking and risk-aversion among economic agents.

##### **4.3.1 GLOBAL LIQUIDITY MAY HELP REFLECT THE IMPACT OF FOREIGN ORIGINATED SHOCKS**

The globalisation of financial markets increases the importance of foreign developments in the domestic monetary policy transmission mechanism. In the three years to August 2007, the composition of cross-border capital flows changed significantly, from equity and foreign

<sup>34</sup> For an exhaustive discussion of the recent and past carry trade episodes involving the yen, see Winters (2008).



direct investment to more liquid assets, so that a sizeable amount of “global” liquidity was created that can move quite freely across financial markets.<sup>35</sup> Consequently, one of the most debated issues among central banks at the moment is the implication of “global” liquidity for the conduct of monetary policy.

Research conducted at the ECB<sup>36</sup> seems to suggest that global excess liquidity affects economic conditions in the euro area in a way that accords with the theoretical predictions, i.e. an expansion (contraction) of global excess liquidity increases (reduces) the inflationary pressures in the euro area. Furthermore, this research also shows that domestic liquidity conditions are important indicators for inflationary pressures in the other G7 economies. Combining these results, it could be argued that the research supports the argument that euro area domestic inflation is affected by “global” inflation.

This is a result that other authors obtain<sup>37</sup> in different contexts and thus seems to be rather robust to modelling and methodological differences. However, domestic inflation always remains in the last analysis a phenomenon controllable by domestic monetary policy, as explained in the next section. Hence, while useful to gauge global inflationary risks, it remains unclear whether and how such information can be used in the context of domestic monetary assessments.

Another “global” channel of transmission from liquidity conditions to inflation involves the overshooting of commodity prices following a money supply expansion. Browne and Cronin (2007) use a cointegrating VAR model with US data to show that while both commodity and consumer prices are proportional to the money supply in the long run, commodity prices initially overshoot their new equilibrium values in response to a money supply shock, and the deviation of commodity prices from their equilibrium values has explanatory power for subsequent changes in consumer price inflation. However, this approach does not take into

account the money supply of countries other than the United States or else assumes that such money supplies would be strongly correlated with the US data, which may be true over some periods but not for others.

Also, the concept of global liquidity, while helpful at the global level, does not reflect the tensions generated by cross-border flows, which it internalises. Although it can be useful to understand global trends, possibly complementing the notion of ‘global slack’, for instance, in relation to commodity prices, it does not help to identify the individual roles of national or regional monetary policies. However, the increasing importance of capital flows creates practical difficulties for central bankers, be they pure inflation targeters or be they interested in monetary analysis and/or financial flows. In the first case, as argued above, the inclusion of asset prices, financial sectors and capital flows in models of the economy would be highly desirable, but is not yet easy to achieve. In the case of central bankers who are also interested in monetary and/or financial flows analysis, international capital flows tend to make the link between money and prices unstable in the short to medium term, so that the direct interpretation of monetary aggregates is more difficult, but also more promising.

#### 4.3.2 THE ROLE OF MONETARY ANALYSIS IN IDENTIFYING THE IMPACT OF CAPITAL FLOWS ON PRICE STABILITY AND ASSET PRICES

Since monetary aggregates and their counterparts at the national or regional level reflect international capital flows, they may also be used to yield essential information on their impact and on the risks they create for asset price developments. The analysis of monetary aggregates and their counterparts, i.e. loans to the

35 Coincidentally, over the same period the daily correlation between changes in the ten-year swap rates in the United States and Germany increased to 0.65 from less than 0.2 over the period 1990-2003 – see Bernanke (2007). The same picture emerges for the correlations between interest rate pairs across other G7 countries.

36 Rüffer and Stracca (2006).

37 Ciccarelli and Mojon (2005).

private sector and net external assets, allows the central bank not only to gauge medium to long-term inflationary risks by correcting monetary aggregates for estimated portfolio shifts, but also to form scenarios about plausible use of the corresponding liquidity. The identification of underlying trends combined with estimation of the likely impact on the domestic economy of the various capital-flow scenarios allows better measurement of developments in prices and associated risks. Thus, this analysis helps support a “risk management” approach to price stability by monetary authorities.

In this context, a direct approach for taking into account asset price movements and inflationary pressures simultaneously has recently been proposed. As shown by De Santis et al. (2008), asset prices in the United States and the euro area interact with money in the euro area and influence the relationship between inflation and monetary aggregates.<sup>38</sup> In particular, the interplay of Tobin’s  $q$  in the two areas closely reflects the shape of financial flows observed in the balance of payments of the euro area. The inclusion of asset prices in money demand functions explains and addresses the instability of traditional money demand equations apparent after 2001 in the euro area. It also shows that the correction of monetary aggregates by ECB staff to measure the underlying trend of money demand, called ‘portfolio shifts’, was justified. It demonstrates that money and asset prices both in the euro area and the United States interact. Hence, monetary aggregates have the potential to help indicate the risks created by asset price developments induced by capital flows.

For instance, the central bank will tend to interpret the moderate growth of both money and credit as a sign that money growth is likely to be driven by domestic money demand, thus posing fewer risks to price stability. Further, if money growth is low but credit dynamics are more buoyant, it is likely that the net external assets of non-monetary financial institutions (non-MFIs) are growing and that the domestic economy is financing investment abroad. In these circumstances, the central

bank may have to form an opinion about likely developments in the economies towards which domestic capital flows are directed. If it views the foreign investment dynamics as led by an asset price bubble, it may warn investors and communicate its concerns. At the same time those capital outflows may signal a fundamental disequilibrium that may lie, for instance, in the domestic fiscal policy, if it is expected to constrain the evolution of inflation, or in the level of national productivity and consequently in the external value of the domestic currency.

In other circumstances, it may be money that grows fast while credit dynamics are subdued. In this case, money growth is led by the repatriation of foreign investments, whose proceeds are normally deposited with local financial institutions and result in an increase in domestic money. Typically these repatriation flows do not pose significant risks to price stability as they represent reallocation of wealth portfolios and they are unlikely to translate into excess demand. However, the central bank should monitor credit developments as the boost in domestic liquidity may lead financial institutions to relax credit conditions and eventually trigger an unsustainable loan binge.

The most complicated combination, however, may be the one where money and credit both grow quickly. In this case, capital flows do not matter much. The central bank must be able to assess if these developments are due to fundamental factors, like a more or less sustainable increase in productivity growth or a positive shock to real estate prices. In the first case, higher credit growth may be compatible with a higher desire of households to smooth their income over time. By borrowing more today, households increase the entire profile of their consumption path, and they are able to do so because their expected real income is higher, due to the increase in productivity growth. In the second case, credit growth may be driven

<sup>38</sup> Thus, while the choice of policy regime in one country appears justifiable as stability-oriented, it in fact merely transfers possible imbalances abroad through the financial channel and threatens the stability of the recipient country financial system.

by the increase in household wealth, eventually exacerbated by the characteristics of a domestic financial system that allows households to increase their leverage significantly. In these circumstances, central banks need to elaborate on possible scenarios and take into account the whole transmission mechanism, in order to properly assess the nature of the shock underlying the money and credit dynamics and also the eventual risks to price stability that those shocks could create.

However, as monetary analysis is used at the national level rather than the international level, it is rarely used to better understand and perhaps identify the impact of national policies in initiating cross-border capital flows that lead to asset price movements abroad and affect global liquidity. Indeed, the bursting of an asset price bubble in one country, such as Japan, may have global consequences if the fight of its monetary authorities against subsequent deflationary trends facilitates carry trades towards other zones over an extended period. In particular, the deterioration of its fiscal position, if prolonged, may be seen as providing a guarantee that interest rates will remain low for a lengthy period and encourage outflows of excess liquidity created to fight against deflation. This encourages inflows in economies offering higher interest rates, for instance if their peg to another major currency guarantees high rates with limited foreign-exchange risk in a period of low global volatility. In a similar way, the bursting of the high-tech bubble in the United States led to substantial capital inflows in the euro area and to money hoarding, explaining substantial growth rates of monetary aggregates without corresponding price pressures.

#### 4.3.3 THE EMERGENCE OF NEW FINANCIAL MARKET PRODUCTS AND PLAYERS AND THE “BEHAVIOURAL” OR “RISK TAKING” CHANNEL OF MONETARY POLICY.

The emergence of new categories of investors and financial intermediaries, whose behaviour and incentives<sup>39</sup> may be quite different from the traditional categories of market players (like banks), has probably modified the way

shocks are propagated across financial markets and monetary policy impulses are transmitted to the rest of the economy. The same is true of the spread in the use of credit derivatives which, due to their “off the balance sheet” status, often makes the international propagation of their effects difficult to follow.

First of all, the proliferation of financial intermediaries whose main value added is in securitising and making liquid (i.e. tradable in the market place) assets that until a few years ago would have been highly illiquid and remained on the originators’ balance sheet has increased the ability of the financial system to multiply liquidity. To be sure, this is by no means a problematic development per se, but rather one of the desirable outcomes that macroeconomic stability (which mostly has to be ascribed to the increased quality of monetary and fiscal policy in many countries over the last 25 years) is supposed to deliver. In a stable macroeconomic environment, which is much less risky and much friendlier to businesses than in the not-so-distant past, higher expected profits (and lower risks associated with those profit expectations) ought to induce greater risk-taking, and low short-term volatility to encourage the creation of market liquidity by financial institutions. Chart 6 below draws on balance sheet data of both the US financial and non-financial corporate sectors to show how both sectors of the US economy actively manage their own balance sheet.<sup>40</sup> Security dealers and brokers (which include the once well-known large US investment banks), in particular, tend to create liquidity during asset price booms and drain liquidity during asset price declines. Such behaviour tends to impart “bubbly” dynamics to asset prices, thus feeding its own collapse. The beneficial effects of making specific assets, like mortgage loans, liquid become sclerotic once the unsustainable dynamics in the price of the

<sup>39</sup> Rajan (2006).

<sup>40</sup> That is to say that leverage is procyclical. When asset prices increase, the equity capital of the firm increases, thus reducing its leverage (defined as the ratio of assets to equity). If firms tend to target a constant – or even increasing – leverage ratio, they must incur new debt and purchase new assets.

underlying assets (in this case house prices) are reversed; financial institutions engage in massive de-leveraging and cause a drainage of market liquidity, which hits the global financial system at its heart.

Furthermore, behavioural shifts have occurred (as they always have in past episodes of asset price bubbles) that are associated with new

products and increased incentives for financial market players to pursue risky investment strategies. Risk shifting, illiquidity seeking, tail-risk seeking and, of course, herding,<sup>41</sup> may affect the way central banks influence the economy through the conventional channels of transmission. In other words the classic channels – interest rate, balance sheet, bank lending and liquidity channels – might be affected in such a way as to influence the effectiveness of monetary policy to an extent that was previously unknown. This is what some authors prefer to introduce as a supplementary channel, which they call a “behavioural” or “risk taking” channel for the transmission of monetary policy.

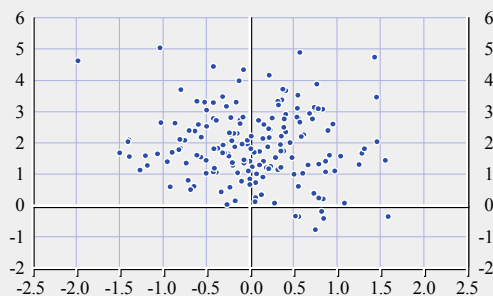
In an era when banks dominated financial systems, bank officials’ incentives were clear. Their salary would rarely depend on banks’ short-term investment returns and they thus had little interest in seeking extra returns that, being more risky, could have jeopardised banks’ balance sheet. Shareholders, for their part, were happy to enjoy the steady income arising from the limited competition in the market for funds and the system was able to deliver stable but inefficiently conservative financial intermediation flows. In the modern, deregulated and competitive environment, investment managers in investment banks or in other financial intermediaries have, at least up until now, worked with an incentive structure commensurate with the new context. As the penalty of poor investment performance in the new environment was believed to be less drastic than a bank run, investment managers may have perceived that there was more upside than downside to adding risk in order to generate extra returns that immediately affected their own salaries. In such an environment, what really mattered for many investment managers was to perform better than their peers or, at least, no worse. And this generates two perverse consequences.<sup>42</sup> First, investment managers try to boost returns by investing in assets that have

**Chart 6 Total asset and leverage growth**

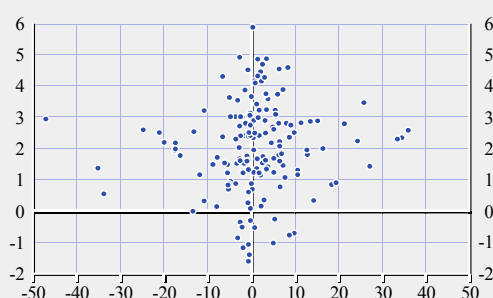
(percent quarterly)

y-axis: total assets growth  
x-axis: leverage growth

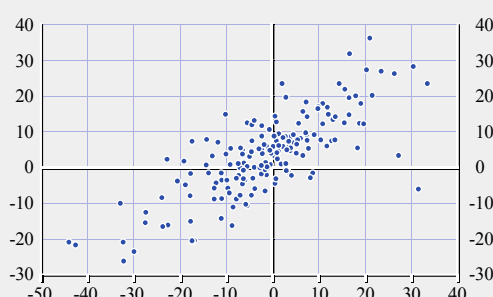
**Non-financial, non-farm, corporates**



**Commercial banks**



**Security dealers and brokers**



Source: Adrian and Shin (2008).

41 Rajan (2006a).

42 Rajan (2006).

risk characteristics that are easily concealed from investors, i.e. assets that perform extremely badly in the event of extreme events but offer generous returns the rest of the time. The finance literature calls these risks “tail risks”. The second perverse consequence is the incentive for investment managers to herd with competitor managers, because this behaviour guarantees that they will not underperform their peers. It is easy to appreciate how both behaviours tend to reinforce each other in periods of asset price increases, which provide the impetus for an upward spiral that feeds on itself and is prone to develop into a credit bubble.

The combination of financial innovation and behavioural shifts on the part of market participants increases the vulnerability of the international financial system to sudden gyrations in markets’ risk perceptions and tolerance. The explosive dynamics imparted by the ability of financial institutions to pack and sell credit-growth risk becomes an equally powerful implosive force when risk materialises and hits financial institutions’ balance sheets. Furthermore, if losses are realised on off-balance sheet positions, there is by definition no market that can offer actual prices, due to the absence of market-makers and clearing houses. In such context, liquidity crises can easily erupt as most participants have difficulty assessing the soundness of their own balance sheets, let alone that of those of their counterparties.

One clear example of such perverse dynamics is the ongoing financial turmoil that originated in the US sub-prime mortgage market. Over the period 2002-2005, a combination of rising house prices and very low interest rates contributed to increase both households’ demand for mortgage credit and the risk appetite of financial institutions in search of higher returns. Thanks to financial innovation, primary mortgage lenders securitised their loans, which in practice meant separating out their lending business from the risks implied by holding mortgage loans on their own balance sheets. Through mortgage-backed derivatives mortgage lenders could lock in their return on the mortgage, while the buyers of the

mortgage risks, mostly hedge funds and non-bank institutions, could obtain the extra return they were seeking. In the absence of market players with a higher tolerance for risk, these dynamics would not have developed. In normal times, such dynamics are beneficial because they help allocate capital more efficiently to those agents willing to bear particular risk/return profiles associated with their investments and result in a higher provision of funds to those who may need them.

However, after a significant decline in house prices and the tightening of monetary policy that started in 2006, mortgage-loan defaults and home foreclosures increased in the United States, until the market for mortgage-backed securities came to a sudden standstill in August 2007. Credit and liquidity risk increased sharply worldwide and the turmoil spread very quickly from the United States into global financial markets and from mortgage markets to other asset classes, including money markets. In those circumstances, financial institutions around the globe were unable to sell risk in the market anymore and were forced to retain on their balance sheet a significant amount of non-performing mortgage loans. Hence, such institutions had to cut their exposures to other investments in order to repair their balance sheets and global credit flows dried up sharply.

These developments show that in some circumstances the presence of high-risk investors with relatively short investment horizons can instil perverse dynamics and foster asset price bubbles, eventually causing leverage in the economy to increase to well above a sustainable level. Apart from obvious considerations concerning reform of the regulatory framework to prevent unsustainable credit-creation dynamics ex ante, the changes in the financial markets’ microstructure and their ability to engineer and supply more innovative and complicated products thus have some important implications for monetary policy.

First, central banks have to make sure that they avoid the risk of becoming, paradoxically,

victims of their own success in achieving macroeconomic stability and earning high credibility. Periods of low macroeconomic volatility may well be precisely those periods when market dynamics “take on a life of their own” and depart from all rational considerations of possible risks. This implies that central banks have a duty to base their analysis, recommendations and policy decisions on a firm focus on the fundamental trends in the economy.

In particular, central banks should be very cautious when communicating to the markets and the public in general in order to avoid fostering unsustainable expectations among market participants. In some circumstances, the unfounded expectations of a certain future policy course may have an amplifying effect on asset prices and thus may contribute to the build-up of financial imbalances that quickly unwind in a costly way when expectations change.

Third, central banks should devote maximum effort to understanding the extent to which the transmission channel of monetary policy in a stable macroeconomic environment may be affected by both a high degree of integration of global financial markets and an ever developing market microstructure. For example, globalisation and the perverse behaviours spurred by financial innovation may have combined in the last two years to make the long end of the yield curve less responsive to monetary policy tightening (especially in the United States, but also in the euro area) than it was expected to be on the basis of historical experience. It is very likely, in fact, that global savings were flowing into the United States attracted by the unsustainable low risk-return profile offered by new financial products and by the mirage that the credit risk premium had almost disappeared.

Fourth, central banks need liquidity policies well adapted to the occurrence and development over time of deep financial scares. Ex ante, a liquidity management framework that allows a wide range of high-quality collateral and a large

number of possible counterparties is helpful in maintaining market access for illiquid but solvent institutions. Moreover, international cooperation is also needed to allow foreign-currency liquidity to be dispersed across domestic banks.

However, this may not be sufficient. Recent developments show that drastic decisions (like the acceptance of lower-rated collateral and state guarantees for interbank operations) may sometimes be needed to reignite markets. Such decisions which, de facto, expand the role of monetary policy and threaten to reduce the efficiency of financial markets, also increase the risks and the potential fiscal costs borne by the authorities. This begs the question whether it would not be desirable to include in central banks’ operational framework the possibility of pursuing extraordinary liquidity strategies, in addition to those aimed at very short-term money markets, in order to avoid resort to such extreme initiatives. For instance, it is possible to imagine a catalytic role for central banks (including the use of moral suasion) in reorganising market infrastructure and/or maintaining trading activity in certain high-quality assets used by banks as collateral in their repo operations, when trading in low-quality assets is shunned by the financial system. Further, in some circumstances it may be possible (and even profitable) for central banks to sell Treasury bills and to accept high-quality assets in payment, in order to foster the appreciation of the latter. Such operations might be profitable for central banks and may simultaneously reduce the number of banks having to post losses on their trading books. These exceptional possibilities should be designed in a way that clarifies the instances in which they can be applied and the expected exit strategy, in order to minimise moral hazard and inefficient intervention in money markets. It is probably fair to admit that the lack of such contingency provisions in central banks’ liquidity management framework has deprived monetary authorities of tools that could have been used to foster the unwinding of the financial turmoil, which was subsequently transformed into a financial crisis. In many cases, despite

having sufficient amounts of capital from the viewpoint of their Tier 1 ratios, banks became illiquid and then insolvent due to the fall in the value of high-quality-but-no-longer-traded assets. It may thus be argued that some support of financial prices by central banks could have avoided the almost complete market standstill and might even have avoided recourse to capital injections.

Lastly, it may be important to increase the exchange of information between central bankers and supervisors, as well as the ability of statisticians to follow the development of the “off-balance-sheet” positions of financial intermediaries. Also, it may be useful to provide incentives for financial institutions to create and trade standardised, exchange-traded securities in order to increase transparency and reduce systemic risk.<sup>43</sup> Standardised securities are normally traded through clearing houses that ensure that every party to a financial contract meets its own obligations. Furthermore, clearing houses continuously mark to market gains and losses and impose on the parties to the contract margin requirements that depend on valuation changes. Hence, margin requirements serve the role that capital requirements serve for banks and marking to markets allows the state of each financial market’s capital to be monitored transparently. Ultimately, counterparty and liquidity risk is easier to quantify in real time, and the likelihood that credit bubbles (possibly involving the creation of obscure financial securities that are not easily detectable in financial institutions’ balance sheets) will develop is much lower.

43 Cecchetti (2007).

## 5 THE IMPLICATIONS OF GLOBALISATION FOR MONETARY POLICY

Recent developments in inflation, both in the industrialised and in the emerging economies, and the propagation of the financial tensions in the United States suggest that globalisation may now be entering a new stage. Following a period when the opening up of international commodities and services markets to the emerging economies caused the relative price of manufactured goods (and of some services) to decline worldwide, the ongoing growth of such markets is now contributing to the current upward pressure on the price of food and of the raw materials employed in their manufacturing sectors. In fact, the net effect in industrialised countries is the (sometimes significant) ongoing acceleration in domestic inflation. Simultaneously, the increase in financial pressures evidenced by the ongoing deepening of the financial turmoil shows that globalisation also entails the risk of rapid transmission of financial pressures.

Globalisation, which initially seemed characterised by its downward impact on prices and inflation, is now increasingly recognised as a complex factor with multiple influences. While its potential for generating upward pressures on inflation is fully recognised, its other effects, including the rapid transmission of financial shocks, are also apparent. This has generated questions of many types: has the ability of national central banks to control inflation at the national level been impaired? Conversely, can the propagation of financial scares be controlled or prevented? In particular, which techniques should be adopted or developed by central bankers to facilitate such control? Beyond macroeconomic considerations, how should money market liquidity be managed in the context of international financial turmoil? More generally, what role should be given to international cooperation in such fields? This section first considers the impact of globalisation on the case for domestically conducted monetary policies and considers the evolution of techniques used by central bankers in the macroeconomic field. It then addresses

the challenges arising from financial innovation and integration. Finally, it addresses the need for enhanced international co-ordination.

### 5.1 GLOBALISATION AND MONETARY POLICY: THE CASE FOR A DOMESTICALLY CONDUCTED MONETARY POLICY

Globalisation does not weaken the case for a domestically conducted monetary policy pursuing price stability over the medium term. In the event of capital and/or goods market integration, greater openness does not impair the ability of domestic monetary policy to control inflation. Inflation is ultimately always a monetary phenomenon, i.e. a phenomenon that the central bank can control. In a recent contribution, Woodford (2007) uses an open-economy structural model to make that point, i.e. that neither a high degree of financial market integration<sup>44</sup> nor a greater role for a “global” measure of economic slack in domestic supply dynamics is likely to weaken the ability of national central banks to control the dynamics of domestic inflation. In the same vein, Taylor (2008) argues that there exists clear evidence based on various models that monetary policy cooperation does not deliver additional gains to those provided by domestic monetary policy. Thus, he concludes that in the most efficient monetary policy framework, central banks may act on their own, insofar as they incorporate into their decisions the expected actions of the other central banks. In such a framework, it is crucial that monetary policy authorities exchange information so that each of them can incorporate the others’ monetary policy reaction into its own decisions.

However, globalisation has brought some significant challenges and requires new aspects of monetary policy to be investigated in order to ensure the maintenance of price stability. In the words of Rogoff (2006), globalisation, through both goods and asset-price arbitrage, “is weakening the grip of individual central banks over the trajectory of domestic real

<sup>44</sup> Financial integration in Woodford’s analysis is captured by allowing global liquidity to be the determinant of the domestic interest rate and allowing global savings and investment to determine the domestic equilibrium real interest rate.



interest rates, except at relatively short horizons”. Moreover, recent developments such as the GSE crisis and the bankruptcy of several investment banks in the United States make clear that propagation risks have enormously increased. Hence, the monetary policy implications of the changes in the transmission mechanism engineered by both the structural changes described in Sections 2 and 3 and the four stylised facts discussed in Section 4 have to be drawn.

### 5.2 GLOBALISATION AND MONETARY POLICY: FACING THE CHALLENGES OF STRUCTURAL CHANGES

The first implication of the changes in the monetary policy transmission mechanism due to globalisation is the need for central banks to go beyond simple models and to widen the battery of tools used to gauge inflationary pressures, including structural analysis in the assessment process. Structural analysis, in conjunction with other models and indicators, can be very useful in identifying possible shocks to the economy but also in devising the right response to them.

First, simple rules and concepts like “output gap” or “core inflation” are increasingly insufficient, as explained in Section 2. As a consequence, a more sophisticated analysis is necessary. Second, a structural understanding of global shocks is increasingly needed, and thus DSGE models are increasingly useful, especially as they have adjustable production functions and adjustable exchange rate pass-through. The actual flexibility of various markets needs to be taken into account, as well as the impact of international competition on the length of the adjustments needed and hence on the shape of the business cycle. Third, the impact of globalisation on inflation perceptions and the credibility of the central bank should not be forgotten. In particular, it is now necessary for central bankers to take into account the risk of second-round effects and of a dispersion of inflation expectations in order to ensure that economic agents concentrate on the adequate response to the challenges faced. Hence,

credibility and inflationary perceptions should be measured and, if possible, modelled. Finally, for this reason, communication, transparency and competence are increasingly pivotal for central banks. It is particularly important for them to convince fiscal authorities to avoid any measure that would amplify inflation or delay the economic adjustment.

### 5.3 GLOBALISATION AND MONETARY POLICY: FACING THE CHALLENGES OF FINANCIAL INTEGRATION

Facing the challenges of financial integration requires even further adjustment in the behaviour of central banks. First, they need to acknowledge that asset prices developments, may more often than usually expected, lead to abrupt price changes; the frequency of fat-tail events is not consistent with usual Gaussian distributions. Second, they need to learn how to monitor the flows of liquidity which help propagate the development of asset price bubbles and often underlie the development of global imbalances. This is complicated by the fact that capital flows may prompt asset price movements across borders and that money may shift from one type of asset to another when liquidity allows it to. Third, central banks need to learn how to “lean against the wind” efficiently. It is now apparent that asymmetric central bank responses, such as the ones advocated by A. Greenspan, end up encouraging moral hazard and are eventually counterproductive. Indeed, an effective approach to risk management must also be forward looking. The size and the duration, as well as the contagious nature of the current financial turmoil strongly support this point, which also finds some support at the theoretical level. Indeed, Loisel et al. (2007) show, in a closed economy context, that there exist particular situations in which a central bank can usefully lean against the wind. These cases are characterised by asset price bubbles that develop on account of herding behaviour by entrepreneurs who take investment decisions on the basis of other entrepreneurs’ decisions rather than on the basis of fundamental signals arising from the economy. By increasing the

cost of borrowing in response to the observed herding behaviour, the central bank can curb the investment of herding entrepreneurs, which is very sensitive to the cost of borrowing, and thus reduce the risk of asset price bubbles. Those entrepreneurs who actually invest on the basis of fundamental rationale will be only marginally hit, since for these entrepreneurs the expected return on the investment is not equal to the borrowing cost.

This is not to say that the identification of asset price bubbles does not remain difficult. Nor does it imply that central banks are always able to influence asset prices, or that central banks should ‘prick asset price bubbles’. Irrational exuberance is indeed a reality, but targeting asset prices directly would give rise to moral hazard even more directly than asymmetrical behaviour. Rather, central banks should develop a broad range of models and indicators in order to ensure that the fundamental analysis of asset price developments is as robust as possible. The persistence of unexplained paths for the residuals across statistical and econometric models and possible instability in their parameters may well be a warning light that a bubble is in the making.

The recent financial crisis is a case in point, as the excessive decrease in risk premia up to 2007 was for many a clear sign of asset price disequilibria and excess liquidity.<sup>45</sup> The recent turmoil has clearly shown that financial globalisation may amplify and spread across the world’s financial markets the effects of inefficient market behaviour.<sup>46</sup> Hence, central banks should devote more resources to the analysis of global capital flows and to their impact on developments in the domestic savings-investment balance and in current accounts across economic areas, which may prove to be unsustainable. There is also a need for increasing inclusion of financial frictions in DSGE models and, in particular, of both a non-financial sector and a banking sector.

Moreover, monitoring and analysing monetary aggregates with a view to identifying underlying trends also leads to identification of the asset prices that have a more volatile impact on

such aggregates. This systematic monitoring naturally leads to the construction of “risk scenarios” addressing the likely developments in a certain part of the economy or of financial markets. In this way the policymaker can assess the relative probabilities of a larger number of uncertain future developments and, thus, make a more robust assessment of its own monetary policy stance.<sup>47</sup>

Hence, central banks should consider the possibility of adjusting their monetary policy stance in response to excessive asset price movements, when there is a high probability that capital flows and credit dynamics are driven by self-fulfilling expectations of continuously increasing asset prices or unrealistic expectations about the developments in fundamentals. The cost of inaction may, in some cases, be much higher than the negative wealth effects of bursting the bubbles and may lead to periods of heightened financial (and possibly also economic) instability. It is important however that such action is not perceived as targeting asset prices. In fact, its goal should be to avoid such prices departing further from their equilibrium level rather than supporting them at any such level. A good candidate strategy for such purpose is the two-pillar strategy used by the ECB.<sup>48</sup> As monetary and credit aggregates often reflect the risks of bubbles in the economy without being associated with specific asset markets, it allows the central banker to avoid the moral hazard associated with ‘leaning against the wind’.<sup>49</sup>

45 See the Overview in ECB (2007), pp. 9-15.

46 The strand of economic literature dealing with “behavioural finance” analyses various reasons why financial market prices may depart from their fundamental-based values (see Shleifer (2001) and Abreu and Brunnermaier (2002)).

47 See Stark (2007).

48 See Trichet (2005).

49 Ultimately, this approach would not differ in substance from the approach that central banks already adopt when exchange rates depart from their estimated “fundamental” value. In normal times, the central banks of large economic areas do not intervene in the foreign exchange markets to avoid creating conflicts with their primary objective of domestic price stability. However, occasionally these central banks may find it optimal to intervene in a coordinated manner in order to “throw sand in the wheels” of speculators, when their internal analyses show that actual exchange rate developments are not compatible with any of the models that are supposed to explain exchange rate behaviour.

The greater role of international financial transactions in the monetary policy transmission mechanism requires however that monetary policy authorities gain more insight and expertise in the analysis of financial market microstructure, including the functioning of ever newer and more complicated financial products. The analysis of monetary aggregates and their counterparts with a view to gauging the medium to long-term risks to price stability can help to detect possible bubble developments in asset markets if a detailed knowledge of the financial microstructure and of financial products is available to the central bank.

Hence, available assessments of the stability of the domestic and the international financial system should be routinely taken into account in the assessment of the monetary policy stance and the risks to price stability. By considering financial stability issues in financial stability reports only, central bankers may miss important elements in their evaluation and risk being caught by surprise by the unwinding of asset market bubbles. The latter may be fostered by the same low volatility environment that the central bank has contributed to establish and, in particular, by possibly persistent changes in the size and quality of international capital flows. Furthermore, the decline in investors' "home bias" exposes any economy to the possibility that the benefits of asset diversification (in terms of low output and inflation volatility) may abruptly evaporate and sharp asset price changes in international asset markets may lead to severe income and wealth losses in the domestic economy. In this respect, central banks and supervisory authorities should cooperate in order to provide monetary authorities with a thorough analysis of the risks embedded in the financial system, which is constantly evolving both in terms of products and of the characteristics of its players.

Finally, the current financial turmoil shows the need for: a high degree of consistency between central banks' operational frameworks; organisation at the national level of the function of lender of last resort; and central bank responsibility for financial stability.

An important lesson for central banks of the recent financial turmoil is the need to avoid the increase in risk premia, in periods of heightened volatility, not only affecting the markets in longer-dated securities but also putting money markets under stress. The collapse in the US mortgage market has called into question the ability of financial institutions to engineer financial products that actually do transform previously illiquid assets (i.e. mortgages) into easily tradable instruments. When the mortgage market crisis erupted in June 2007, the liquidity flows suddenly dried up and what started as a problem in a quite limited segment of the world's financial markets quickly spilled over into other markets, including the one for very short-term securities. Thus, it became an urgent issue for central banks to avoid the compounding of credit and liquidity risks bringing the international financial markets to the verge of collapse. Since June 2007, the major central banks of the world have engaged in "extraordinary" liquidity injections, which have enabled money markets to function again. In this respect, the ECB's operational framework, which allows a wide range of collateral and a large number of institutions to participate in its refinancing tenders, proved to be very useful in absorbing the sudden increase in risk premia and restoring the orderly functioning of money markets.

Hence, it is preferable to furnish the central bank with an operational framework that allows it to lend to all solvent counterparties against high-quality collateral rather than to a limited set of counterparties. This allows a clear distinction to be made between operations which do not carry financial risk for the central bank and operations which do carry such risk. If low-quality collateral needs to be accepted from a counterparty judged solvent, such operation can effectively be called emergency liquidity activity and be undertaken at the responsibility of the central bank. Moreover, it is important that, in the central bank statute or in an explicit and formal agreement with fiscal authorities, the cost of eventual financial losses created by insolvent counterparties be fully borne by those financial institutions themselves. In a context in

which large banks can become insolvent, this ensures the independence of the central bank and the soundness of its balance sheet. For the ECB and the Eurosystem, this is ensured by Article 101 of the Treaty which forbids the direct financing or subsidisation of other European institutions by the Eurosystem. Finally, this overall organisation, including the ‘leaning against the wind’ part, is consistent with a system in which a central bank contributes to financial stability rather than being fully responsible for it.<sup>50</sup>

#### 5.4 GLOBALISATION AND INTERNATIONAL POLICY COOPERATION<sup>51</sup>

The greater integration of financial markets and the role of new countries in the global exchange of capital also challenge international fora to strive for better analysis and understanding of the ongoing changes in the international financial system. Since the 1980s, many systemic crises have occurred that have had different explanations and that have developed in different ways. Each of these crisis episodes has led international institutions to learn from their mistakes and implement monitoring and cooperation frameworks that reduced the risks of a similar crisis. The G7 has been instrumental in shaping the international financial architecture, as it reacted to the need to better involve emerging market economies. In particular, since the creation of the Group of Twenty (G20) forum of finance ministers and central bank governors in 1999, emerging market countries have been involved in global economic and financial stability issues like exchange rate regimes, prudent debt management, domestic financial deepening and international codes and standards. The G20 has also played an important role in forging consensus on reforms of the Bretton Woods institutions and has been constructively involved in helping shape mechanisms for crisis prevention and resolution.

However, the development and integration of global financial markets pose new challenges to policymakers and suggest that international cooperation needs to take new forms in order

to address such challenges. The multilateral consultation procedure inaugurated and sponsored by the IMF in 2006 (on Global Imbalances) may prove to be the right forum for his purpose, assuming that the analysis is broadened to fully incorporate the interrelated dynamics of global financial markets. In particular, the multilateral consultation procedure should take a global perspective and assess the risk to monetary and financial stability by taking into account both the possible existence, assessment and prospective impact of asset price disequilibria and their international channels of transmission. For example, phenomena like global imbalances and carry-trade financial flows, as discussed in Section 4.2.2, should be analysed from a multilateral viewpoint because the possible domestic policy misalignments or the development of an asset price bubble can easily have a significant repercussion on the risks to price and financial stability in other parts of the world. In particular, a multilateral exercise that also focuses on capital flows and their nature could help in assessing asset price developments and eventually help central banks to set monetary policy in a manner that incorporates the risk of a bubble building up and eventually bursting in the medium term. Such “leaning against the wind” would not be intended to prick the bubble but rather to avoid a monetary policy stance that passively contributes (by facilitating credit growth) to the inflating of the bubble. Hence, it is relevant to examine whether excess liquidity flows in an open economy context may not also spur asset price bubbles.

Finally, better cooperation in terms of liquidity provision is also needed. A first example of successful cooperation is provided by the auctions of US dollar liquidity, jointly organised by the Federal Reserve, the ECB and the SNB since the start of the turmoil in mid-2007.

50 See Bini-Smaghi (2008), Uhlig (2008) and Goodfriend (2008).

51 Here, international “cooperation” indicates a more or less formal framework which facilitates the exchange of information among policymakers and the sharing of views about the nature and the consequences of particular international policy considerations. The term “cooperation” does not signify any act by various policy authorities that would imply a common decision with immediate consequence for their respective policy instrument.

Widespread adoption of such arrangements might be envisaged to deal with other crises in the future. Moreover, international institutions should better understand the dynamics of liquidity crises and be able to advise countries on their best strategies. Furthermore, it might be asked how the participation of countries in such cooperation should optimally be organised. Who might join such cooperation and how should the risks to those countries which do not participate be monitored? Lastly, how should the corresponding swap agreements and the various other facilities made available by regional or international institutions be made compatible?

## 6 CONCLUSION

Globalisation is a dynamic, multi-faceted phenomenon that changes the structure of national economies and the way shocks are propagated both within a single economy and across the world. In particular, the emergence of large countries participating in global markets for goods, services and financial assets is likely to affect inflation developments in new ways that are, to some extent, still unexplored by central banks. This paper argues that the challenges posed by globalisation do not call for greater “coordination” of monetary policies across the world. National monetary policies, which are oriented towards the maintenance of domestic price stability, are still the most efficient solution to control inflation developments and, consequently, to contribute to financial stability.

Nevertheless, globalisation has probably contributed to some major changes in the way central banks ought to perform their duties. The fact that changes may have occurred in the economic relationships driving output growth and price formation mechanisms and the proliferation of external shocks, of a varied nature, that can hit the domestic economy suggests that central banks should devote more effort to structural analysis than in the past. A robust, “risk-managing” approach to monetary policy must be able to identify as precisely as possible shocks, the way they are transmitted to the domestic economy and, ultimately, how they can affect domestic inflation.

In particular, central banks must take into account how the evolution of financial markets’ structure and their increased interdependence may play out in the monetary policy transmission mechanism. Liberal and innovative capital markets may have a non-negligible role in the creation of liquidity, which is not always necessarily aligned with the central banks’ objective of price stability. In this respect, the ongoing financial crisis has demonstrated that financial stability considerations are not always separable from the analysis of the risks to price

stability, but rather should be part of the normal assessment of the monetary policy stance. As a consequence, it is conceivable that central banks may, under certain conditions that are admittedly very difficult to meet in reality, use monetary policy to “lean against the wind” of possible asset price bubbles, if the eventual bursting is judged to pose significant risks to price stability. In this case, the high uncertainty surrounding the existence of a bubble in a particular asset market should be weighed against the eventual costs of the bursting, without ruling out “tail” events. The analysis of monetary and credit aggregates can provide valuable information to help identify the risks of a bubble bursting.

Finally, the increased interdependence of financial markets across the world and the possible impact that financial flows can have on the global economy suggest that multilateral policy cooperation should take new forms. In particular, the already existing surveillance framework should be enlarged in order to encompass a thorough analysis of domestic and international capital markets, including the possible impact that domestic monetary policies may have on capital flows and on the liquidity conditions in each country.

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