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Editorial

By Gabriel Fagan, ECB

*Since early August 2007, the financial turmoil - characterised by heightened uncertainty in financial markets, diminished liquidity in key market segments, increases in risk premia and more frequent and substantial liquidity provision by central banks - has been a defining characteristic of the global financial landscape. The first article in this issue, "**A research perspective on the propagation of the credit market turmoil**", looks at the underlying sources of the recent turmoil from a research perspective. Against the background of the emergence of a set of new financial instruments aimed at increasing investors' access to credit markets, the article traces the deeper causes of the turmoil. It reviews the role of a number of key explanatory factors which have been identified in the literature - valuation uncertainties, adverse selection, incentive problems in risk management and difficulties in pricing illiquid assets.*

*The trigger for the latest bout of turbulence can be found in the US subprime mortgage market. This, in itself, raises the question of how changes in housing wealth can have an effect on the broader economy. In this regard, the second article, "**Financial innovation and the effect of housing wealth on consumption**" provides a timely review of recent research findings on the impact of changes in housing wealth on consumption.*

*While differences in inflation rates across euro area countries have long been a subject of discussion, other dimensions of economic heterogeneity within a monetary union have received much less attention. The third article, "**Regional inflation dynamics within and across euro area countries and a comparison with the United States**", presents some original research findings regarding regional inflation differentials. It explains the main factors driving regional inflation rates and shows how regional data may contain valuable information to help understand the underlying forces driving inflation dynamics in the euro area.*

Table of contents

A research perspective on the propagation of the credit market turmoil

By Nuno Cassola, Mathias Drehmann, Philipp Hartmann, Marco Lo Duca, Martin Scheicher, ECB[1]

This article argues that available theory in the areas of information economics, asset pricing and market microstructure analysis can explain the most important economic mechanisms giving rise to the widespread transmission of the ongoing credit market turmoil across developed financial systems during 2007. We identify increases in general uncertainty and adverse selection as likely primary factors in this transmission. Some first selective empirical evidence is provided in support of these hypotheses.

After a long period of relative financial tranquillity, the credit market turmoil that began in the summer of 2007 has raised important questions about the implications of financial innovation and development for the stability of financial systems (see ECB (2007b) and Ferguson et al. (2007)). This article focuses on the economic mechanisms that have caused a problem which initially appeared to be relatively contained (i.e. the United States' sub-prime mortgage crisis) to spread widely and quickly across the financial systems of industrialised countries.[2] The specific aim of this article is to use insights from the research literature to identify and discuss some primary factors explaining those mechanisms.

The central argument of the article is that information problems go a long way towards explaining the spread of the turmoil across the financial world. A combination of valuation uncertainties in the markets for structured credit products and widespread adverse selection, against the background of the greatly increased complexity of credit relationships as banks have moved from the traditional business model of "buy and hold" to the model of "originate and distribute" and the wider spreading of risks associated with this securitisation process, can probably account for the bulk of this propagation during 2007. However, by pointing to these information problems, we do not wish to claim that other factors have not also played a role (incl., for example, the maturity mismatch between assets and liabilities in banks' off-balance sheet investment vehicles).

The facts: The events of summer 2007 and their root causes

The factors giving rise to the credit market turmoil that began in summer 2007 can be summarised in three periods.

1) Ultimate sources: Accumulation of imbalances

The years prior to 2007 were characterised by low financial market volatility and risk premia, rapid financial innovation in credit markets (e.g. increases in credit derivatives and structured credit products), low interest rates across the maturity spectrum, and ample liquidity. In this environment, banks and other investors engaged in a "search for yield" with the help of new credit products and investment vehicles. The pace of this "herding" behaviour into ever more complicated forms of securitisation far exceeded the market's capacity to solve a number of open valuation, risk

management and incentive issues. The result was a highly complex and opaque system of credit risk distribution in which many investors were either ignorant or imprudent with regard to the risks that they had acquired.[3]

2) Trigger events: Emerging tensions in credit markets

The main trigger of the turmoil, which brought the weaknesses mentioned above to the surface, seems to have been the US sub-prime mortgage crisis. Delinquencies on US sub-prime mortgages increased sharply during 2006 and 2007, as a result of lax lending standards and, in some cases, outright fraud coupled with declining house prices and rising interest rates. In June 2007 two Bear Stearns hedge funds investing in sub-prime assets got into severe difficulties and credit default swap premia started to increase sharply. Shortly afterwards rating agencies downgraded a large number of asset-backed securities (ABSs) and collateralised debt obligations (CDOs), and in July 2007 the prices of even AAA-rated CDO index tranches declined below par value. Also signs of weakening in US economic conditions seem to have played some role. The ensuing general repricing of risk and tensions in credit markets spread beyond the United States, even though the sub-prime segment represents only a small share of US financial markets and other countries did not have significant sub-prime mortgage segments.

3) Systemic risk: Transmission to the main money markets

The tensions in the markets for structured finance products did not, however, pose a significant threat to systemic stability until major money markets became seriously affected. In early August money market rates rose sharply across the maturity spectrum and trading dried up. A few medium-sized banks that had large direct or indirect exposures to US sub-prime mortgages or depended particularly heavily on money market funding were saved

2   It does not focus on the propagation of the credit market turmoil to the real economy, although the mechanisms identified are also relevant in this regard.
3   The ECB had warned about the emerging vulnerabilities well before the turmoil broke out (see e.g. Trichet (2007) and various financial stability reviews (including ECB, 2007a)).

from default.[4] A number of large and complex financial institutions have also announced heavy losses in their credit business.[5] While the extensive and coordinated provision of central bank liquidity to money markets was successful in reducing very short-term money market rates and volatility, money market rates at one-month, three-month and longer-term maturities have remained stubbornly high.[6]

Since the events of 2007 large and complex banks have gone through several rounds of announcing credit losses.[7] So the actual extent of exposures to the problematic instruments and the health of specific financial institutions becomes only gradually more known and further revelation is expected in the future.

An economic explanation: Valuation of credit and adverse selection

Given the above, we hypothesise that the main reason for this widespread transmission during 2007 was the emergence of severe information problems in new credit markets and in the money markets. We see two types of information problem: general uncertainty (owing to "imperfect information") in relation to credit valuations; and adverse selection (owing to "asymmetric information").

1) General uncertainty and credit spreads

The first type of information problem can be founded upon the literature on the pricing of risky credit assets (see Merton (1974), Black and Cox (1976) and Leland and Toft (1996)). Duffie and Lando (2001) show that if one introduces in such theories investors who can only observe asset values imperfectly, possibly because of imprecise or delayed accounting reports, the occurrence of defaults becomes a Poisson-like random process. This means that defaults can occur suddenly and positive credit spreads can emerge even at the short end of the maturity spectrum.[8] So, if general uncertainty (or "imperfect information") regarding asset valuations increases, short-term credit spreads will increase accordingly.

The main reason why general uncertainty increased so dramatically in the summer of 2007 is the fact that the market realised, first by means of losses in sub-prime securitisations, that the current practices used for valuations – primarily the valuation of structured finance – were unreliable. Often this pricing was based on ratings and the transaction prices of supposedly similar instruments. The risk assessments of rating agencies turned out, however, to be flawed. Moreover, contrary to accounting assumptions, for most of these instruments liquid markets with observable prices never really existed.[9]

The problems with pricing and risk assessment have a lot to do with the complexity of structured instruments. For instance, many CDOs contain tranches of other securitisations as inputs. And, in turn, these CDOs often form the underlying assets for asset-backed commercial paper (ABCP) or other ABSs. Thus, several layers of repackaged instruments and tranching mechanisms are intertwined.

Finally the market realised, through the events of the summer, that major parties involved, such as brokers, originators, structurers and rating agencies, did not have the skills, information or incentives necessary for accurate pricing and risk assessments, with some potentially using the complexity of the instruments to their own short-term advantage. All of these weaknesses were laid bare by the credit market tensions in the first half of 2007.

2) Adverse selection, interest rates and market functioning

The second type of information problem has been put forward by Ferguson et al. (2007) as an explanation for the current turmoil and can be founded upon the literature on credit rationing and adverse selection (see Akerlof (1970) and Stiglitz and Weiss (1981)). According to this theory, a seller may know more about the quality of a good than a buyer (i.e. information is "asymmetric"). If, as a result, a buyer is not able to distinguish good quality from bad quality, prices can generally increase and market activity can dry up. In the present context, the "quality of a good" can correspond to the credit quality of interbank loans (basically the solvency of money market counterparties) or to the credit quality of structured finance products (ABSs, CDOs, collateralised loan obligations (CLOs) or tranches of such securitisations, etc.).

Flannery (1996) applied this reasoning to interbank markets. In his model, banks are uncertain about the fundamentals of borrowers in this market (not knowing, for instance, counterparties' exposure to structured finance products). Furthermore, banks are uncertain about their own and their competitors' ability to evaluate credit quality (as a result, for example, of the pricing problems discussed above). Knowing that interbank borrowers will choose the best offer, banks realise that they may end up with bad credit. This "lemons problem" will increase interbank rates and, if significant, may lead to the breakdown of the interbank market. Significant increases of interbank rates and mal-functioning of major money markets is exactly what

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4   These included IKB Deutsche Industriebank, Northern Rock and Sachsen Landesbank.
5   This concerned, for example, Citigroup, Merrill Lynch, Swiss Reinsurance and Union Bank of Switzerland (UBS). Also monoliners selling credit insurance experienced great difficulties.
6   For a more detailed account of the events of summer 2007, see ECB (2007b).
7   An important event in this regard was the collapse of Bear Stearns and its subsequent takeover by JP Morgan Chase.
8   By contrast, in the classical theories a default is "predictable" in the sense that investors can track the asset value all the way along as it approaches the default point (see, for example, Merton (1974)).
9   See, for example, Duffie (2007) or Fender and Mitchell (2005) for further discussion of valuation problems in structured finance. For an in-depth discussion of the problems associated with rating-based pricing of structured finance products, see Committee on the Global Financial System (2005).

Table I General and idiosyncratic repricing of bank credit spreads			
	Turmoil	Normal	Ratio
Average	77.2	21.7	3.6
Mean absolute deviation	48.9	17.1	2.9
Standard deviation	89.8	39.9	2.2
Average/mean absolute deviation	1.6	1.3	1.3
Average/standard deviation	0.9	0.5	1.6

Source: Bloomberg.
Notes: Credit default swap premia for the largest EU and US banks in basis points (maturity of five years). "Normal" covers the period from 1 January to 8 August 2007. "Turmoil" covers the period from 9 August to 22 January 2008.

was observed as of August 2007, with financial institutions "hoarding" short-term funds instead of lending them out.

Application of the adverse selection argument to structured finance products also seems to provide a good explanation of what happened to conduits, structured investment vehicles (SIVs) and the ABCP market – another important element in how the credit tensions propagated to money markets. Conduits and SIVs were put in place by banks in order to invest in structured finance products off-balance sheet. They made long-term investments in instruments such as ABSs, CDOs and CLOs and used them as collateral in order to finance such investment in the ABCP market in the short term. But once ABCP investors became aware of the valuation and risk management problems associated with these products and became unable easily to distinguish between sound and unsound vehicles owing to their opacity, they were generally not inclined to roll over ABCP, with the result that conduits and SIVs encountered funding problems. Since the banks had often granted liquidity back-up lines and feared reputation effects, many conduits and SIVs were not really "balance–sheet remote". As banks also feared asset fire sales, they often chose to bring assets back onto their balance sheets ("re-intermediation") and were thus also confronted with uncertainties surrounding their value. This, together with the presence of direct exposures to US sub-prime assets or structured finance instruments, was another reason for the observed hoarding of short-term funds and further reinforced the adverse selection in the interbank market. For both interbank market counterparties and structured finance investors, even small amounts of exposure were enough to cause these adverse selection problems, as counterparties and investors did not know where these exposures were located.
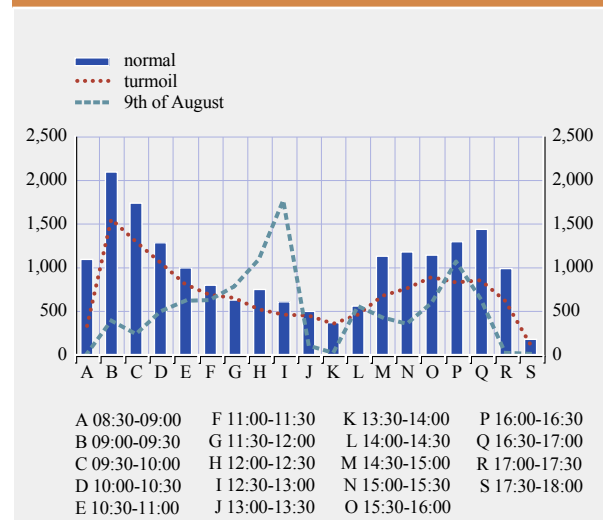
3) Some empirical evidence

The presence of both information-related propagation mechanisms would imply large market-wide increases in bank credit spreads and money market rates, which have been well documented (see, for example, ECB (2007b), Chart E in Box 2 and Chart S13). Interestingly, there have

been both common and idiosyncratic components in the repricing of credit risk. Table 1 looks at a wide range of bank credit default swap (CDS) premia before and after the outbreak of the turmoil. It shows that significant increases have been seen not only in average bank credit risk premia, but also in their standard deviation and mean absolute deviation across individual banks. However, in line with a general increase in both uncertainty and adverse selection, it turns out, when looking at the ratio of the average to the dispersion, that the common component of credit risk has increased by more than the bank-specific average.

The next question we ask is whether there is any specific evidence in support of the presence of adverse selection in interbank markets. This is not only important for distinguishing between generalised uncertainty and adverse selection. It can also provide information on whether liquidity hoarding occurred because of banks' idiosyncratic risks related to their own exposures to sub-prime and structured products or, as suggested above, because of adverse selection in the interbank market.

To this end, we have examined transaction volumes for the electronic interbank trading system e-MID before and after the outbreak of the turmoil. Chart 1 shows the average daily buy-initiated volumes – i.e. transactions initiated by banks that wanted to borrow in the overnight market – for

Chart I Buy-initiated intraday volumes for unsecured overnight deposits traded on e-MID

A 08:30-09:00	F 11:00-11:30	K 13:30-14:00	P 16:00-16:30
B 09:00-09:30	G 11:30-12:00	L 14:00-14:30	Q 16:30-17:00
C 09:30-10:00	H 12:00-12:30	M 14:30-15:00	R 17:00-17:30
D 10:00-10:30	I 12:30-13:00	N 15:00-15:30	S 17:30-18:00
E 10:30-11:00	J 13:00-13:30	O 15:30-16:00	

Notes: "Normal" is the volume that would have been expected for each 30-minute interval from August to December 2007 had the credit market turmoil not arisen. This was calculated by regressing the average volumes for each time interval between 2 January 2002 and 8 August 2007 on the basis of a set of annual dummies (to capture trends) and monthly dummies (to capture seasonal factors). Dummies for the year 2007 and for the months August through December were not included in this regression, so the constant captures the "expected" averages for August through December 2007. "Turmoil" is the average volume actually observed for the period between 9 August and 31 December 2007. Half-hourly volumes are in millions of euro.

Table 2 Regressions estimating daily volume reductions in the trading of unsecured overnight deposits on e-MID			
	Total volumes	**Buy volumes**	**Sell volumes**
c	23,105.4***	18,700.5***	4,405.0***
	(548.1)	*(548.4)*	*(194.2)*
γ	-6,785.8***	-5,465.2***	-1,320.6***
	(659.5)	*(649.1)*	*(242.5)*
During turmoil	16,319.6	13,235.2	3,084.3
Difference	-29.4%	-29.2%	-30.0%
Number of obs	1,124	1,124	1,124
R-squared	0.4	0.4	0.1

Notes: These regressions are similar to those explained in the note accompanying Chart 1, but are based on daily data and enhanced by a turmoil dummy (1 for 9 August 2007 and the subsequent period; 0 for the period prior to 9 August 2007). The constant c captures "expected" volumes on the basis of normal periods and the parameter γ captures the marginal effect of the turmoil. "*During turmoil*" is the average daily volume as of 9 August 2007, with the average reduction vis-à-vis normal figures reported in percentages underneath ("*Difference*"). All volumes are in millions of euro. Standard errors are reported in brackets; *** and ** indicate significance at the 1% and 5% confidence levels respectively.

unsecured overnight deposits broken down into half-hourly intervals for the period prior to 9 August 2007 ("normal"), for the period after 9 August ("turmoil") and for 9 August itself, the day when credit market tensions spread into money markets. The lower buy-initiated volumes on 9 August and in the months that followed suggest that it became more difficult for counterparties that wanted to borrow in the interbank market to find a lender.[10]

Table 2 shows that daily volumes (buy-initiated, which are generally higher on e-MID, and sell-initiated) declined by about 30%. Note, however, that these reductions are probably underestimated, as the turmoil was accompanied by trading in money markets shifting from longer to shorter maturities. Not displayed in the chart and table is that buy

volumes declined significantly between July and September 2007 and remained low for the rest of the year, whereas sell volumes remained largely unchanged until September. This situation changed sharply towards the end of the year when declines in sell volumes exceeded those for buy volumes (in relative terms) in November and December. Overall, the evidence presented is consistent with the presence of credit rationing through adverse selection.

This article focused primarily on the role that information problems played in the transmission of the turmoil across financial systems once first tensions had come to the surface. As already indicated in the introduction, however, also other factors have contributed. One interesting question for further research is, for example, why market participants in the phase of the accumulation of imbalances (see above) ignored or underestimated the risks associated with structured credit products. Research in the areas of behavioural finance and corporate governance of financial institutions could be of help in this regard. Another is the identification of contagion phenomena across different markets. More research could also be helpful examining realistic alternatives to rating-based pricing of structured products As over time valuation uncertainties and asymmetric information are reduced, the propagation of the turmoil will depend on the actual exposures to impaired assets.

10 Chart 1 shows a particularly strong decline in buy-initiated transactions early in the morning, when asymmetric information tends to be more pronounced. On 9 August buy volumes gradually recovered after a communiqué at around 10.30 a.m. signalled the ECB's readiness to act to ensure orderly money market conditions. Those volumes peaked between 12.30 p.m. and 1 p.m., as at 12.30 p.m. the ECB announced a large liquidity-providing fine-tuning operation. This operation alleviated the major market tensions observed on that day. As the results of the fine-tuning operation were not known to banks before 2 p.m., markets remained inactive over lunchtime.

Financial innovation and the effect of housing wealth on consumption

By Jirka Slacalek, ECB

The recent strong growth of house prices in many countries and the turbulence on the US sub-prime mortgage markets have highlighted the need for policy-makers to understand the links between financial markets and the real economy. A key channel operates through the effect of financial and housing assets on personal consumption. The importance of this channel is determined by the institutional structure of financial markets. Financial innovation lowers transaction costs and leads to the reduction of credit constraints. A priori, these two elements affect the size of the wealth effect in opposite directions, so the overall outcome can be determined only by means of empirical analysis. Available research suggests that the sensitivity of personal consumption to wealth shocks, particularly shocks in housing wealth, has risen over time. This trend is likely to continue in the future.

The household budget constraint implies that total (discounted) lifetime consumption equals the sum of current wealth and lifetime income. As many households hold most of their wealth in the form of owner-occupied housing, the budget constraint immediately suggests that shocks to housing wealth directly affect consumption. In the benchmark model,[1] which does not distinguish between various forms

of wealth, the marginal propensity to consume out of wealth – i.e. the reaction of consumption in euro to a €1 increase in wealth – is approximately equal to the (real) interest rate. Using various methodologies, samples and countries, most empirical estimates of the wealth effect lie between 0 and 10 cent per euro.

While the benchmark model is a good place to start when thinking about the wealth effect, it obviously ignores many relevant features of the real world and says nothing about the impact of financial innovation. For example, the effect of housing wealth shocks on consumption will clearly differ depending on whether people own their own house or are merely renting.[2]

As pointed out by Muellbauer (2007), a priori it is not even clear in which direction house prices will affect aggregate consumption. Households, especially first-time buyers, typically buy houses early in life when their incomes are relatively low. Since the purchase of a house typically requires a down payment, many young households, having to save for their down payments (which rise with the value of a house), may actually reduce their spending when real estate prices rise.

Most people acquire large long-term mortgages in order to finance the purchase of a house. The availability and parameters of mortgages crucially depend on the structure and evolution of financial markets, particularly credit markets. Many consumers are subject to credit constraints (for instance as a result of asymmetric information) and are not able to borrow against their future income to the extent that they would like, or are able to do so only with substantial transaction costs.[3] These individuals have to consume less than they would if financial markets were frictionless.

Financial innovation affects households through at least two channels. First, some authors assume that households can use their houses as collateral against which they can borrow (more cheaply) to smooth out consumption. An increase in house prices increases the value of this collateral, so consumers are less likely to be constrained in terms of credit and will tend to consume more. This channel suggests that as financial innovation spreads and banks become more efficient in identifying households with credit constraints, liquidity constraints become less relevant and consumption becomes less sensitive to shocks, i.e. households become better able to smooth out consumption.

A second – and probably stronger – effect in the opposite direction arises as a result of falls in down payments and increases in loan-to-value (LTV) ratios. Rising LTV ratios increase the consumption of households that plan to buy a house and reduce the relevance of the negative effect that housing prices have on spending by such individuals. In addition, higher LTV ratios make housing wealth more liquid, and the spending of house-owners thus becomes more responsive to shocks in housing prices.

These two effects of financial innovation on the transmission mechanism between the housing market and the macroeconomy are modelled in some innovative work by Iacoviello and Neri (2007), who constructed a dynamic stochastic general equilibrium model containing a housing sector, heterogeneous households and a rich set of rigidities. On the basis of data from the US, they estimate that before 1983 consumers who were subject to credit constraints received 32 percent of aggregate income. The corresponding figure for the period since 1989 was only 20%. Iacoviello and Neri also calibrate that the typical LTV ratio of housebuyers who are likely to be constrained in terms of credit rose from 0.78 (in the pre-1983 period) to 0.93 (in the post-1989 period). Empirically, the second effect is much stronger. Because collateral constraints became more relevant for consumption dynamics, the sensitivity of spending to (preference and monetary) shocks increased substantially.[4]

A key characteristic of houses is their illiquidity. Converting them into money is costly. Households' adjustment of their holdings of illiquid assets is very different from that of their liquid assets (as shown, inter alia, in the theoretical work by Grossman and Laroque (1990) and Otsuka (2004)). To cover transaction costs, holdings of illiquid assets are rebalanced only after enough shocks have accumulated. Consequently, the reaction of consumption to small shocks in housing prices is muted. Financial innovation probably increases the liquidity of houses, as new financial products make it easier to borrow against housing wealth. As a result, it becomes easier for the owners of houses to use them as collateral for loans, which may boost consumption once housing prices increase and can also plausibly be considered to contribute to an increase in the housing wealth effect.
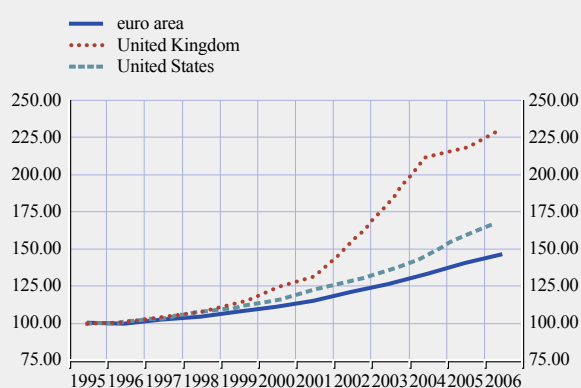
Empirically, while estimates of the wealth effect are subject to considerable uncertainty, the evidence typically points in this direction. Slacalek (2006) finds that the size of the marginal propensity to consume out of housing wealth has, in the euro area, risen in a statistically significant manner after 1989, increasing from almost zero to roughly 2 cent per euro. Aron, Muellbauer and

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euro area
United Kingdom
United States

Sources: Eurostat, European Central Bank, US Office of Federal Housing Enterprise Oversight (OFHEO) and Halifax (HBOS plc).
Note: Deflated using total consumption expenditure deflators.

The institutional framework of mortgage markets differs greatly across industrialised economies. As illustrated in Girouard and Blöndal (2001), Mercer (2003) and Hoeller and Rae (2007), this is true even within areas that are in many respects fairly homogeneous, such as the euro area, where differences persist in mortgage debt-income ratios, LTV ratios, the degree of securitisation for mortgages and the extent to which adjustable rate mortgages are used. The evidence available suggests that even across countries, the size of the housing wealth effect increases with the development of mortgage markets [5] or their "completeness" – i.e. the range of financial products that make it easy to borrow (for and against housing), their prices and the range of customers they serve. Looking ahead, as European mortgage markets become more integrated and more competitive, the importance of the link between housing wealth and consumption is likely to grow.

Murphy (2007) report that housing wealth effects in the United Kingdom and South Africa increased substantially with the credit market liberalisations in the two countries of the early 1980s and 1990s respectively. Qualitatively similar evidence is available for the United States (Muellbauer (2007)). These reduced-form results thus generally agree with the findings reported in the structural model used by Iacoviello and Neri (2007).

4   *The contribution of collateral constraints to consumption dynamics is measured as the difference between the actual (observed) consumption path and the counterfactual consumption path in the absence of constraints. At the same time, Campbell and Hercowitz (2005), Dynan, Elmendorf and Sichel (2006) and Iacoviello and Neri (2007) estimate that financial innovation contributed to the fall in the volatility of US GDP growth in the mid-1980s.*
5   *While financial innovation brings substantial gains to many households, the recent turbulence in the US mortgage markets highlights the need for the markets to be adequately regulated in order to minimise excessive lending to households that want to borrow beyond their expected long-term income prospects.*

Regional inflation dynamics within and across euro area countries and a comparison with the United States

By Kirstin Hubrich, ECB

Regional inflation developments within euro area countries are characterised by considerable heterogeneity. This may be related to differences in regional economic developments and structural characteristics. Monitoring regional inflation rates improves understanding of the monetary policy transmission mechanism. Regional inflation dynamics are also of importance for aggregate euro area-wide inflation developments. Interestingly, the degree of heterogeneity in regional inflation rates in the euro area seems to be comparable to that observed in the United States, the latter representing a long-established common currency area.

Regional inflation heterogeneity

In recent years the issue of heterogeneity in inflation developments between countries of the euro area, both before and after the introduction of the euro in 1999, has received considerable attention in the economic literature and in economic policy debates. The size, persistence and origins of inflation differentials and their potential policy implications have been thoroughly analysed (e.g. in ECB, 2003). In this article it is argued that while national borders within the euro area are relevant for inflation developments in different regions, there is also considerable regional heterogeneity within countries.

Different regions within countries are characterised by different economic and structural features. Monitoring regional inflation rates within euro area countries is useful in order to understand the underlying inflation trends in the euro area as a whole, complementing other disaggregate information on inflation developments, such as national or sectoral information. Regional information enhances the understanding of both the sources of inflation differences and the adjustment processes of the economy.

Chart 1 illustrates the extent to which regional inflation rates in the euro area differ, using monthly data for the period 1996-2004 for those countries for which data are available. Over the sample as a whole, regional year-on-year inflation

Chart 1 Regional European inflation rates over the period 1996-2004

x-axis: time
y-axis: inflation rate (yoy percentage change)
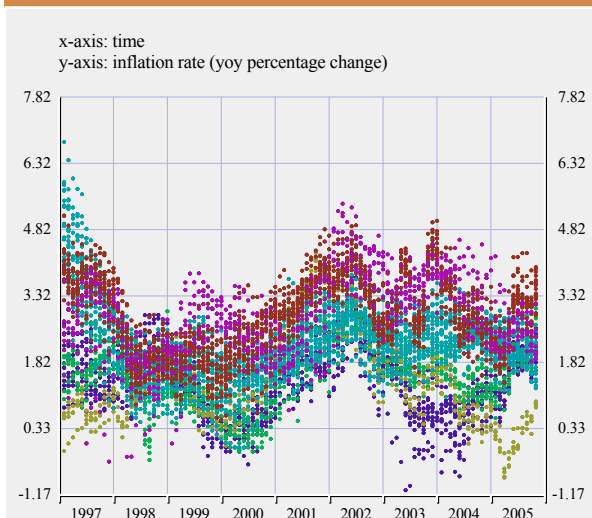
Notes: This chart plots inflation rates for individual regions within Germany, Austria, Finland, Italy, Spain and Portugal. Inflation rates are computed as year-on-year percentage changes in the underlying consumer price index.

varies between -1% and almost 7%. There appears to be no tendency for regional inflation dispersion to decrease over time. To the contrary, there is in fact a tendency for inflation dispersion to increase over the later part of the sample, but that seems to occur between countries rather than within countries. The different colours in the chart represent regional inflation rates within different euro area countries.

The descriptive statistics in Table 1 show that the dispersion of regional inflation rates is more limited at a national level than at the aggregate level. Nevertheless, dispersion remains significant at the national level. This indicates that regional data might contain information that is not available in solely national data.

Co-movement and heterogeneity in regional inflation dynamics and their relationship with aggregate area-wide inflation

Co-movement and heterogeneity in inflation rates at a regional level within euro area countries were first systematically analysed in a recent article by Beck, Hubrich and Marcellino (2006). The authors investigate, on the basis of a new regional dataset, how and to what extent differences in regional

inflation rates arise *within*, as well as *across*, the national borders of euro area countries. Their analysis complements the literature on euro area disaggregate inflation dynamics and convergence (see, for example, Engel and Rogers (1996 and 2004), Marcellino, Stock and Watson (2003), Beck and Weber (2005), Hendry and Hubrich (2006), Rogers (2007) and Duarte and Wolman (2007)). This article draws extensively on the results of Beck, Hubrich and Marcellino (2006).

1) How much co-movement and heterogeneity is there at the regional level?

Factors driving inflation developments could originate at an area-wide, national or regional level. Beck, Hubrich and Marcellino (2006) explore the strength of co-movements for all regional inflation rates at the area-wide and national levels, as well as regional heterogeneity in the euro area, and compare the findings with those obtained for the United States. The method employed for this analysis is based on a factor model – similar to the model used by Forni and Reichlin (2001) in their analysis of output fluctuations – which explains regional inflation dynamics by means of common euro area and country-specific factors, as well as an idiosyncratic regional component.
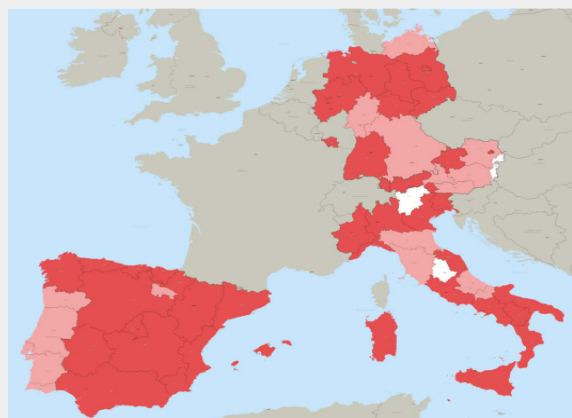
The analysis on the basis of the factor model shows that there is substantial co-movement of regional inflation rates at an area-wide level, with the area-wide component explaining at least 50% of the variation in the regional inflation rates. This common component of regional inflation rates could be related to the common monetary policy in the euro area and external developments such as changes in oil prices or the euro's exchange rate. A national component of regional inflation is also found to be relevant. This explains between around 25% and 50% of variance in regional inflation rates, depending on the country. This is not surprising, since fiscal policies are determined at a national level and labour market institutions are still, to a large extent, determined nationally, particularly as regards unemployment insurance, employment protection laws, minimum wage rates and the degree of centralisation of the collective bargaining process. Despite the importance of national determinants of inflation developments, the analysis also indicates that a relevant regional component remains. There are clearly numerous local factors influencing inflation developments. First, local production conditions vary across geographically segmented markets and depend on total productivity, which is related to technology, human capital and infrastructure. Second, mark-ups on firms' production costs

Table 1 Descriptive statistics for regional inflation rates for the period 1996(1)-2004(10)

	All regions	Germany	Austria	Finland	Italy	Spain	Portugal
Mean	2.18	1.35	1.62	1.41	2.26	2.87	2.85
Standard Deviation	0.63	0.15	0.10	0.09	0.22	0.22	0.15

Notes: This chart plots the percentage of inflation variance that is explained by euro area-wide factors for regions in Germany, Austria, Finland, Italy, Spain and Portugal. The darker colour indicates that three euro area factors account for 75% or more of the region's inflation variance; the lighter colour indicates a contribution of between 50% and 75%; and white indicates a contribution of less than 50%.

vary across regions, leading to local price differentiation. Such mark-ups depend on the degree of competition and, ultimately, the market structure. Third, the sectoral specialisation of a region might also be relevant for inflation developments. Fourth, prices of non-traded input factors underlie the local component of inflation, reflecting in particular wage costs and rents. Finally, although labour market conditions are to a large extent determined nationally, regional labour market conditions could be of even greater importance than those at the national level owing to the low labour mobility across European regions.

Interestingly, there is no substantial difference between Beck, Hubrich and Marcellino's findings before and after the introduction of the euro in 1999, suggesting that convergence largely took place prior to the mid-1990s.

2) Do common area-wide and national factors in regional inflation rates affect inflation symmetrically across regions?

The relative importance of area-wide and national factors in explaining regional inflation developments is heterogeneous across euro area regions. For area-wide factors, this can be seen from Chart 2. Regional inflation rates respond differently to area-wide and national developments both within countries and across national borders. These differences may be related to regional economic and structural characteristics affecting the adjustment of regional inflation. Output growth (reflecting "catch-up" effects), the degree of competition, labour market differences and sectoral specialisation are of particular relevance.

3) Does regional inflation help to explain aggregate inflation?

The area-wide and national factors which explain regional inflation in the euro area will ultimately help to understand aggregate inflation. However, can area-wide and national factors computed on the basis of regional data also provide useful information for aggregate inflation in a more direct way? When regressing euro area inflation on both a set of standard macroeconomic variables and, additionally, the factors extracted from the regional dataset, those factors appear important in order to explain aggregate inflation and increase the explanatory power of the aggregate inflation model.

Regional heterogeneity: Are there major differences between the euro area and the United States?

Disaggregate inflation series have also been examined for the United States with a view to benchmarking and comparing the results for the euro area with a long-established common currency area. An analysis based on two different regional datasets for the United States over the period 1996-2004, the same sample period as for the euro area, provides qualitatively similar results as regards the heterogeneity and co-movement of US regional inflation rates. Overall, the common US area-wide component is only slightly more relevant in comparison with the euro area-wide component. Thus, regional inflation rates also have a role in explaining aggregate inflation developments in the United States.

ECB staff wins Best Paper Award at the 2007 European Finance Association Meeting

The paper "Trade Credit Defaults and Liquidity Provision by Firms" (ECB Working Paper no. 753, http://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp753.pdf) by Frédéric Boissay (ECB) and Reint Gropp (Frankfurt University) was awarded the prize for the best paper presented at the 34th European Finance Association (EFA) Annual Meeting held in Ljubljana in August 2007 (http://www.efa2007.org/home.asp). The EFA conference is one of the three most important conferences in finance worldwide. This box summarises the main findings of the paper.

Trade credit is the single most important source of external finance for European firms. This paper unveils a new mechanism of how firms use trade credit to relax their financial constraints. It provides strong evidence that credit-constrained firms are able to pass unexpected adverse liquidity shocks on to their suppliers by postponing the payment of their trade debt. These findings are consistent with theories that consider trade credit as a liquidity insurance mechanism whereby suppliers accommodate the defaults of their customers when their customers are in financial distress.

The main results of the paper suggest that (i) credit constraints are prevalent among small French firms; (ii) the option to default on trade credit permits small firms to cope with adverse liquidity shocks; (iii) in addition to providing liquidity insurance, non-credit constrained firms inject fresh liquidity into the system. Overall, this piece of research contributes to a better understanding of the transmission of shocks through the economy.

Geneva Report on "International financial stability"

In autumn 2006 a team led by former Federal Reserve Vice Chairman Roger Ferguson embarked on a study of the issue of international financial stability for the ninth Geneva Report on the World Economy.[1] Starting during a period of relative tranquillity, the team – which, in addition to Ferguson (Swiss Re), comprised Philipp Hartmann (ECB), Fabio Panetta (Banca d'Italia) and Richard Portes (London Business School) – decided to review the major structural developments in the international financial system and assess their implications for financial stability. In addition to the topical issues of growth and the risks presented by new credit market instruments (structured finance and credit derivatives), the report covers macroeconomic imbalances, developments in financial volatility, financial consolidation, cross-border financial integration, household finances (including sub-prime mortgage markets) and hedge funds. It also includes a conceptual chapter that might provide a useful framework for central bank financial stability reviews. The report was published in London in November 2007.

The authors argue that the fact that banks have moved from the traditional "buy and hold" business model to the "originate and distribute" credit model spreads risks much more widely in the economy. This has many advantages for the efficiency of financial systems and for stability and growth. But the credit market turmoil has revealed a number of important weaknesses, which have been present for some time. For example, the new model has reduced incentives for monitoring certain borrowers, placed too much emphasis on credit ratings, ignored important liquidity risks and suffered from a lack of transparency. The authors conclude that the shift from "buy and hold" to "originate and distribute" should not be reversed. But policy-makers and industry bodies need to strive to make this model work better. For example, regulatory reforms could require originators to retain an economic interest in structured finance products (such as keeping the equity tranche on their own books). Credit rating agencies could offer a range rather than a point estimate for the risk level of an instrument. And credit market transactions that do not definitively transfer risk should not be treated by regulators or risk managers as if they did. Finally, liquidity in money and other important markets should be the subject of ongoing international cooperation among major central banks and supervisors.

1 *This report is produced every year by the Centre for Economic Policy Research and the International Center for Monetary and Banking Studies.*

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