Box 4

ASSESSING STRESS IN INTERBANK MONEY MARKETS AND THE ROLE OF UNCONVENTIONAL MONETARY POLICY MEASURES

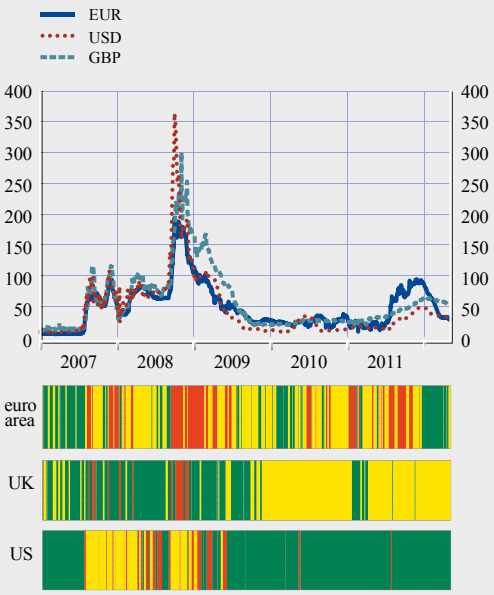
Interbank money markets have exhibited intermittent stress since the onset of the financial turmoil in mid-2007 – tensions at times extreme, reflecting both counterparty and liquidity risk. Central bank policy measures, and in particular extraordinary non-standard ones, have made a strong contribution to stemming liquidity-related pressures in interbank markets. This box presents a means of measuring the intensity of such pressures, and thus the unwillingness of banks to grant unsecured loans. It then focuses on conditions over recent months in the euro money market and in particular the impact of the Eurosystem's three-year LTROs announced in December 2011, or more specifically an estimate of how stress may have evolved in the *absence* of this policy measure.

The analysis is based on a frequently used measure of interbank market stress, that is, the spread between unsecured interbank money market rates (the London interbank offered rate, or LIBOR, as a proxy) and a corresponding measure for a risk-free interest rate (here the overnight index swap (OIS) rate). This spread is allowed to traverse a number of regimes, affiliation to which is expressed by means of probabilities that are estimated by a Markov-switching model.[1] Chart A visualises the resulting probabilities in the form of a heat map for the euro, pound sterling and US dollar markets. It illustrates that intermittent periods of strong funding stress appear to have characterised the euro money market during the escalation of sovereign tensions (and in particular over much of 2011), in contrast to relative stability – albeit not free of stress entirely – in other major money markets. It is particularly noteworthy that, following the announcement of the Eurosystem's three-year LTROs in late 2011, tensions clearly eased in the euro money market.

1 Specification tests suggest that three regimes should be set, as the model dynamics (i.e. coefficients) are different to conventional levels of significance across all three regimes.

Chart A Funding conditions in interbank money markets

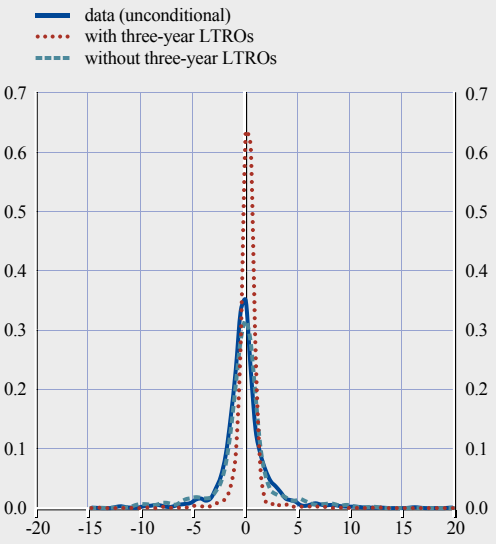
(Jan. 2007 – May 2012; basis points; three-month LIBOR/OIS spread)



Sources: Bloomberg and ECB calculations.
Note: Red indicator points to rising, yellow to moderating and green to falling pressure in the respective markets.

Chart B Kernel density distributions conditional on the three-year LTROs

(y-axis: density; x-axis: three-month LIBOR/OIS spread in basis points)



Sources: Bloomberg and ECB calculations.
Note: Based on a simulated path (stochastic simulation for 10,000 days) from the regime-switching model with a LTRO-dependent transition matrix.

The model is then used to conduct a series of counterfactual simulations to assess the role played by the anticipation of unconventional policy action in the euro area, in this case the Eurosystem's three-year LTRO announcement of December 2011. Specifically, making the model-inferred transition probabilities between regimes a function of this specific policy measure provides an assessment of the extent to which it has contributed to more stable funding conditions in the euro money market.[2] The model set-up is used to simulate artificial market data under the counterfactual assumption of the three-year LTROs having been versus not having been conducted.

2 Technically, this conditioning is accomplished by introducing a binary dummy to the otherwise conventional first-order Markov-chain process, with the dummy marking the announcement date of the three-year LTROs on 8 December 2011.

Long-run regime probabilities and distributional statistics of the LIBOR/OIS spread as a function of three-year LTROs

		Overall spread		Liquidity		Credit	
		LTRO=OFF	LTRO=ON	LTRO=OFF	LTRO=ON	LTRO=OFF	LTRO=ON
Long-run probabilities	Rising	30%	6%	26%	12%	35%	56%
	Flat	53%	16%	35%	17%	35%	41%
	Falling	17%	78%	39%	71%	10%	3%
Distributional statistics	Mean	0.05	-0.30	0.01	-0.16	0.02	0.02
	STDEV	2.78	1.09	2.59	1.46	1.16	1.41
	Skew	0.06	2.79	0.07	-0.01	0.01	-0.07
	IQ range	1.65	0.68	2.07	1.97	0.76	1.13

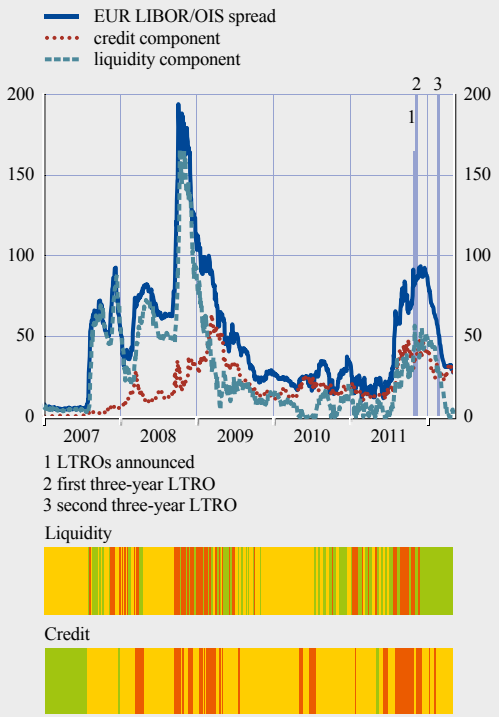
LTRO-conditional regime-switching probabilities, as well as summary statistics for the distributions of the simulated euro market spreads, are summarised in the table above. For the overall spread, the underlying simulated distributions are plotted in Chart B. In addition, the overall spread has been decomposed into its credit and liquidity components and the counterfactual simulations have been run on them separately (see Chart C).[3]

The long-run weight (probability) associated with the falling pressure regime increases significantly upon conditioning on the three-year LTRO. The distributional statistics suggest that it was able to compress the spread and reduce the volatility in euro money markets substantially, with the reduction in the standard deviation equalling about 54%.

The analysis in this box suggests that the three-year LTROs led to a significant reduction of the stress that had characterised the euro money market over much of 2011. The impact was, according to the estimates, primarily achieved via a compression of the LIBOR/OIS spread's liquidity component.

Chart C Decomposition of the three-month euro LIBOR/OIS spread and related heat maps

(Jan. 2007 – May 2012; basis points)



Sources: Bloomberg and ECB calculations.
Note: Red indicator points to rising, yellow to moderating and green to falling pressure on the respective spreads.

3 The decomposition entails two steps: (i) for the LIBOR panel of banks, one-year credit default swap spreads are scaled to the three-month horizon and then used to infer risk-neutral probabilities of default (PDs) under the assumption of 60% losses given default (LGDs); (ii) an average across the panel is assumed to proxy the credit premium, and the remaining spread to the LIBOR minus a measure of the risk-free rate (here the OIS) is assumed to reflect all non-credit factors, including a premium associated with liquidity risk. A number of caveats of this methodology are discussed e.g. in Bank of England, *Quarterly Bulletin*, 2007 (see also the references therein) and F. Heider, M. Hoerova and C. Holthausen, "Liquidity hoarding and interbank market spreads: the role of counterparty risk", *ECB Working Paper Series*, No 1126, 2009.