

## Box 5

### The potential for spillovers from emerging markets to euro area banks

**Many emerging market economies (EMEs) are facing a difficult combination of slow growth, weak commodity prices, and further tightening credit conditions.** These challenging aggregate conditions point to the potential for negative spillovers to the euro area. Direct exposures of euro area banks to emerging market assets remain limited (see Box 1 of the May 2016 FSR). At the same time, potential shocks could be transmitted through indirect channels to euro area banks via EMEs' trade links with euro area countries and a broader financial market confidence channel stemming from uncertainty about growth prospects in EMEs. Such indirect channels are complex. One way of gauging them is by measuring the market perception of the potential for spillovers of financial risk from emerging markets to euro area banks.

#### Chart A

Computation of a bank-specific vulnerability measure

Impulses from EM sovereigns	Responses of euro area banks	Change in CDS & stock price of:	
		EAbank_1	... EAbank_N
Change in CDS of:	EM_1	(i) →	GIRF (i,j)
	... EM_M		
Vulnerability of EAbank (j)		$\sum_{i=1}^M \frac{GIRF(i,j)}{M}$	

Source: ECB.

**A possible modelling strategy is to relate shocks to financial market pricing of EME sovereigns to the response of European banks**<sup>30</sup>.

Specifically, measures of euro area bank vulnerability to EME sovereign shocks can be derived based on generalised impulse responses (GIRs) from a mixed cross section global vector autoregressive (MCS-GVAR) model, comprising credit default swap (CDS) spreads and bank equity returns as the main inputs to the model.<sup>31</sup> The model is estimated based on daily data spanning the period from January 2011 to September 2016 and includes two institutional sectors: sovereigns (of emerging markets and the euro area) and banks (of the euro area).<sup>32</sup> The model relates daily

changes in CDS spreads for sovereigns and banks, together with daily bank equity returns for banks. The VIX (the Chicago Board Options Exchange's Volatility Index) is included in the model to control for global conditions. To construct the model, three sets of weights are used, linking the two cross-sections: (i) to link sovereigns, trade weights are used (the sum of nominal bilateral exports and imports for any pair of countries); (ii) to link banks, bilateral loan and deposit volume exposures

<sup>30</sup> Gross, M. and Tereanu, E., "Assessing the spillover potential from emerging market economies to European banks", ECB, mimeo.

<sup>31</sup> Gross, M. and Kok, C., "Measuring contagion potential among sovereigns and banks using a mixed cross section GVAR", *Working Paper Series*, No 1570, ECB, August 2013. See also Gross, M., Kok, C. and Zochowski, D., "The impact of bank capital on economic activity – Evidence from a Mixed-Cross-Section GVAR model", *Working Paper Series*, No 1888, ECB, March 2016; and Gross, M., Henry, J. and Semmler, W., "Destabilizing effects of bank overleveraging on real activity – An analysis based on a Threshold MCS-GVAR model", *Macroeconomic Dynamics*, forthcoming.

<sup>32</sup> The sample comprises 16 EU sovereigns, 19 EME sovereigns and 18 EU banks. The sample choice was driven by CDS data availability and sufficient market liquidity as well as sufficient bank size (drawing on the SSM sample of banks).

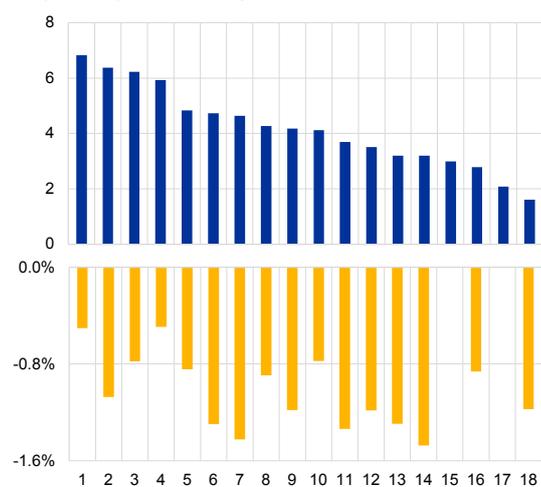
from a supervisory database are used; and (iii) to link euro area banks and countries, supervisory data on total bank assets vis-à-vis a country are employed.

### Chart B

Bank CDS responses are more pronounced compared with equity price returns

Responses of selected euro area banks' CDS spreads and equity returns to an EME sovereign shock

(top panel: bank CDS spreads (blue), basis points; bottom panel: bank equity returns (yellow), percentages)



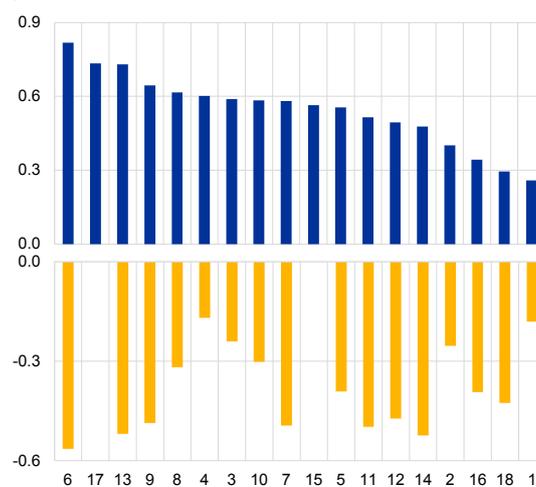
Sources: ECB and ECB calculations.

### Chart C

Despite heterogeneity, some of the CDS responses appear sizeable

Normalised responses of selected euro area banks' CDS spreads and equity returns to an EME sovereign shock

(top panel: bank CDS spreads (blue); bottom panel: bank equity returns (yellow), multiples of own standard deviations)



Sources: ECB and ECB calculations.

### A set of GIRs can be computed using this model by sequentially alternating the “shock origin” and recording all other responses.

While this can be examined from multiple perspectives, a relevant choice for this analysis is a “bank average vulnerability measure” (Chart A). The bank-specific vulnerability estimates are represented by the maximum of the cumulative CDS spread changes, and the minimum of the cumulative returns of bank equity prices, both over a five-business-day simulation horizon (Chart B). The size of the shock considered for the EME sovereigns was based on a rare one-day-in-four-years event.<sup>33</sup> The resulting responses are also presented in normalised form in Chart C, expressed as multiples of historical standard deviations of the banks’ daily CDS spreads and equity price returns.<sup>34</sup> The average standard deviation multiple across banks equals 0.54 and -0.35 for CDS and equity price responses, respectively. Some banks’ CDS responses appear sizeable, reaching standard deviation multiples of up to 0.8.

<sup>33</sup> Based on the observed EME daily sovereign CDS changes (not the model residuals). The shocks corresponding to the 0.1% probability range between 11 basis points for Qatar and 110 basis points for Russia (an average of about 100 basis points across EMEs). Relative to the end-of-sample observation on 13 September 2016, the shocks correspond to multiples between 1.1 and 1.7 (an average of 1.3).

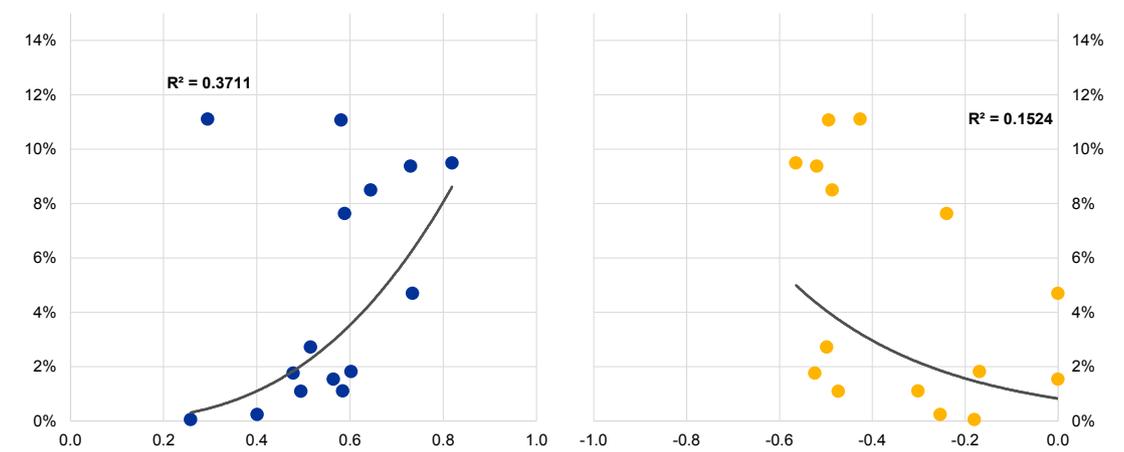
<sup>34</sup> The normalisation is meant to place the response in relation to each bank’s idiosyncratic amount of risk and thereby make the responses across banks more comparable. The rationale is that the same raw CDS or equity price response does not have the same implication for a bank that has been significantly more risky (volatile) in historical terms.

## Chart D

The correlation between banks' CDS and equity responses to an EME shock and the relative size of the direct exposure is of the expected sign; however, the size of exposure is not sufficient to explain the magnitude of the responses

### Correlation between bank responses to an EME shock and the relative size of the direct exposure

(x-axis: individual banks' exposure weight, percentage of total direct exposure to EMEs in the sample; y-axis: bank normalised CDS response (in multiples of own standard deviations (blue dots), bank normalised equity return response (in multiples of own standard deviations (yellow dots))



Sources: ECB and ECB calculations.

**The analysis suggests that simply the “width” of a direct exposure channel (identified through actual asset holdings in an emerging market) may not be sufficient to assess the spillover potential from EMEs to European banks (Chart D).** Although the positive (negative) relation between CDS spreads (equity prices) and the exposure weights is confirmed in the data, the low  $R^2$  in Chart D suggests that the type of exposures, the extent to which banks are hedged, and the sufficiency of loan loss reserves for loan book exposures all appear to play a role in determining the banks' susceptibility to an EME sovereign shock. Overall, the analysis suggests that the responses of euro area banks could be sizeable, in particular in the event of a broad EME market stress, and they appear to be heterogeneous. Therefore, a close monitoring and assessment of the channels transmitting emerging market vulnerabilities to euro area banks is warranted.<sup>35</sup>

<sup>35</sup> A few caveats should be noted. The model is not a structural model (it can be referred to as semi-structural instead, given that it involves various weight sets, including supervisory exposure data) and hence it remains difficult to distinguish the relative importance of profitability and solvency concerns, for instance, or to identify causal relationships more generally. Moreover, the CDS spreads and bank equity prices measure risk perceptions only approximately, while the complex interactions between EME sovereigns and euro area banks would be only partially reflected in links informed by bilateral trade and asset exposures.