

External Connectivity and Risk of Contagion to the Malaysian Banking System

The increasing complexity and globalisation of financial services has reinforced the interlinkages between financial institutions, markets and countries. This higher level of interconnectedness promotes innovation, growth and competition, allows for greater diversification and redistribution of risks, and enhances the efficiency of liquidity and credit allocation. However, extensive interlinkages of the financial system can also increase contagion risk across markets and borders through the network of on- and off-balance sheet financial obligations and reputational links between banks and their counterparties. Increasingly complex networks of financial obligations have further heightened the potential for idiosyncratic shocks affecting an internationally active financial institution (or a highly interconnected banking system) to cause wider spillovers to other financial systems as experienced during the Global Financial Crisis (GFC). The magnitude of such contagion shocks is also likely to be amplified.

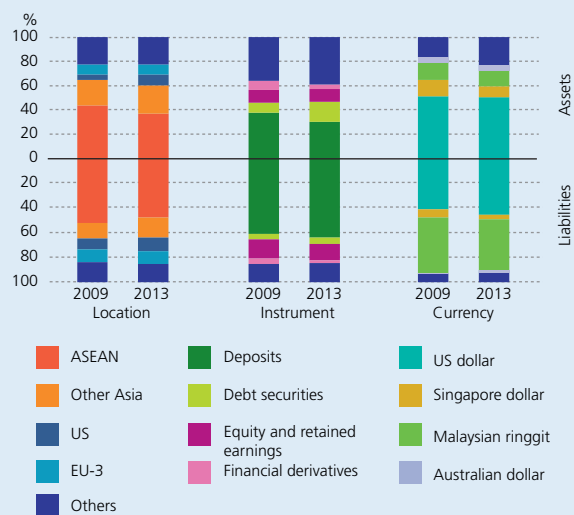
This article evaluates the cross-border claims and liabilities of Malaysian banks, and the potential risks associated with increased financial integration from a network analysis perspective. The network analysis is used to examine linkages between the Malaysian banking system and banking systems in other countries, including those that headquarter internationally active banks¹, to establish if and to what extent external linkages have resulted in heightened contagion risks to Malaysian banks.

Cross-border Interconnectedness of Malaysian Banks

The nature and extent of external financial linkages of the Malaysian banking system have evolved and increased steadily since the GFC. Claims on, and liability obligations to, non-resident counterparties grew at a compounded annual growth rate (CAGR) of 13% and 12% respectively over the past five years. Total external exposures however, remained low at less than 10% and 15% of the total assets and total funding of the banking system respectively as at end-2013. The bulk of the external exposures of the banking system relates to intra-group transactions between banking institutions in Malaysia and their overseas parents, subsidiaries and affiliates, mostly in the form of interbank

Chart 1

Banking System: External Assets and Liabilities by Location, Instrument and Currency



Source: Bank Negara Malaysia

¹ There are 12 global systemically important banks (G-SIBs) operating in Malaysia through locally-incorporated subsidiaries, some of which have extensive branch networks operating in the major cities.

placements and borrowings (Chart 1). The counterparty risks associated with these transactions are assessed to be manageable based on the low default probability of the counterparties, which also avoided destabilising credit or funding shocks during the peak of the GFC.

Apart from interbank placements and borrowings, the increase in cross-border exposures was also contributed by the higher holdings and issuances of debt securities (CAGR of 29% and 17% respectively). These exposures accounted for 16% and 5% of external claims and liabilities respectively. More than 40% of the banks' holdings of non-resident debt securities were papers of good credit standing issued by financial institutions, sovereigns and non-bank private entities in the US and Singapore. On the liability side, approximately 83% of total debt securities issued by domestic banks in the international capital markets were denominated in US dollar and Singapore dollar. The higher holdings and issuances of these debt securities were in part driven by the diversification of trading and investment portfolios, and to better meet growing liquidity and funding needs in significant currencies, particularly, for overseas operations. As for the locally-incorporated foreign banks, the steady expansion of the Malaysian operations during this period had also resulted in the paid-up capital and retained earnings to grow at a CAGR of 9%, constituting 13% of total external liabilities of Malaysian banks.

The country composition of cross-border exposures was dominated by on-balance sheet transactions with (i) regional financial centres; (ii) countries where Malaysian banks have overseas operations; and (iii) countries with internationally active banks, particularly those with locally-incorporated subsidiaries in Malaysia. Claims on, and liabilities to, Asian countries accounted for 62.8% of Malaysian banks' total external exposures. Cross-border claims on ASEAN grew steadily at a CAGR of 8% over the past five years in tandem with new business acquisitions and the organic expansion by several domestic banking groups in Singapore, Indonesia, Thailand, Vietnam, Laos and Cambodia. Within the same period, claims on East Asian countries also increased by 15%, driven by higher placement of interbank deposits and nostro balances with the parent and affiliates in Hong Kong SAR and PR China to facilitate growing regional trade and currency settlements. About a fifth of the cross-border claims were to the US and UK, predominantly arising from holdings of US Treasuries and interbank transactions between domestic banks or locally-incorporated foreign banks in Malaysia and the parent and affiliates in London and New York. As a result of the growth in cross-border exposures, banks in Malaysia were more exposed to adverse developments in the foreign exchange markets and yield movements across different economies. Moderate spillover effects were felt in the domestic market during periods of tightened US dollar conditions in 2008, as evident from the increased spreads of onshore USD/RM cross-currency swap rates and the widening of short-term US dollar liquidity mismatch positions of banks in Malaysia. This risk however, is mitigated largely by the low reliance of banks in Malaysia on cross-currency funding and offshore wholesale funding markets, limits on counterparty exposures and more active centralised liquidity management of US dollar funds within the banking groups. This is supported by the network analysis presented below.

A Network Approach to Assess Cross-border Contagion and Network Externalities

The network simulation analysis is used to (i) quantify and trace the propagation of credit and funding shocks (contagion paths) across banking systems induced by a hypothetical default event in a particular country; (ii) identify potential systemic linkages and cross-border domino effects between internationally active banks and the Malaysian banking system; and (iii) measure a banking system's susceptibility to external spillovers and its propensity to amplify cross-border contagion. For the purpose of this study, the network analysis is constructed from a matrix of inter-banking system cross-border claims and liabilities² involving selected countries with a higher relative degree of connectivity with the Malaysian banking system, either due to (i) high direct external claims and

² Data for the network analysis is derived from the Bank for International Settlements (BIS) Locational Statistics, with conservative interpolation and estimation of bilateral credit and funding exposures for selected countries. Alternatively, the cross country analysis can be undertaken using the BIS Consolidated Statistics (immediate borrower basis or ultimate risk basis).

funding obligations with Malaysian banks; (ii) the presence of significant regional operations of Malaysian banks; or (iii) high intra-group linkages of locally-incorporated foreign banks with parent or related institutions abroad. The banking systems of these 11 countries represented more than 80% of total external claims on, and of total external liabilities to, all Malaysian banks.

The network simulation model is applied by generating the impact on the capitalisation of the banking systems in the sample population from: (i) a hypothetical default by the banking system of a particular country (the 'trigger country'); or (ii) hypothetical simultaneous default by two banking systems. The model simulates the combined impact of credit and funding shocks on the cross-border interbank obligations³ without taking into account any policy response by the authorities such as liquidity assistance or capital support. To simulate a credit shock, the banking system in the trigger country is assumed to default on the outstanding cross-border interbank borrowings, causing other counterparty banking systems to incur a 100% loss⁴ which is then fully absorbed using system-wide capital. For funding shocks, the banking system in the trigger country ceases to provide cross-border interbank funding⁵, contributing to liquidity strains in other counterparty banking systems. The affected counterparty banking systems are assumed to replace a fraction of the lost funding⁶ through a fire sale of assets. Severe haircuts⁷ are applied in the model to capture the amplification of systemic risk that can arise from exposures to common asset classes, in turn reinforcing a downward spiral in asset values and triggering steep declines in the market value of the portfolios of other banks. The combined effects of credit and funding contagion shocks are simulated in an iterative manner until no additional banking system experiences a decline in capitalisation below 8%.

This analytical framework is not intended to predict the likelihood of distress of a particular banking system. Rather, it seeks to provide useful insights on the potential direct and indirect cross-border spillovers to the Malaysian banking system, and the ability of the system to absorb losses under tail-risk events. The hypothetical simulations using aggregated data treat each banking system as a single foreign counterparty and therefore, assume a widespread default by all individual banks within a country on its foreign exposures⁸. While the likelihood of such extreme events occurring in a contemporaneous and homogenous manner is low, the stringent assumption was used to estimate the maximum potential contagion impact arising from multiple credit defaults and funding shocks materialising simultaneously, disregarding the effects of credit risk transfers, loss mitigation response by banks or policy intervention by authorities. The static modelling of institutional behaviour at the aggregated level also allows an assessment of both the first order impact of distress (direct external contagion) and its amplified effects across banking systems as a result of indirect spillovers due to network externalities. Such self-reinforcing domino effects may not necessarily lead to system-wide failures, but can indicate the degree to which a particular banking system may be weakened by the transmission of cross-border financial distress.

Simulation Results

Single trigger country

The network analysis revealed that the simulated distress of the banking system in one trigger country has limited direct contagion impact on the Malaysian banking system. Out of the 11 individual

³ Cross-border exposures include (i) loans and deposits; (ii) holdings or own issues of debt securities; and (iii) other claims and liabilities.

⁴ Loss given default of 100% reflects the inability of a creditor banking system to recover any of the loans as banks typically face substantial uncertainty over recovery rates in the short run, particularly when it takes considerable time for distress-debt markets to price in recently defaulted instruments.

⁵ Assume no rollover of outstanding external funding irrespective of maturity and funding sources.

⁶ 50% of funding needs are assumed not to be refinanced in the simulations. The extent to which a bank is able to replace an unanticipated decline in interbank funding depends on the liquidity conditions in the global or domestic money markets. As demonstrated in the recent GFC, the complexity and opacity in cross-border banking led to a system-wide liquidity squeeze due to perceived solvency concerns and heightened counterparty risk aversion.

⁷ The model assumes that assets are traded at a discount (market value is less than book value) when the availability of abundant, instantaneous liquidity in the money and capital markets diminishes during stressed periods.

⁸ The simulations arbitrarily assume only a fraction (75%) of the banking system defaults.

hypothetical defaults, six trigger countries were found to have no contagion impact on the domestic banking system. The susceptibility of Malaysian banks to adverse cross-border spillovers is only heightened when a banking system distress spreads to two or more countries in subsequent contagion rounds. In all of the single trigger country simulations, the capitalisation of the Malaysian banking system was only severely affected in the final round of contagion (where the contagion loop from a simulation ends), after other banking systems in the sample have also suffered extreme financial distress. For example, in simulations where the trigger country is outside Asia, the total capital ratio of the Malaysian banking system only fell below 8% after system-wide distress has affected major internationally active banks in at least seven advanced economies within the sample. This indicates that indirect spillovers are only felt through losses amplified by network externalities.

As expected, the contagion impact on the domestic banking system was more pronounced when the financial distress originates from trigger countries with a stronger on- and off-balance sheet links with Malaysian banks. For example, the total cross-border claims by Malaysian banks on Singapore accounted for 23% of total external assets of the domestic banking system as at end-2013, while external liabilities of Malaysian banks to Singaporean counterparties represented 46% of total external liabilities of the domestic banking system. This is attributed primarily to the strong presence of Malaysian banks in Singapore and vice versa. The branch operations of Malaysian banks in Singapore alone accounted for at least 4% of the group assets, with profits from operations in Singapore contributing between 4% and 25% to group profits. Singaporean banks operating in Malaysia accounted for 8.4% of total Malaysian banking system assets. Despite these linkages, the simulated contagion impact on the Malaysian banking system arising from a hypothetical banking system distress scenario originating from Singapore was only felt in the third contagion round. For countries such as the US and UK which are headquarters to internationally active banks, the indirect contagion effects on the Malaysian banking system only occur after all major banking systems in the sample have experienced acute financial distress. This finding supports the limited susceptibility of the Malaysian banking system to the potential indirect spillovers originating from the Malaysian subsidiaries of six G-SIBs headquartered in the US and UK in the event of system-wide distress occurring in these countries. Similar findings were observed for the two European G-SIBs operating in Malaysia.

Two trigger countries

The potential direct contagion impact to the Malaysian banking system from a simultaneous banking system distress in two countries was also found to be contained. The simulated pair-wise defaults affect domestic banks in the second to fourth rounds of contagion, after all other banking systems in the sample have suffered extreme financial distress. The extent and speed of contagion paths were significantly augmented when a cross-border crisis affects major banking systems in both advanced and emerging economies simultaneously. New contagion paths were found to emerge for countries which did not induce financial distress in other banking systems under the single trigger country simulations. Conclusion derived from the different permutations of simulated joint distress of two banking systems showed that the probability of a contagion impact to the Malaysian banking system was found to be twice as high compared to simulations involving a single trigger country. This is explained partly by the new contagion paths caused by extreme distress in countries without cross-border spillovers on a standalone basis. In other words, potential losses could be further amplified by connections between a pair of banking systems that together can cause wider spillovers than individually.

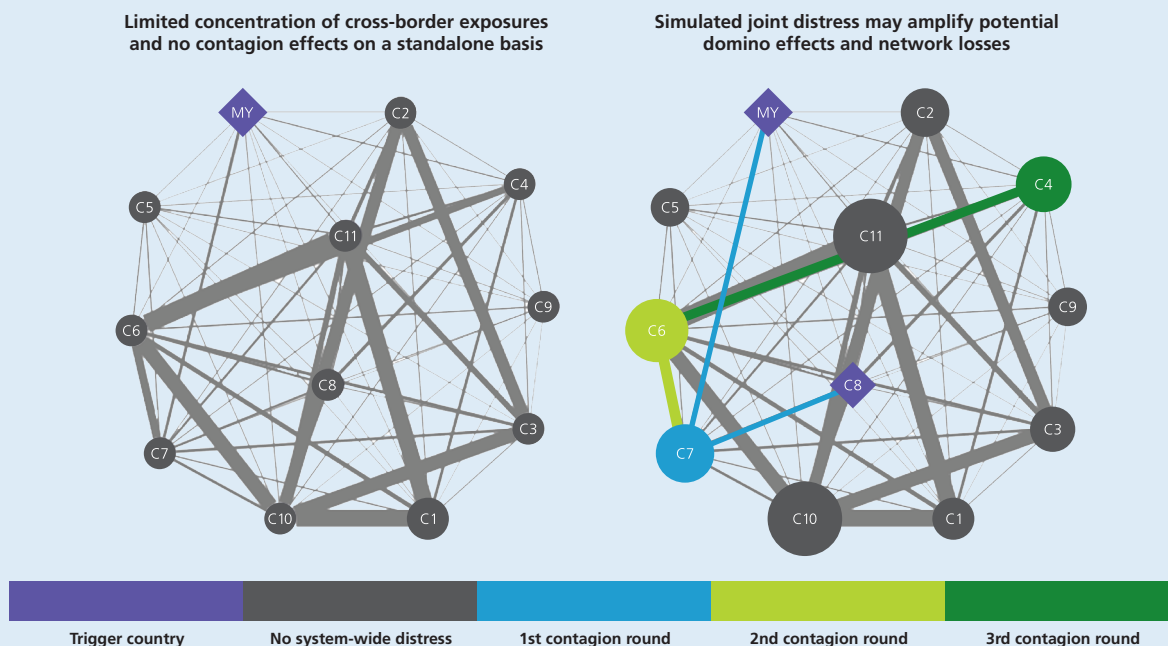
Contagion by Malaysian banks

The extent of potential direct and indirect contagion posed by the Malaysian banking system on cross-border banks in the regional and advanced economies was also found to be limited. The simulated financial stress in the Malaysian banking system alone does not threaten system-wide solvency in other countries. In addition, simulations of joint distress in the Malaysian banking system together with a banking system outside the Asia Pacific region that headquarters internationally active banks did not induce additional system-wide distress in other countries in the sample. This implies that potential losses from a widespread distress among banks headquartered in advanced economies

are not significantly amplified as a result of connections with the banking system in Malaysia. However, when the system-wide distress involves another banking system in the Asia Pacific region simultaneously, the potential contagion impact on other jurisdictions within the sample increases, with two additional contagion paths observed (Diagram 1). This is consistent with the more pronounced cross-border interconnectedness within the region, following the expansion of intra-regional trade and regionalisation activities of the Malaysian banks.

Diagram 1

Interconnectedness of Malaysian Banking System and Effects of Network Externalities on Contagion



Note: Each node represents the banking system of a country from the sample population (12 in total, including Malaysia). The width of the lines denotes the relative degree of interconnectedness between two banking systems, as measured on a net cross-border exposures basis. The size of the node in the right diagram represents the relative measure of cumulative capital losses arising from simulated credit and funding shocks in all contagion rounds.

Source: Bank for International Settlements, Bank Negara Malaysia and internal estimation

Policy Priorities

The increasing level of financial and non-financial linkages among internationally or regionally active banks underscores the importance of monitoring interconnectedness as a potential source of systemic vulnerability. However, financial network structures are complex, constantly in flux and therefore, often challenging to ascertain. While the Bank will continue to develop and enhance the use of macroprudential surveillance tools to monitor systemic financial linkages within and outside of the financial system, including the practical application of financial network analysis, there is a role for collective efforts by policymakers to improve the monitoring of global and regional systemic linkages. This should include effective arrangements for multilateral information sharing and surveillance, and wider coverage of reporting on cross-border financial obligations. At the regional front, the Executives' Meeting of the East Asia Pacific Central Banks (EMEAP) serves as an important platform in monitoring potential risks associated with greater global and regional interconnectivity. This multilateral cooperation framework has forged strong cross-border coordination within the region in areas relating to surveillance, financial safety nets and crisis prevention, management and resolution. Going forward, EMEAP will continue to play an important role in bolstering such regional arrangements as financial integration within Asia and between Asian and other regions deepens.

Given the potential for external contagion shocks to expose domestic vulnerabilities and exacerbate the risk of instability within the domestic financial system, the Bank places a high priority on ensuring strong domestic institutions that are prudently managed, and comprehensive and effective arrangements for crisis containment, management and resolution. This is critically supported by the enhanced financial stability arrangements that have been put in place under the Central Bank of Malaysia Act 2009 (CBA), the Financial Services Act 2013, the Islamic Financial Services Act 2013 and the Malaysia Deposit Insurance Corporation Act 2011. They include the ability of the Bank to take broad measures to address risks to financial stability arising from the exposures and activities of non-regulated institutions; strengthened governance arrangements to oversee and coordinate such measures through the Financial Stability Executive Committee which is established under the CBA; comprehensive powers to undertake resolutions of financial institutions and non-bank financial institutions; and an effective and comprehensive deposit insurance system that provides strong incentives for sound risk management. The strengthened prudential framework and enhanced cross-border cooperation arrangements that are being implemented for the oversight of financial groups (elaborated further in Chapter 3) will further reinforce the resilience of the domestic financial system against external contagion.

References

Allen, F. and D. Gale, (2000), 'Financial Contagion', *Journal of Political Economy*, Vol. 108, No.1, pp1-33.

Chan-Lau, J., M. Espinosa, K. Giesecke and J. Solé (2009), 'Assessing the Systemic Implications of Financial Linkages', *IMF Global Financial Stability Report*, 2.

Upper, C. (2007), 'Using Counterfactual Simulations to Assess the Danger of Contagion in Interbank Markets', *BIS Working Paper No. 234*.