

Chapter 8

PHILIPPINES: CONTAGION RISK ANALYSIS OF CROSS-BORDER EXPOSURES OF BANKS¹

By

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1. Introduction

Empirical data reveal increasing interlinkages in the global financial system. A sizable portion of which have been channeled through cross-border bank flows and have been found to have contributed to the amplification of the Global Financial Crisis (GFC) in 2007 to 2008.⁵ The proliferation of cross-border lending activities can transmit foreign shocks to recipient markets, especially to emerging markets (Bruno and Shin, 2015; Schnabl, 2012). Transmission of these shocks can be spread by contagion, a much broader concept of systemic risks and a major financial stability concern due to its potential threat to the stability of the local banking system. Thus, our understanding of the extent of the countries' cross-border exposure is a policy imperative.

In the Association of Southeast Asian Nations (ASEAN) region, the increase in cross-border banking flows was due mainly to the following: (1) adoption of the ASEAN Banking Integration Framework (ABIF)⁶; and (2) evolution of financial technologies that facilitate complex and extensive linkages across global markets.

This paper intends to map cross-border exposures⁷ of the U/KBs in the Philippines with their key cross-border counterparties⁸ from neighbouring countries in the ASEAN region and the United States - the country's major foreign counterparty⁹ - both in terms of cross-border claims and cross-

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1. The views and opinions expressed in this paper are those of the authors and not necessarily reflect those of the Bangko Sentral ng Pilipinas (BSP) or the SEACEN Centre.
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 5. For instance, Brunnermeier et al. (2012) confirmed that the large bulk of cross-border debt during the GFC was intermediated through the domestic banking system based on the Bank for International Settlements (BIS) data.
 6. ABIF aims to achieve free flow of financial services within the ASEAN regional banking market (BSP, 2018).
 7. In the Philippines, the Manual of Regulations for Banks (MORB) X301.6(e) requires banks to "take into account the nature of their business and the complexity of their products. In any case, a bank's exposures to a counterparty should include its on and off-balance sheet exposures and indirect exposures."
 8. Foreign counterparties pertain to non-resident banks, non-bank financial institutions and non-financial institutions which (i) are located in a country or economy other than the Philippines and (ii) participate as another party in a financial transaction with a domestic financial institution (i.e., domestic banks in the current case).
 9. Cross-border exposures of domestic banks are determined using BSP's internal statistics on Philippine cross-border report. As of end-March 2018, United States counterparties represent 27.6% and 62.3% of the total cross-border claims and cross-border liabilities, respectively.

border liabilities.¹⁰ In addition, the paper aims to assess the impact of credit and liquidity shocks to domestic banks and foreign banks' capital.

Following the definition in the BIS international banking statistics guidelines (BIS, 2013), cross-border claims consist of loans and deposit to banks and non-banks, holding of securities and other claims. Meanwhile, loans and deposits from banks and non-banks, own issues of debt-securities and other liabilities comprise cross-border liabilities.¹¹ In terms of international operations, cross-border transactions may take two forms: 1) transactions with foreign residents, in foreign currency, or with counterparties outside the country; and 2) institutional presence in other countries such as a branch or a subsidiary.

Relatively little analysis has been published on country-specific cases for Asian emerging market economies such as the Philippines (Claessens and Forbes, 2001). In particular, the region still has much to learn about contagion, risk transfers and exposures to and from the global financial system. Thus, the results of this study could serve as valuable inputs in monitoring and analyzing contagion risk in the Philippines in greater detail.

This study could inform or serve as a useful input to the Bangko Sentral ng Pilipinas' (BSP) conduct of macrofinancial surveillance amid increasing complexities in the financial system and the evolving nature of systemic risks. As far as policy is concerned, the findings in this paper are consistent with the BSP's prudential measures targeted at curbing the degree of systemic risks. One way of improving the terms of tradeoffs would be to reduce the spillover risks, without sacrificing the risk-sharing gain. Policy efforts along both lines will complement each other towards a common goal in mitigating the financial stability impact of financial interconnectedness.

The study utilizes the BSP's internal statistics (partly aggregated) from the cross-border reports of banks.¹² Such data and related information are analysed via simulation exercises on the plausible impact of exogenous shocks to the financial position of foreign and domestic banks operating in the country.

The paper proceeds as follows: Section 2 provides a brief overview of the literature on the impact of interconnectedness of financial institutions on the financial system. Section 3 discusses the overview of the Philippine banking system while Section 4 presents the data and methodology. The simulation results are presented in Section 5, which focuses on the potential impact, both direct (credit shock) and indirect (funding shock), of cross-border spillovers on the domestic financial system. Section 6 concludes with a summary of results and some policy implications.

10. Following the definition in the BIS international banking statistics guidelines (BIS, 2013), cross-border claims consist of loans and deposit to banks and non-banks, holding of securities and other claims. Meanwhile, loans and deposits from banks and non-banks, own issues of debt-securities and other liabilities comprise cross-border liabilities.

11. Guidelines on the Completion of the Report on Cross-Border Financial Position, Annex A of the BSP Circular No. 850 dated 8 September 2014.

12. Circular No. 850 dated 8 September 2014 - Phase 1 implementation required universal and commercial banks, as well as thrift banks that are subsidiaries of U/KBs to report their cross-border financial claims and liabilities to the BSP without the need to identify specific counterparty. The succeeding submission after September 2014 was March 2015.

2. Review of Related Literature

The majority of global finance is intermediated by a number of large and complex financial institutions (LCFIs), which commonly operate in a number of developed economies serving as global lenders and borrowers. The resulting transactions with LCFIs as counterparties comprise the core of cross-border financial flows and connect countries with one another (IMF, 2010).

The transmission of external shocks through the interest rate, exchange rate and other economic and financial channels could threaten the stability of the financial system. The external shocks transmitted through these channels work their way into the domestic financial system via cross-border financing intermediated mostly by banks. It is in this regard that Smaga (2014) underscored the inherent vulnerability of banks to contagion risks or negative externalities caused by cross-border activities and interconnectedness.¹³ In an ECB Financial Stability Review (2004), contagion risk is an important element in banking crises and a subset of a much broader concept of systemic risks, thus a major financial stability concern. However, for a systemic contagion to occur, the institution from which the distress starts must be systemically important¹⁴ to affect other institutions and the financial system as a whole. Once (systemically important) sources of distress are identified, it is important to consider the potential transmission of shock and exposures to vulnerabilities that the banking sector could face.

The study of Ahrend and Goujard (2012) underscores the role that strict financial regulations play in lessening contagion risks. One of the main findings of the study is that countries with less-leveraged banking sector and lower credit-over-deposits ratio face lower risk of bank-balance-sheet-driven contagion that could possibly lead to a banking crisis. These analyses corroborate earlier OECD findings (Ahrend et al., 2011a) that indicators of regulatory and supervisory strength are correlated with how well countries managed the damage to their banking sector during the global financial crisis. Ahrend and Schwellnus (2012) and Ahrend and Goujard (2011) further suggest that countries with stronger banking supervision are less affected by investor-sentiment driven capital flow reversals and thus have a lower risk of suffering from financial crises. Considerably, lower risks and lesser vulnerability to international bank-balance sheet shocks could be achieved if there are longer debt maturity; better capitalised banking system; and adequate central bank reactions during financial turmoil (Ahrend and Goujard, 2012). Nonetheless, while stricter financial oversight reduces overall financial fragility, there are some indications that stricter domestic banking supervision may increase short-term foreign bank borrowings due to regulatory arbitrage or increased attractiveness on the part of financial investors which could further expose the banking sector to balance-sheet shocks (Ahrend and Schwellnus, 2012).

Meanwhile, to the best knowledge of the researchers, literature on the analysis of contagion risk in the Philippine banking system appears to be limited. Hence, this paper could serve as a good starting point for researchers in analysing contagion risk in the Philippines in greater detail.

13. Smaga, P. (2014). The Concept of Systemic Risk, SRC Special Paper No. 5, August 2014.

14. In the case of the Philippines, the systemic importance of a bank is assessed using an indicator-based measurement approach (BSP Circular No. 856, Series of 2014).

3. Overview of the Philippine Banking System (PBS)¹⁵

The PBS, which represents the core of the financial system in the Philippines, is classified into the following categories:¹⁶ U/KBs, thrift banks (TBs)¹⁷ and rural and cooperative banks (RCBs).¹⁸ U/KBs¹⁹ represent the largest group of financial institutions in the PBS in terms of total assets and also offer the widest variety of banking services. TBs are composed of savings and mortgage banks, private development banks, stock savings and loan associations and microfinance thrift banks.²⁰ U/KBs and its TBs subsidiaries comprise 9.2% of the 585 operating banks' head offices. As of end-March 2018, U/KBs still dominated the Philippine banking sector, holding P15,333.4 billion in total assets or 90.8% of the banking system's total assets. Likewise, loan portfolio of U/KBs took up 88.9% of the total banking system's portfolio, and represent 49.5% of gross domestic product (GDP).²¹

For the purposes of having a broader view of the PBS, universal banks are classified further into three types: (i) private domestic banks (PDBs), (ii) government banks, (iii) and foreign bank branches (FBBs). Likewise, commercial banks are classified further into three types: (i) PDBs; (ii) foreign bank subsidiaries (FBS); and (iii) FBBs. Most of the FBBs²² and subsidiaries, categorized either both universal and commercial, originate from the Asia-Pacific region. In particular, around 57.9% of FBBs and subsidiaries originate in countries within Asia-Pacific region.

Meanwhile, the Basel Committee on Banking Supervision (BCBS) has developed a methodology for assessing systemic importance of banks using an indicator-based approach of different categories. According to the BCBS, a bank's size²³ is a key measure of systemic importance (BIS, 2011). Aside from the bank's size, other indicators include interconnectedness,²⁴ substitutability and complexity. However, countries may adopt new methodologies, introduce new indicators, and/or vary the weights of factors in identifying the D-SIBs based on its assessment.

15. As of end-March 2018.

16. As of end-2018, the PBS accounts for 78% of the Philippine financial system's total resources (BSP, 2018).

17. Some TBs are subsidiary of U/KBs.

18. Rural banks and cooperative banks are differentiated from each other by ownership. Rural banks are privately owned and managed, while cooperative banks are organised/owned by cooperatives or federation of cooperatives.

19. U/KBs in the Philippines represent the largest single group, resource-wise, of financial institutions. They offer the widest variety of banking services among financial institutions. In addition to the function of an ordinary commercial bank, universal banks are also authorised to engage in underwriting and other functions of investment houses, and to invest in equities of non-allied undertakings (BSP).

20. www.bsp.gov.ph/banking/bspsup.asp

21. Year-to-date nominal GDP as of end- March 2018.

22. The FBBs' target markets include companies registered and domiciled in the originating countries that are probable investors in the Philippines. The FBBs also target small and medium enterprises, overseas Filipino (OF) workers and other entities involved in government project financing. See the BSP's Report of the Philippine Financial System as of 2nd Semester 2015 for detailed reference.

23. Size is measured using the definition in Basel 3 items §157-164, which includes total assets and other off-balance sheet items such as loan commitments and financial guarantees.

24. Interconnectedness measures a bank's systemic impact on other financial institutions. Individual indicator of interconnectedness is composed of intra-financial system assets (IFS assets), intra-financial system liabilities (IFS liabilities) and wholesale funding ratio (BIS, 2011).

Table 1 assesses the systemic importance of banks in this study using banks' size and interconnectedness as indicators. A bank's size is measured using the definition of total exposure under Basel 3 (i.e. the sum of on-balance and off-balance sheet items).²⁵ The size of the universal-PDBs comprises 71.5% of the total U/KB exposure, followed by universal- government banks and commercial- FBBs at 15.5% and 4.8%, respectively.

Another selected indicator developed by the BCBS is interconnectedness with other financial institutions. Individual indicators of interconnectedness, by BCBS' definition, is composed of intra-financial system assets (IFS assets), intra-financial system liabilities (IFS liabilities) and the wholesale funding ratio. IFS assets of U/KBs such as debt securities issued by financial institutions (held by the bank) and loans (from the bank) to financial institutions are largely attributed to universal-PDBs, which has 81.8% share in the total for U/KBs. On the other hand, IFS liabilities refer to funds and deposits (at the bank) from financial institutions, while the wholesale funding ratio considers how banks source their funds from other financial institutions in the funding market (Table 1).

Table 1
Size and Interconnectedness of U/KBs
(in Percent)

	Bank Size ^{1/} (share to total for all U/KBs)	Interconnectedness		
		IFS Assets ^{2/} (share to total for all U/KBs)	IFS Liabilities ^{3/} (share to total for all U/KBs)	Wholesale Funding Ratio ^{4/}
by bank category				
Universal - Foreign Bank Branches (FBBs)	4.15	3.32	1.44	0.46
Universal - Government Banks	15.50	7.82	21.53	1.33
Universal - Private Domestic Banks (PDBs)	71.54	81.83	59.03	0.86
Commercial - Foreign Bank Branches (FBBs)	4.82	3.34	3.52	0.93
Commercial - Foreign Bank Subsidiaries (FBSs)	1.08	1.01	0.95	0.94
Commercial - Private Domestic Banks (PDBs)	2.91	2.68	13.54	4.57
by nature of operations				
Commercial	8.81	7.02	18.01	6.44
Universal	91.19	92.98	81.99	2.65
by ownership				
Domestic	89.95	92.33	94.09	6.76
Foreign	10.05	7.67	5.91	2.34

1/ Measured using the definition of total exposure under Basel 3 (i.e. the sum of on-balance and off-balance sheet items).

2/ Assets issued by financial institutions and loans to financial institutions.

3/ Deposits from financial institutions.

4/ Share of deposit liabilities from other banks to total liabilities.

Source: BSP Authors' Computation.

25. Basel 3 items §157-164 include total assets and other off-balance sheet items such as loan commitments and financial guarantees.

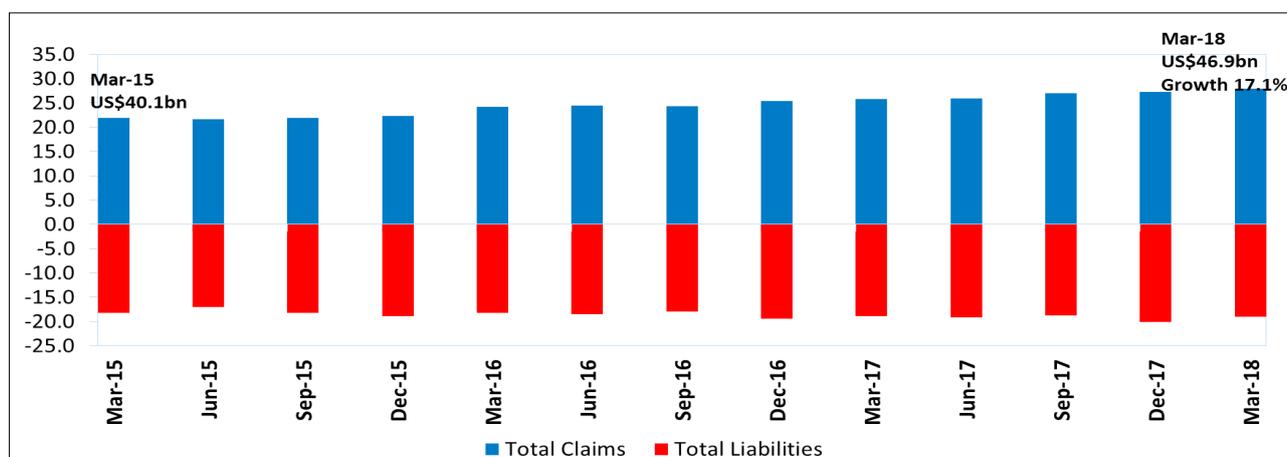
The combined significant share of domestic banks at 90% (U/KBs- PDBs, as well as U/KBs- government banks) in terms of size suggests that domestic banks could transmit contagion to other resident banks through its investment in debt securities, extension of loans and acceptance of deposits.

The aforementioned indicators provide an overview of the U/KBs’ systemic importance in the financial system. However, in order to further assess the contagion and effects of possible spillovers following a failure from banks’ counterparties, a more detailed study on the nature of cross-border exposures of these banks is necessary. These are discussed in the succeeding sections.

3.1 Assessment of the Philippine Banking System’s Cross-Border Exposures²⁶

The increasing trend in cross-border lending and borrowing exposes banks to distress, uncertainties and even burden sharing during crisis. When banks respond to a deterioration in their balance sheets through large reductions in cross-border loans, a financial contagion in the international banking system could be triggered. For instance, during the GFC, several Central and Eastern European banks that were particularly exposed to Western European banks suffered deterioration in their financial conditions as the latter tried to cut their exposure to the former in reaction to losses incurred in their asset portfolio.

Figure 1
Total Cross-border Financial Position of U/KBs and its Subsidiary TBs^{1/}
 (Consolidated Basis, in US Billion Dollar)²⁷



1/ Total Cross-Border Financial Position is the sum of Cross-Border Financial Claims and Cross-Border Financial Liabilities.

Source: BSP- Supervisory Data Center (SDC).

26. Under Basel 3, total exposure is the sum of on-balance and off-balance sheet items. In the Philippines, cross-border exposures of domestic banks are determined using BSP’s internal statistics as reported in the Philippine cross-border report.

27. The best way for management to obtain a picture of an international bank’s overall exposure to foreign borrowers outside a bank’s own organisation is by measuring country exposure on a consolidated basis.

Using the gross cross-border financial position of U/KBs and its subsidiary thrift banks, it has been observed that there is an increasing trend of cross-border exposures (in terms of asset holdings) in the PBS albeit at a gradual pace. The gross cross-border financial position or the sum of cross-border financial claims and cross-border financial liabilities, has grown by 17.0% from US\$40.1 billion as of end-Mar 2015²⁸ to US\$46.9 billion as of end-Mar 2018²⁹ (Figure 1).

Table 2
Cross-Border Exposures of U/KBs and its Subsidiary TBs
(in US Billion Dollar)

Total Cross-Border Claims			Total Cross-Border Liabilities			Gross Cross-Border Financial Position ^{1/}			Net Cross-Border Financial Position ^{2/}		
Mar-15 ^{3/}	Mar-18	% change	Mar-15 ^{3/}	Mar-18	% change	Mar-15 ^{3/}	Mar-18	% change	Mar-15 ^{3/}	Mar-18	% change
21.9	27.9	27.7%	18.2	19.0	4.3%	40.1	46.9	17.0%	3.6	8.9	144.8%

1/ Sum of cross-border financial claims and cross-border financial liabilities.

2/ Cross-border financial claims less cross-border financial liabilities.

3/ Data available as of end-March 2015.

Source: BSP-SDC, Authors' computation.

Table 2 shows that the Philippine U/KBs altogether remain a net cross-border lender with a net cross-border financial asset position of US\$8.9 billion as of end-March 2018. Meanwhile, year-on-year (y-o-y) growth of cross-border exposures has averaged at 6.7% from 2016 to 2018. In terms of level, U/KBs cross-border exposures relative to the total banking system asset is at 16.9% as of end-March 2018 (from 16.3% as of end-March 2015)³⁰.

These balances are gathered from the quarterly Cross-Border Financial Position Reports submitted by U/KBs and its subsidiary thrift banks.³¹ In this paper, cross-border exposures refer to claims and liabilities of all banks in the Philippines regardless of their nationality and bank type.

28. BSP Circular No. 850 dated 8 September 2014 mandates a 2-phase submission of the Report on Cross-Border Financial Position. Phase 1 covered initial submission of a one-time report on total cross-border financial position according to geographic region/country and currency. Meanwhile, Phase 2 included the quarterly submission of the report on total cross-border financial position starting 31 March 2015. The report shall be categorized according to the sector of their non-resident counterparty within a country.

29. As of the recent quarter, total number of reporting U/KBs and subsidiary TBs reached 43 and 11(6 have exposures of cross-border), respectively.

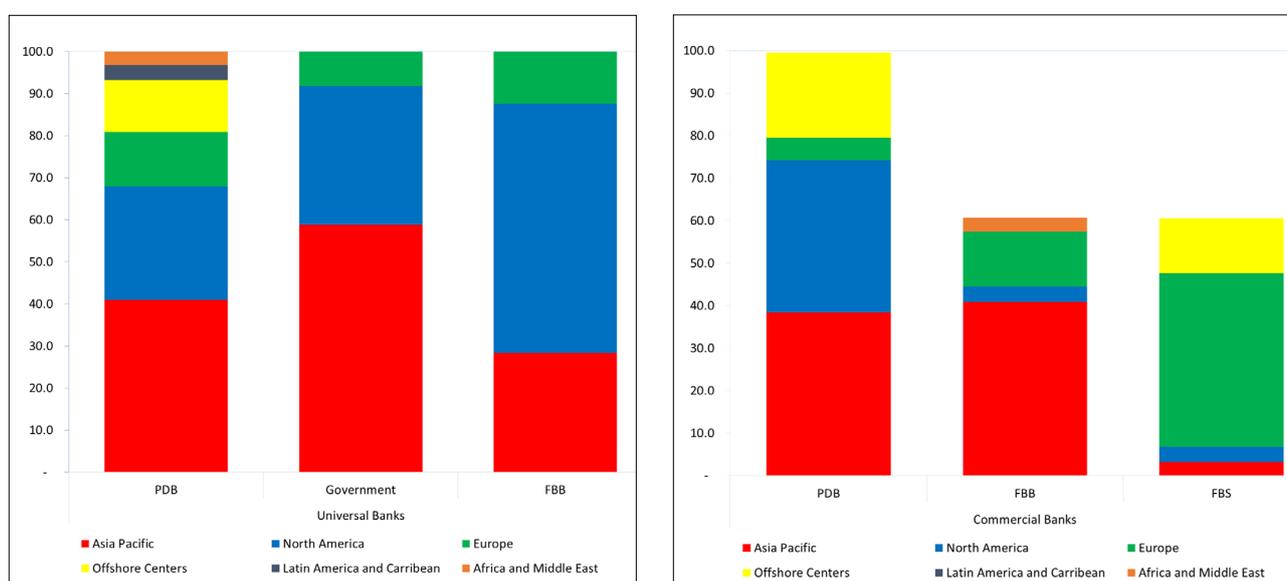
30. Total assets of the banking system grew by 47.2% in end-March 2018 relative to end-September 2014 partly due to entry of new foreign banks. Hence, the share of cross-border to total banking asset remained around 16.0% despite a 27.4% growth from end-September 2014 to end-March 2018.

31. BSP Circular No. 850 dated 8 September 2014.

3.2 Cross-Border Position of U/KBs by Region

By region, majority of U/KBs’ cross-border claims are from Asia Pacific economies, followed by claims in North American and European economies. In particular, Asia Pacific economies own a significant share in universal PDBs and government banks, and in commercial PDBs and FBBs. Likewise, United States and Canada, which comprise the North American region, have sizeable shares in universal banks and in commercial PDBs. Figure 2 below summarizes the cross-border claims of U/KBs categories by region.

Figure 2
Cross-Border Claims of Universal (lhs) and Commercial Banks (rhs) by Region*
 (As of End-March 2018, Percent Share to Total**)



* By regional location of the counterparty.

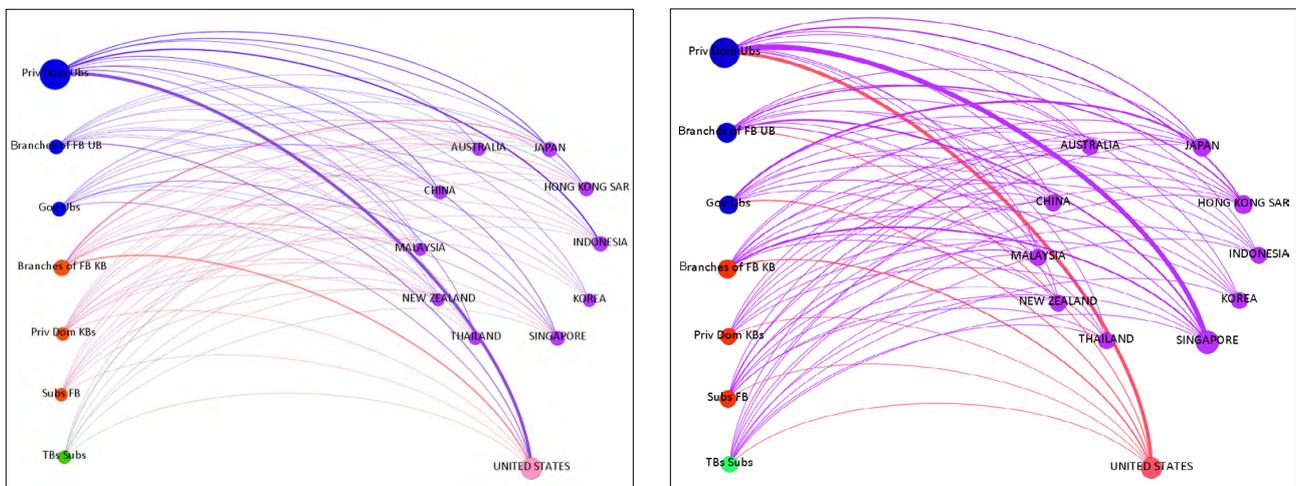
** Regional share of cross-border claims to total claims by category (i.e., Universal Banks: PDB- Private Domestic Banks; Government; FBB- Foreign Bank Branches and Commercial Banks: PDB- Private Domestic Banks; FBB- Foreign Bank Branches; FBS- Foreign Bank Subsidiaries).

Source: BSP-SDC, Authors’ Computation.

3.3 Cross-Border Position of U/KBs by Country

Figure 3 shows the cross-border positions of U/KBs by counterparty, in particular, on selected Asia-Pacific countries plus the United States. The size of the “nodes” represents the level of cross-border exposure of a particular bank category. The larger the nodes, the bigger is the said cross-border exposure (cross-border financial claims and liabilities) of a particular bank category. Meanwhile, the thickness of the “edges” represents the magnitude of Philippine banks’ exposure to a specific country. The thicker the edge, the more exposed a particular bank category is to a specific country. In terms of cross-border claims, majority are claims to the United States, while major sources of cross-border funding as of end-March 2018 are both from the United States and Singapore.

Figure 3
Cross-border Claims (lhs) and Cross-border Liabilities (rhs)*
 (As of End-March 2018)



* United States and selected Asia-Pacific Counterparties.

Source: Authors' Computation.

4. Data and Methodology

This study focuses on the cross-border exposures of U/KBs in the Philippines in terms of claims from and liabilities to counterparty economies. Foreign counterparties pertain to non-resident banks, non-bank financial institutions and non-financial institutions which (i) are located in the a country or economy other than the Philippines; and, (ii) participate as another party in a financial transaction with a domestic financial institution (i.e., domestic banks in the current case).

Consistent with the BIS' international banking statistics and the BSP's adoption of the same definition, the cross-border claims in this study consist of loans and deposit to other banks and non-banks, holding of securities and other claims. Meanwhile, cross-border liabilities consist of loans and deposits from other banks and non-banks, own issues of debt securities, and other liabilities. The data are obtained from banks' quarterly submissions of Report on Cross-Border Financial Position beginning 31 March 2015 and ending in 31 March 2018. Under BSP Circular No.850 in 2014, the regular submission of cross-border positions should cover transactions from 31 March 2015 onwards. These positions are reported in US dollar at the prevailing exchange rate as of reporting period. Cross-border exposures are denominated in US dollars and are converted to Philippine peso using end-March 2015 and end-March 2018 exchange rates at ₱44.80 and ₱52.20, respectively.³²

To assess the potential systemic implications of cross-border linkages of Philippine banks with its counterparty countries such as the United States,³³ and selected Asia-Pacific economies,³³ a simple interbank exposure model employed by Espino-Vega and Sole (2010) was replicated in this

32. Using the Philippine Dealing System (PDS) Peso/US Dollar closing rate and the New York US Dollar/Third Currencies closing rate (BSP Circular No.850, series 2014, Annex A).

33. i.e., China, Hong Kong, Indonesia, Japan and Singapore.

paper. This network model allows identification of systemic and vulnerable institutions in terms of capital absorption within a network of banks. It also enables monitoring of contagion chains stemming from different financial shocks.

The researchers acknowledge the limitations in replicating the model. Data limitations on inter-institutional exposures and assumptions on different parameters are limited to post-crisis as the initial quarterly cross-border reporting in the Philippines only covers March 2015 as the reference quarter.³⁴ Given this, the comparison of Philippine banks' exposures were limited to end-March 2015 data and end-March 2018 data. Moreover, foreign counterparty banks are not specifically identified in the analyzes due to data limitations. Likewise, analysis and results are also limited to the application of the empirical strategy between domestic and foreign banks.

There are two scenarios wherein Philippine banks' balance sheets are subjected to different shocks. The first scenario includes assessing vulnerability due to credit shock, while the second scenario considers the impact of funding shock to the domestic banking system. The paper defines credit shock as the reduction in the capital of U/KBs triggered by the default of foreign counterparties.³⁵ Meanwhile, funding shock is the reduction in the capital of U/KBs as a result of foreign counterparties' withdrawal of interbank funds from local banks, thereby affecting the liquidity condition of the borrowing counterparty.

Similar to the balance sheet model designed by Espino-Vega and Sole (2010), Equation (1) represents the Philippine bank i balance sheet covering the banks' total assets, total liabilities and equity, of which the portion of cross-border claims to specific countries are identified:

$$\sum_j X_{ji} + a_i = k_i + b_i + d_i + \sum_j X_{ij} \quad \text{Equation (1)}$$

Where x_i stands for Philippine bank i 's (by bank category) cross-border claims on country j (i.e., United States, selected Asia-Pacific counterparties and other counterparties)³⁶, a_i stands for Philippine bank i 's other assets (total banking asset less claims to other jurisdictions), k_i stands for Philippine bank i 's capital, b_i represents Philippine bank i 's borrowings less liabilities from other jurisdictions, d_i stands for deposits, and X_i stands for Philippine bank i 's liabilities to country j .

Equation (2) provides the basis for the first set of simulations on the impact of cross-border counterparties' default on their obligations to domestic PBS. This credit shock to the asset side of the balance sheet of Philippine banks affects its capital when an account in default is written-off. This paper simulates Equation (2) and uses the same initial loss-given-default (LGD) parameter

34. BSP Circular No. 850 dated 8 September 2014 mandates a 2-phase submission of the Report on Cross-Border Financial Position. Phase 1 covered initial submission of a one-time report on total cross-border financial position according to geographic region/country and currency. Meanwhile, Phase 2 included the quarterly submission of the report on total cross-border financial position starting 31 March 2015.

35. Foreign counterparties pertain to non-resident banks, non-bank financial institutions and non-financial institutions which (i) are located in a country or economy other than the Philippines and (ii) participate as another party in a financial transaction with a domestic financial institution (i.e., domestic banks in the current case).

36. Cross-border exposures in USD were converted to PHP using end of March 2015 and end of March 2018 exchange rates at 44.80 and 52.207 PHP/USD, respectively. Reference rate is the Philippine Peso per US Dollar – Daily Rate found in the Bangko Sentral ng Pilipinas website.

(equivalent to 100 percent on impact) in the paper of Espino-Vega and Sole (2010) and tests the other LGD scenarios (i.e., 20.0%, 50.0% and 75.0%). At an LGD rate of 100%, when the credit shock first materializes, bank i is unable to recover any of their loans from country j as it takes time for secondary and debt-distressed markets to price recently defaulted instruments.. The different credit shock scenarios should help determine the level of percentage default upon which a bank's capital starts to deteriorate.

Counterparty shock is exogenous to the economic and financial developments within the Philippines and may emanate from countries suffering from either economic or political turmoil. For purposes of stress testing, identified trigger countries are the following: United States, and the top 5 Asia-Pacific counterparties of Philippine banks in terms of cross-border claims, namely, Indonesia, Singapore, Japan, Hong Kong and China.

A default of each of these trigger countries, represented by the assumed LGD (denoted by the parameter λ), reduces the capital of banks because the assumption is that banking system's i capital absorbs the losses on impact. This negative impact on capital is reflected as a percentage capital reduction in the simulation. The baseline balance sheet identity of bank i becomes:

$$a_i + \sum_{j \neq h} X_{ji} + (1 - \lambda)X_{hi} = (k_i - \lambda X_{hi}) + b_i + d_i + \sum_j X_{ij} \quad \text{Equation (2)}$$

Insufficiency of capital to cover its losses due to default happens when $(k_i - \lambda X_{hi}) < 0$. Equation 2 is a modification of Equation 1 with two additional parameters on both sides of the equation, interpreted as follows:

- X_{hi} : bank i 's loans to counterparty h
- (λ) : default (LGD) rate of counterparty h
- $(\lambda)X_{hi}$: amount of hypothetical default of counterparty h

In addition to the assumption that the loss due to credit shock is absorbed by the banks' capital, this paper also assumes that any capital reduction due to writing-off of bad accounts cannot be replaced easily by raising new capital due to high cost of external funding.

Equation 3 simulates funding shock when a cross-border counterparty pulls out interbank funds from local banks, thereby affecting the liquidity condition of the borrowing counterparty. When the affected bank is unable to roll over its (part of) funding in the interbank cross-border market, it will have to sell assets at a discount in order to re-establish its balance sheet position. The Espino-Vega and Sole (2010) model for this funding shortfall is shown as:

$$a_i + \sum_j X_{ji} - (1 + \delta)\rho X_{ih} = (k_i - \delta\rho X_{ih}) + b_i + d_i + \sum_j X_{ij} - \rho X_{ih} \quad \text{Equation (3)}$$

Where ρ represents the lost funding rate from country/counterparty h and Philippine banks will be able to replace only a fraction $(1 - \rho)$. To be able to provide the liquidity in the absence of alternative sources of funding, a bank may be forced to sell (fire sale) part of its assets worth $(1 + \delta)\rho X_{ih}$ in order to restore its balance sheet position. Capital reduction $(k_i - \delta\rho X_{ih})$ is equivalent to the portion deducted from the capital pertaining to the haircut δ during fire sale, multiplied by lost funding ρX_{ih} .

Assumptions for the first scenarios are 50.0% haircut in the fire sale of assets and a 65.0% roll-over ratio (partial ratio) of interbank debt³⁷ similar to the assumptions used in the paper of Espino-Vega and Sole (2010). The 50.0% haircut is a conservative assumption given that typical central banks' haircut framework suggests a close to zero haircut for most liquid assets and high haircuts (e.g. 0.5% to 65% haircut rates for different asset categories)³⁸ for the least liquid assets.³⁹

5. Simulations and Results

5.1 Vulnerability Due to Credit Shock

Table 3 shows the reduction in capital of domestic and foreign banks due to hypothetical default of counterparties. The results of the simulation show that the four hypothetical default scenarios could potentially reduce foreign banks' capital. Capital reduction appears to be moderate under the 20% default scenario. Considering the case under the lowest default rate, the simulation shows that a 20% hypothetical default of claims from United States could lead to a decrease in foreign banks' capital by 37.5%.

Notably, the results are more moderate for domestic banks. A double-digit percentage reduction in domestic bank capital will result under the 50.0, 75.0 and 100.0% (the last one being considered as the worst case scenario) hypothetical default on claims from United States.

Table 3
Capital Reduction Due to Credit Shock in Selected Countries*
(As of End-Mar 2015)

Default Scenario	Bank Category	CH	HK	ID	JP	SG	US
20% Default	Domestic Banks	-0.6%	-1.0%	-1.7%	-0.6%	-0.6%	-4.5%
	Foreign Banks	-3.0%	-3.0%	-0.3%	-1.2%	-6.6%	-37.5%
50% Default	Domestic Banks	-1.5%	-2.6%	-4.2%	-1.4%	-1.5%	-11.2%
	Foreign Banks	-7.6%	-7.6%	-0.8%	-3.0%	-16.5%	-93.8%
75% Default	Domestic Banks	-2.3%	-3.8%	-6.3%	-2.2%	-2.3%	-16.7%
	Foreign Banks	-11.4%	-11.3%	-1.1%	-4.5%	-24.8%	-140.7%
100% Default	Domestic Banks	-3.0%	-5.1%	-8.4%	-2.9%	-3.1%	-22.3%
	Foreign Banks	-15.2%	-15.1%	-1.5%	-6.0%	-33.1%	-187.5%

* CH-China, HK-Hong Kong, ID-Indonesia, JP-Japan, SG-Singapore, US-United States.

Source: Authors' computation.

37. Parameter values of $\delta = 1$ and of $\rho = 0.35$. In the same paper of Espino-Vega and Sole (2010), an alternative way of interpreting the values is presented as follows: "Let px be the amount of funding that cannot be replaced. Let p be the current market price for assets and let y be the quantity of assets sold. That is, $p^1y = px$. Hence, $\delta = (p^0 - p^1)/p^1 \dots$ " (where higher δ reflects higher distress in markets).

38. Referring to European Central Banks' haircut rates for different securities classified in liquidity categories according to issuer types, for three buckets of residual maturity and for two rating classes. (ECB, 2013)

39. Bindseil, Ulrich, 2013. Central Bank Collateral, Asset Fire Sales, Regulation and Liquidity, Working Paper Series No. 1610, European Central Bank, November 2013.

The estimated capital reduction of domestic banks appear to be manageable for all assumed default rates from counterparties in China, Hong Kong, Indonesia, Japan and Singapore. However, simulated impacts on capital of foreign banks are larger in magnitude across all scenarios from counterparties in China, Hong Kong, Singapore and United States. This could be attributed to sufficient build-up of capital buffers by domestic banks in the Philippines in an environment of increasing cross-border transactions.

Philippine domestic and foreign banks appear to be more exposed to defaults/write-offs by counterparties in the United States as the country is considered a net supplier of US dollar funding in the international market (BIS, 2018). The resulting larger reduction in capital could be attributed to the foreign banks' substantial US dollar investment abroad.⁴⁰ Notably, Philippine foreign banks could experience double-digit percentage capital reduction even with the lowest 20.0 percent assumed default by United States counterparties.

Meanwhile, based on the latest available data as of end-March 2018, the assumed default in counterparties' claims showed a generally lower reduction (when compared to that as of end-March 2015) in foreign banks' capital (Table 4). Reduction in foreign banks' capital with claims from Japan turned double-digit under the 50.0, 75.0 and 100.0% default rate scenarios.

Table 4
Capital Reduction Due to Credit Shock in Selected Countries*
(As of End-Mar 2018)

Default Scenario	Bank Category	CH	HK	ID	JP	SG	US
20% Default	Domestic Banks	-0.7%	-0.9%	-1.9%	-0.8%	-1.0%	-4.7%
	Foreign Banks	-0.6%	-2.6%	-0.2%	-8.1%	-6.4%	-26.7%
50% Default	Domestic Banks	-1.8%	-2.3%	-4.7%	-2.1%	-2.5%	-11.7%
	Foreign Banks	-1.6%	-6.4%	-0.4%	-20.1%	-16.0%	-66.7%
75% Default	Domestic Banks	-2.7%	-3.4%	-7.0%	-3.2%	-3.8%	-17.5%
	Foreign Banks	-2.4%	-9.7%	-0.6%	-30.2%	-24.0%	-100.0%
100% Default	Domestic Banks	-3.6%	-4.6%	-9.3%	-4.2%	-5.1%	-23.4%
	Foreign Banks	-3.2%	-12.9%	-0.8%	-40.3%	-32.0%	-133.4%

* CH-China, HK-Hong Kong, ID-Indonesia, JP-Japan, SG-Singapore, US-United States.

Source: Authors' computation.

The results for foreign banks were consistent with the BIS (2018) report suggesting that the largest cross-border claims of banks in the Philippines were on the United States and neighbouring Asian economies (BIS, 2018). Relative to the end-March 2015 data, estimates using end-March 2018 data indicate larger capital reduction owing to increased share of foreign banks in cross-border claims from Singapore, Japan, China and Indonesia, particularly under the assumption of a 100% LGD.

40. "Statistical Release: BIS International Banking Statistics at end-September 2017," Bank for International Settlements, 18 January 2018.

5.2 Vulnerability Due to Funding Shock

The impact of funding shock on both domestic and foreign banks' capital follows from the assumption that banks may resort to fire sale of assets in order to replace all the funding previously granted by the defaulting counterparties (Bisias et al., 2012). The resulting lower capital reduction in both domestic and foreign banks capital from a funding shock indicates sufficient amount of highly liquid asset holdings by Philippine banks. In fact, banks in the country have maintained satisfactory asset quality, adequate provisioning, capital buffers and ample liquidity which serve at its defense against external shocks (BSP, 2017).

Table 5
Capital Reduction Due to Funding Shock in Selected Countries*
(As of End-Mar 2015)

Default Scenario	Bank Category	CH	HK	ID	JP	SG	US
50% haircut; 65% roll-over rate	Domestic Banks	-0.5%	-0.9%	-1.5%	-0.5%	-0.5%	-3.9%
	Foreign Banks	-2.7%	-2.6%	-0.3%	-1.1%	-5.8%	-32.8%
75% haircut; 50% roll-over rate	Domestic Banks	-1.1%	-1.9%	-3.2%	-1.1%	-1.2%	-8.4%
	Foreign Banks	-5.7%	-5.7%	-0.6%	-2.3%	-12.4%	-70.3%

* CH-China, HK-Hong Kong, ID-Indonesia, JP-Japan, SG-Singapore, US-United States.

Source: Authors' computation.

Tables 5 and 6 present the results of the stress-test using 65.0% roll-over rate and 50.0% haircut for the first scenario; while 50.0% roll-over rate and a 75.0% haircut were used in the second scenario.⁴¹

Table 6
Capital Reduction Due to Funding Shock in Selected Countries*
(As of End-Mar 2018)

Default Scenario	Bank Category	CH	HK	ID	JP	SG	US
50% haircut; 65% roll-over rate	Domestic Banks	-0.6%	-0.8%	-1.6%	-0.7%	-0.9%	-4.1%
	Foreign Banks	-0.6%	-2.3%	-0.1%	-7.0%	-5.6%	-23.3%
75% haircut; 50% roll-over rate	Domestic Banks	-1.3%	-1.7%	-3.5%	-1.6%	-1.9%	-8.8%
	Foreign Banks	-1.2%	-4.8%	-0.3%	-15.1%	-12.0%	-50.0%

* CH-China, HK-Hong Kong, ID-Indonesia, JP-Japan, SG-Singapore, US-United States.

Source: Authors' computation.

41. In the Philippines, a haircut is applied by a collateral taker as a risk control measure as a protection against losses arising from a decline in market value. Specific haircuts (ranging from 15% to 50%) are applied depending on the level and type of an asset class (BSP Circular No. 905, series of 2016).

Table 7 summarizes the results of the stress tests on a combination of credit and funding shocks. It shows the amount of banks' capital reductions can come largely from United States and Japanese counterparties. This could still be attributed to the increasing claims of Philippine banks on neighbouring Asian economies, which includes Japan (BIS, 2018). The result is consistent with the impact of credit shock on claims covering end-March 2018 (see discussion in Table 4).

Table 7
Capital Reduction Due to Credit-plus-Funding Shocks in
Selected Countries*
(As of End-Mar 2018)

Default Scenario	Bank Category	CH	HK	ID	JP	SG	US
50% haircut; 65% roll-over rate							
20% Default	Domestic Banks	-1.4%	-1.7%	-3.6%	-1.6%	-1.9%	-8.9%
	Foreign Banks	-1.2%	-4.9%	-0.3%	-15.3%	-12.2%	-50.7%
50% Default	Domestic Banks	-2.4%	-3.1%	-6.4%	-2.9%	-3.4%	-15.9%
	Foreign Banks	-2.2%	-8.8%	-0.5%	-27.4%	-21.8%	-90.8%
75% Default	Domestic Banks	-3.3%	-4.3%	-8.7%	-3.9%	-4.7%	-21.8%
	Foreign Banks	-3.0%	-12.0%	-0.7%	-37.5%	-29.8%	-124.1%
100% Default	Domestic Banks	-4.2%	-5.4%	-11.0%	-5.0%	-6.0%	-27.6%
	Foreign Banks	-3.8%	-15.2%	-0.9%	-47.5%	-37.8%	-157.5%
75% haircut; 50% roll-over rate							
20% Default	Domestic Banks	-2.1%	-2.7%	-5.5%	-2.5%	-3.0%	-13.7%
	Foreign Banks	-1.9%	-7.6%	-0.4%	-23.6%	-18.8%	-78.2%
50% Default	Domestic Banks	-3.2%	-4.1%	-8.3%	-3.7%	-4.5%	-20.7%
	Foreign Banks	-2.9%	-11.4%	-0.7%	-35.7%	-28.4%	-118.3%
75% Default	Domestic Banks	-4.1%	-5.2%	-10.6%	-4.8%	-5.7%	-26.6%
	Foreign Banks	-3.7%	-14.6%	-0.9%	-45.8%	-36.4%	-151.6%
100% Default	Domestic Banks	-5.0%	-6.4%	-12.9%	-5.8%	-7.0%	-32.4%
	Foreign Banks	-4.5%	-17.9%	-1.1%	-55.8%	-44.4%	-185.0%

* CH-China, HK-Hong Kong, ID-Indonesia, JP-Japan, SG-Singapore, US-United States.

Source: Authors' computation.

5.3 Vulnerability Due to Funding Shock with Changes in Exchange Rate

The third stress-test scenario employed in this paper focuses on the effect of depreciation on the liability side of the balance sheet. The results of the stress tests should explore the possibility of dollar-denominated bank liabilities exceeding dollar-denominated bank assets to financial systems in the event of a large and sudden exchange rate depreciation. The imbalance could trigger large losses and may cause banking vulnerability. Such asset-liability mismatch was behind some of the most severe financial crises in emerging market economies during the mid-1990s and early 2000s—including Turkey in 1994, Argentina in 1995, Russia in 1998, and Argentina again in 2001 (Catao and Terrones, 2016).

Currency/exchange rate risk is the risk that foreign exchange rates or the implied volatility will change, thereby affecting the value of banks’ assets held in foreign currency. With greater integration in the global financial system, the financial channel of exchange rates has become more important. A stronger dollar is associated with slower dollar-denominated cross-border bank flows and lower real investment in emerging market economies. Moreover, there is an association between the depreciation of an international funding currency and higher borrowing in that same currency by non-residents.

The stress-test activity in this empirical strategy determines the percentage reduction of capital due to domestic currency depreciation against the US dollar. In the Philippines, the peso has notably depreciated against the US dollar at an average of 200-basis points (bps) between end-March 2015 and end-March 2018. An assumption of a slightly more conservative 300-bps depreciation of the peso is applied in the third stress-testing scenario. Since data are reported in US-dollar denominated positions, data are converted using the BSP reference exchange rate for the respective periods covered. Table 8 shows that a 300-bps depreciation of the peso against the US dollar could cause a large reduction of capital of foreign banks, in particular, due to the sudden negative shock in the collection of liability funding from these counterparty countries: United States, Singapore and Japan. For other countries in the table, minimal reductions are observed in the results.

Table 8
Capital Reduction Due to Funding Shocks in Selected Countries*
with 300-bps Peso Depreciation⁴²
 (As of End-Mar 2018)

Default Scenario	Bank Category	CH	HK	ID	JP	SG	US
50% haircut; 65% roll-over rate	Domestic Banks	-0.6%	-0.8%	-1.7%	-0.8%	-0.9%	-4.2%
	Foreign Banks	-0.6%	-2.3%	-0.1%	-7.3%	-5.8%	-24.1%
75% haircut; 50% roll-over rate	Domestic Banks	-1.4%	-1.8%	-3.6%	-1.6%	-2.0%	-9.0%
	Foreign Banks	-1.3%	-5.0%	-0.3%	-15.6%	-12.4%	-51.6%

* CH-China, HK-Hong Kong, ID-Indonesia, JP-Japan, SG-Singapore, US-United States.

Source: Authors’ computation.

42. Cross-border exposures, which were reported in US dollar, were subsequently converted to PHP using end of March 2018 exchange rates at PHP/USD-52.207/1. The 300 bps depreciation rate or PHP/USD-53.821 was applied across the reported balance of cross-border exposures.

The results of the simulations reflect the structure of the banking system, which is characterized by varying degrees of domestic banks' exposure to cross-border risks depending on the source and level of the haircuts or shocks. A rare event of large haircuts could possibly lead to greater cross-border risks for foreign banks with higher exposure to United States and Japan. Domestic banks are less vulnerable to such cross-border risks, even in the case of a 300-bps depreciation of the local currency. Balance sheet structure shows that banks' assets are the channels through which cross-border risks are transmitted, rather than through their liabilities.⁴³ The conclusion supports the fact that the Philippine banking system remains a net cross-border lender with a net cross-border financial asset position of US\$8.9 billion as of end-March 2018 (see Table 2).

6. Summary and Policy Implications

6.1 Summary of Results

Results of the first simulation, involving a credit shock scenario, show that foreign banks are mostly affected by the failure of counterparty banks in the United States. Assuming different and increasing LGD rate scenarios, hypothetical default in counterparty banks, particularly those of Japan and Singapore results in a relative impairment (less than 20%) of foreign banks' capital (given realistic haircuts). The notable impact of hypothetical default in Japanese and Singapore counterparty banks could be attributed to the relatively large cross-border claims of Philippines banks to the neighbouring Asian economies, in addition to the United States.

Meanwhile, results of the simulations involving funding shock show lower impact relative to the results of the first scenario due to the availability of sufficient and highly-liquid bank assets during a fire sale. In general, foreign banks' capital is more likely to be affected than domestic banks' capital. The increasing trend in cross-border activities of both domestic and foreign banks provides a case for continued surveillance of cross-border exposures of Philippine banks to Asian counterpart countries such as China. In particular, in the paper of Koch and Remolona (2018), it has been pointed out that Chinese banks have become an increasingly important provider of international bank credit to borrowers both within and outside Asia. This area of risk to funding is termed as "common lender channel."

Results show that the risk of contagion through the reduction in domestic banks' capital may be lower in comparison with foreign banks' upon the application of both credit and funding shocks. Nevertheless, the paper suggests continued surveillance on cross-border exposures of domestic banks in the Philippines despite the results of the spillover effects of the scenario simulations.

43. Banks in the Philippines are net suppliers of US dollar (on balance sheet) funding in the international banking market (BIS, 2018).

6.2 Policy Implications

Financial interconnectedness offers many benefits such as facilitating financial flows for efficient capital allocation, risk-sharing and diversification. However, these activities of financial institutions warrant constant surveillance as exposures are sensitive to macroeconomic conditions, including sharp movements in interest rates, exchange rates and other variables. If banks are highly exposed to such sharp movements, changes in cross-border assets and liabilities could threaten the stability of the domestic financial system.

Stress tests conducted in this paper show that there could be possible thresholds in which double-digit percentage rate reduction in capital and funding conditions can change substantially. This could be attributed to the changing bank balance sheet structure as a result of greater cross-border exposures and financial globalization.⁴⁴

The corresponding results from the simulation exercises suggest that there are unexplored data which can be of use to policymakers. This information could enhance existing policy toolkits for dealing with the challenges of macrofinancial linkages particularly, in the financial system. Results of empirical studies and analysis can change depending on the period covered. Data with greater detail and longer time series maybe be more reflective of the status of the financial sector and from which policies could be calibrated in response to changing economic conditions (Canuto and Ghosh, 2013).

Results show differences in funding, assets and liabilities structure between foreign and domestic banks which could affect the relevance and efficacy of policy measures. Policymakers and concerned multilateral agencies may need to revisit capital flow policies and regulatory mix between domestic and foreign banks to effectively address the challenges of a globally-integrated financial markets.

Moreover, continued coordination on issues concerning cross-border presence and macroprudential policies at the international level maybe warranted to ensure regulation and stability both in the domestic and global financial system (BIS, 2012).

The study may be useful to the BSP in monitoring periods of elevated contagion risks due to increasing complexities in the financial system and the evolving nature of systemic risks. While the findings of the study may be valuable inputs in analyzing contagion risk in the Philippines, the determinants of contagion risks are not examined in this paper. Thus, exploration of contagion and its determinants could be a possible area for future research.

44. Banks are now allowed to tap cross-border funds as well to diversify away from traditional funding sources and towards international interbank markets (Fender and McGuire, 2010).

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