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Financial Dollarization: Evidence from a Survey on Branches of Cambodian Financial Institutions^a

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Abstract

We conducted a survey on Cambodian financial institutions and collected financial data at bank- and branch-level, in order to reveal the actual situation of dollarization in Cambodian financial institutions. We found that there were differences in shares of FX currency deposit and loans between commercial banks (CBs) and microfinance institutions (MFIs). MFIs are likely to have more local currency in their cash on hand, loans, deposits, and borrowings, while CBs rely mostly on FX currency in intermediation. Furthermore, although it is subtle, it can be observed that the share of local currency in deposits has increased over the period of 2009-2013 in the cases both of CBs and MFIs. It might suggest that there is the potential that local currency deposits can be facilitated. However, commercial banks did not allocate KHR funds, although they had large excess KHR funds in Phnom Penh. Moreover, FX currency shares in MFIs' loans have been increasing despite the increase of KHR currency in their deposits. Finally, we found that there were regional differences in dollarization of deposits and loans. In particular, branches in rural areas tend to extend more local currency loans than in Phnom Penh area.

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1. Introduction

Financial institutions, along with other economic agents such as households and enterprises, play a significant role in dollarization. Brown et al. (2014) investigated the loan-level data of a Bulgarian bank, and find that it is likely that foreign currency lending is a consequence of banks forcing firms to borrow in foreign currency, possibly due to an incentive to hedge against the risk of currency mismatch. Recent studies on banks' behaviors in foreign currency lending suggest that there might be heterogeneity in the banks' behavior, which comes from differences in funding sources or ownership structures (Brown et al., 2013). Furthermore, Brown et al. (2015) find that there are also regional differences in the extent of deposits and loan dollarization within a country, due to differences in regional inflation rates and other regional factors.

While several previous studies have investigated dollarization in the banking sector in Cambodia using those measures (Menon, 2008; Duma, 2011), no studies have been done on the behaviors of individual financial institutions in Cambodia, although banks' funding sources and target customers are different across types of financial institutions and banks' behaviors are different across institutional types.

In our study, we collected data from 15 main Cambodian financial institutions: 10 commercial banks (CBs) and 5 deposit-taking microfinance institutions (MDIs). In general, commercial banks emphasize profits and collect funds in the form of deposits, while MDIs collect funds by borrowing from other financial or non-financial institutions. In this paper, we investigate the currency compositions of banks' assets and liabilities, using financial data from banks' branches. In Cambodia, there have been no studies on foreign currency lending and deposits of financial institutions, even though Cambodia is one of the most dollarized economies. Because of this, we conducted a survey on headquarters and branches of 10 commercial banks and 5 microfinance institutions in 2014. In the survey, we collected information on currency compositions of balance sheets and income statements for both consolidated and branch-level disaggregated ones. Our study is the first study using individual bank and branch data to reveal how much banks lend in foreign currency and which factors may affect their behaviors in Cambodia.

As a result, we found that there were differences in the currency composition of loans and deposits among types of financial institutions and among regions. (1) We found that CBs rely much more on FX currency in their operations than MFIs. (2) However, the shares of local currency in deposits have been stable from the period of 2009 to 2013, despite recent rapid growths in the amounts of total deposits. (3) We found that financial institutions were likely to allocate excess funds (deposit amounts minus loan amounts) to branches that were short of funds. However, commercial banks did not allocate KHR funds, although they had large excesses of KHR funds in Phnom Penh. (4) In rural areas, shares of FX currency in loans and deposits were lower than Phnom Penh, although there were indications that shares of FX currency of loans have been increasing in rural areas during the period of study. (5) Shares of FX currency in MFI deposits have decreased in both rural and urban areas. This might be because recent improvements in financial inclusion have allowed people in rural areas, who are mainly using KHR in their daily transaction, to have access to bank deposits. Furthermore, We believe that these findings are helpful for policy-making toward de-dollarization in Cambodia and other countries which experience the same situations.

In the rest of our paper is structured as follows. We present the review of literature of dollarization in Cambodia, and briefly describe the institutional details of the Cambodian banking sector in the second and third sections, respectively. We show the data description used for analysis in the fourth section, and the results of our empirical analysis in the fifth section. In the sixth section, we draw policy implication and conclude.

2. Literature Review on Dollarization in Financial Systems

Some previous research has argued that hedging behaviors in currency mismatch and profit maximizing would be factors driving foreign currency lending in dollarized economy. Basso et al. (2010) examine aggregate credit dollarization for 24 transition countries over the period of 2000–2006. They find that countries in which banks have a higher share of foreign funding display a higher share of FX loans, meaning that dollarization could be the consequence of banks' adjustments of the currency composition between their

assets and liabilities. Similarly, using cross-country data, Lucas and Petrova (2008) found that sources of fund in term of deposit dollarization can impact foreign currency lending, while the foreign liability of banks has no relation to FX lending

Some previous studies find evidence that there is heterogeneity in banks' behaviors in foreign currency lending. In particular, the extent of foreign currency lending by banks seems to be dependent on banks ownership and accessibility of foreign borrowing. De Haas and Naaborg (2006) and De Haas and Van Lelyveld (2006, 2010) show that parent bank funding, typically denominated in FX currency, influences the credit growth of foreign subsidiaries. To the extent that subsidiaries do not swap these funds into local currency, access to parent bank funding may have a positive impact on FX lending. Degryse et al. (2011) provide evidence that FX lending in Poland is related to bank ownership, by examining individual Polish banks during the period from 1996–2006. They find that green-field foreign-owned banks provide more FX loans than domestic banks or foreign-owned banks. Brown and Da Haas's (2013) study on foreign banks and foreign currency lending in emerging Europe using bank-level data from 2001 to 2004, consisted of 95 foreign-owned banks and 98 domestic banks in 20 transition economies of Eastern Europe. They find that banks with more foreign currency shares in deposits tend to extend loans in foreign currency, regardless of the ownership structure.

In addition to the heterogeneity in banks' behaviors, Brown et al. (2015) suggest that there are regional differences in the extent of dollarization within a country. They employed data of aggregated amounts of deposits and loans by regions in Russia, and find that the regional inflation rates affect the extent of regional dollarization, as suggested by the theoretical argument by Ize and Levy-Yatagi (2003).

Currency choice in loans is bilateral. Both the lender and borrower sides possibly affect the choice. Using the loan application and granted loan data of one Bulgarian bank, Brown et al. (2014) investigate whether the supply side or demand side determine the currency choice in loans. The authors showed that banks' decision rather affects the choice of currency in corporate loans, since it is less risky and can mitigate the currency mismatch in bank asset and liability.

Even though Cambodia is one of the most dollarized economies, research on dollarization in the country is very limited, and there are no micro-level studies on financial institutions (Zamaroczy and Sa, 2002; Duma, 2011; Siregar and Chan, 2014). Zamaroczy and Sa (2002) empirically estimated the level of dollarization in the Cambodian economy using macro-level data. Duma (2011) did research on the cause and impact of Cambodian dollarization using macro data. She pointed out that despite macroeconomic and political stability, the level of dollarization keeps rising and surpasses the riel. She explained that there are two types of economy in Cambodia: the urban economy that is mostly dollar-based and has benefited a lot from the garment sector, tourism, FDI, and aid; and the rural economy that depends on agriculture and is riel-based. However, how banks' behaviors affect dollarization in Cambodia is still unclear.

Since Cambodia started to transform from a planned economy to a market-oriented one, a lot of foreign funds have flowed into the Cambodian banking sector in a variety of forms. Therefore, there may exist many types of financial institutions in terms of funding structures. Thus, bank behavior might be different from bank to bank. Furthermore, the low level of infrastructure development, especially for transportation, lead to the low integrity of regional markets. Therefore, it is likely that the dollarization could be different from region to region in Cambodia. Apart from the regional factors, the difference in branch network structures may also affect the extent of dollarization in bank deposits. In our study, we employ different types of data compared to the literature, namely branch-level financial statements of commercial banks and MFIs. We believe that our study provides useful facts to understand dollarization in the banking sector.

3. Trends and the Current Situation of the Cambodian Banking Sector

We briefly describe the institutional background of the Cambodian banking sector, and recent changes in the structure of their assets and liabilities. The Cambodian financial sector is composed of three financial institutions: commercial banks (CBs), specialized banks (SBs), and microfinance institutions. As of 2013, CBs had about 90 percent and MFIs had 10 percent of total assets in banking sector, while SBs had less than 1 percent. In particular, microfinance institutions can be divided into two entities: deposit-taking MFIs (MDIs)

and non-deposit-taking MFIs (MFIs). More than 90 percent of total assets of the microfinance sector are owned by MDIs.³

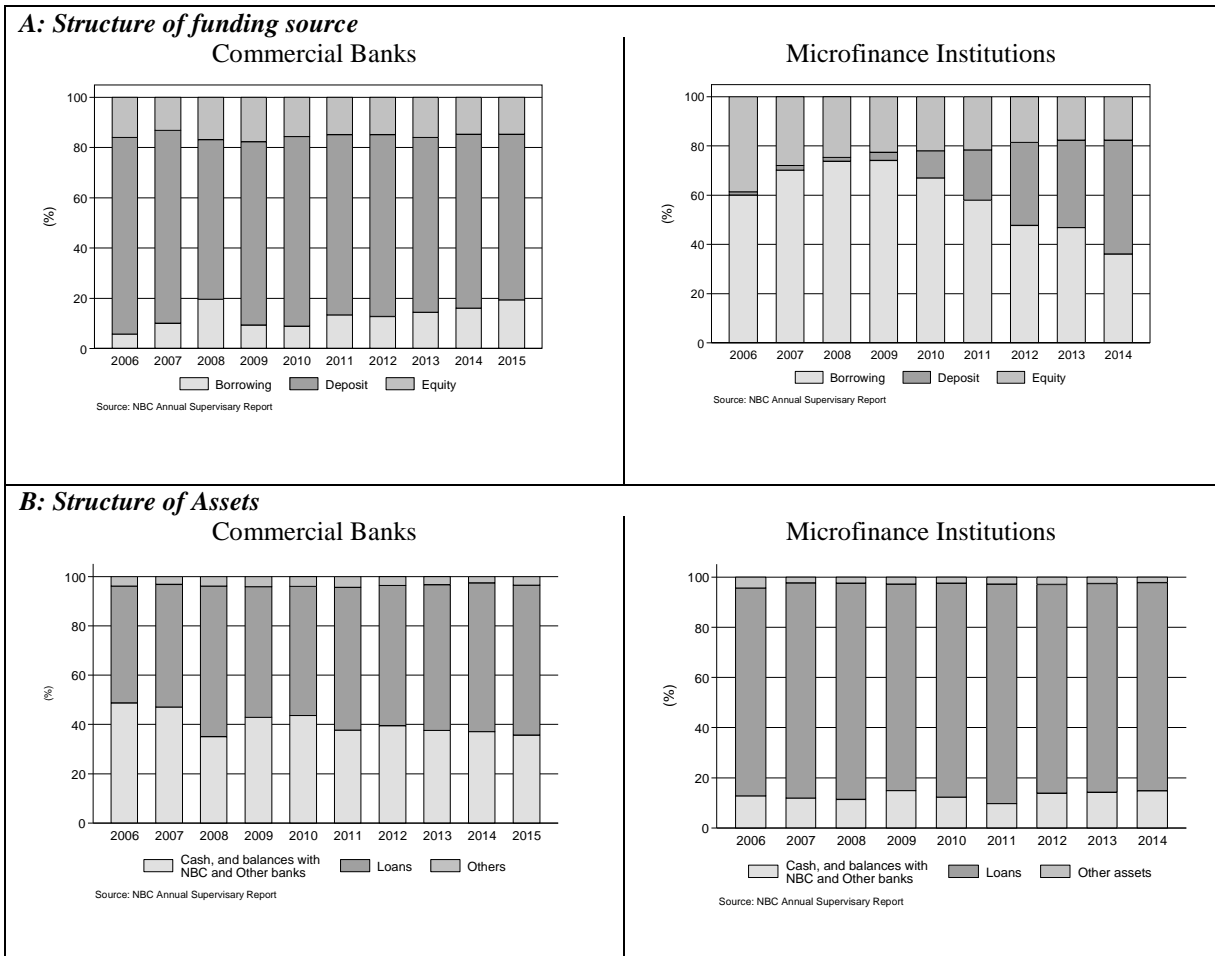
Figure 1 shows the recent trends in the structure of assets and liabilities for CBs and MDIs. Overall, MDIs have experienced significant changes in the composition of their liabilities from 2006 to 2013. The figures also suggest that the trends are different between CBs and MDIs. As is the case in other developing countries, deposits dominate the majority of funding sources for CBs, while borrowings are more important funding sources for MDIs. However, in recent years, deposits as percentages of total liabilities have been increasing in MDIs, suggesting that MDIs have transformed to a sustainability-oriented entities, with more emphasis on commercial funding sources such as deposits.

In addition, there are differences in the composition of assets between CBs and MDIs. CBs have high liquidity in their asset sides, which fluctuates from 35 to 50 percent over the period studied, while MDIs consistently keep liquidity assets of less than 20 percent over the period. Compared to MDIs, CBs are risk-averse and tend to keep massive liquidity in their assets. There are a lot of possible causes for this high liquidity in CBs, such as the absence of deposit insurance. However, it might also be because dollarization incurs additional risks on the operation of banks, as Deléchat et al. (2012) show through cross-country evidence. Since the lenders of last resort are unlikely to work under the dollarized economy, banks have to prepare for the entirety of liquidity shocks on their own. In addition, the low liquidity of MDIs might imply that MDIs are likely to take a risk when extending loans, as their goals are rather to extend loans to the poor, who are typically risky borrowers for banks because of large information asymmetry.

Previous studies have argued that the recent dollarization in Cambodia is not explained by currency substitution, since local currency deposits have been growing at the same pace as foreign currency deposits (Menon, 2008; Duma, 2011; Khou, 2012). This is currently still the case. The amounts and year-on-year growth rates of aggregated bank deposits by currencies are shown in Figure 2. Panel C reveals that the local currency deposits have been increasing rapidly along with foreign currency deposits, although the growth rates of local currency deposits are much more volatile than foreign currency deposits. Therefore, the current expansion of dollarization is not the consequence of distrust in the local currency, but is instead caused by the massive inflow of foreign currency.

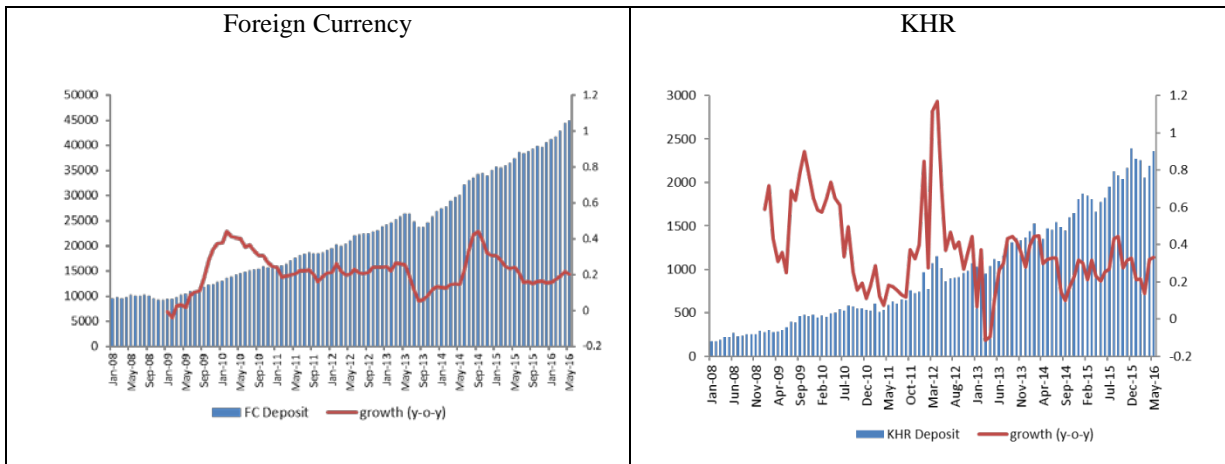
³ In this study, we only examine MDIs.

Figure 1: Recent Trends in Structures of Assets and Liabilities



Source: Data provided by National Bank of Cambodia, and Authors' calculation.

Figure 2: Amounts and Growth of Deposits by Currencies



4. Survey Design and Data Description

To understand the behavior of economic agents (banks and MDIs) in a dollarized market, we conducted a survey to collect financial statements both at the bank- and MDI-levels and at the branch-level in selected commercial banks and MDIs. We conducted a survey of 10 commercial banks and 5 microfinance deposit-taking institutions in April, 2015. Since it was difficult to collect data from all extant banks and MDIs in Cambodia due to the limitations on our resources for the survey, we selected the top 10 commercial banks and 5 MDIs in terms of both asset sizes and the number of branches. The managers of banks filled out and submitted two types of data entry formats: (1) consolidated financial statements, and (2) branch-level financial statements from the period from 2009 to 2013. Both types of data cover information of currencies in most of items of income statements and balance sheets.⁴

4.1 Consolidate Balance sheet

We collected the consolidated financial statements from 10 CBs and 5 MDIs. However, some banks did not provide us with consolidated financial statements. Eventually, there were statements from 7 CBs and 4 MDIs from 2009 to 2013 available to analyze their behaviors in FX currency lending and collecting FX currency deposits. We present the final sample used for our analysis in Table 1.

Table 1: Final Sample of consolidated financial statements

Name	Period of observations
ACLEDA Bank Plc	2009-2013
ANZ Royal Bank (Cambodia) Ltd	2009-2013
Advanced Bank of Asia Limited	N.A.
Bank for Investment and Development of Cambodia Public Bank	2009-2013
Canadia Bank Plc	N.A.
Foreign Trade Bank	2009-2013
Maybank (Cambodia) Plc	2009-2013
RHB Indochina Bank Limited	2009-2013
Union Commercial Bank Plc	N.A.
Amret	2009-2013
AMK Microfinance Institution Plc	N.A.
HATHA KAKSEKAR Limited	2009-2013
PRASAC Microfinance Institution	2009-2013
SATHAPANA Limited	2009-2013

4.2 Branch-level Balance sheet

In addition to the consolidated financial statements at the bank- and MDI-levels, we also collected branch-level financial statements from branches of banks. We prepared the same format for all financial institutions surveyed in our project, and asked the same 15 banks and MDIs to fill out our branch-level financial statements. Although some banks provided us data of all of their branches, others only provided us

⁴ The entry form of bank- and branch-level financial data used in the survey is available upon request.

with data from selected branches because of data availability.⁵ We found that there were some errors in reported branch-level financial statements, possibly because the forms of financial statements used in their operations are different from a bank to a bank. To analyze the banks' behaviors in lending and collecting deposits at the branch level, we selected samples that correctly reported at least the amounts of loans and deposits.

There are several cautions relating to sample selection biases. Firstly, we lack headquarters' financial statement, since headquarters only reported the consolidated financial statements at the bank-level. Secondly, we excluded several banks due to frequent errors and missing values. For example, since there were a lot of errors and missing values in the loan and deposit data of Canadia bank, we excluded Canadia bank. Likewise, we excluded ABA from our analysis of loan currencies since only 2 percent of ABA branches reported the currency composition of loans.⁶ Since UCB only provided us with data for the consolidated financial statements of all branches, we also excluded UCB. Thirdly, we excluded some branches that reported no loans or no deposits. Table 2 shows the final sample which we used in the analysis of bank loans, and Table 3 shows the final samples for deposits.⁷ Finally, since we did not collect the financial statements from all branches, the results of branch-level analyses could be different from the results of analysis on the consolidated financial statements. However, we expect that the branch-level analysis will not produce huge differences, since we collected a large sample of branch-level financial statements.

Table 2: Sample size for Analysis on Loans

Note: This table shows the number of branches of each bank used in analysis during the period from 2009-2013. Since there were a lot of errors in loan and deposit data from Canadia bank, we excluded Canadia bank. Since UCB only provided us with data from the headquarters, we also excluded UCB. Because some banks did not provide headquarters' data, we only included branches.

	Phnom		North-West	North-East	Central	South-	South-East	Total
	Penh	Siem Reap	Area	Area	Area	West Area	Area	
ACLEDA	64	24	22	15	91	41	70	327
ABA	0	5	0	0	5	5	0	15
BIDC	0	4	0	0	3	0	0	7
Campu	45	5	5	0	10	13	9	87
FTB	5	2	0	0	0	4	0	11
Maybank	37	5	1	0	3	7	0	53
RHB	21	4	0	0	4	6	0	35
AMK	9	5	15	20	31	16	25	121
AMRET	12	5	3	1	59	9	53	142
HKT	10	14	23	3	42	19	36	147
PRASAC	12	8	20	16	61	36	57	210
SATHAPANA	13	10	5	7	53	17	30	135
Total	228	91	94	62	362	173	280	1,290

⁵ Some of banks categorize their branch network into several levels, and aggregated branch-level financial records for branches below a certain level.

⁶ We retained ABA in the analysis on loans.

⁷ The sample sizes are shown by regions. In the analysis section, we investigate the regional difference of dollarization, and we divided the sample by regions. For the sake of simplicity, we categorized samples into 7 regions according to the geographical characteristics and types of main economic activities.

Table 3: Sample size for Analysis on Deposits

Note: This table shows the number of branches of each bank used in analysis during the period from 2009-2013. Since there were a lot of errors in loan and deposit data from Canadia bank, we excluded Canadia bank. Since UCB only provided us with data from the headquarters, we also excluded UBC. Because some banks did not provide headquarters' data, we only included branches.

	Phnom		North-west Area	North-East Area	Central Area	South- West Area	South-East Area	Total
	Penh	Siem Reap						
ACLEDA	64	24	22	15	91	41	70	327
ABA	0	5	0	0	5	5	0	15
BIDC	0	4	0	0	0	0	0	4
Campu	46	5	5	0	10	13	9	88
FTB	5	0	0	0	0	4	0	9
Maybank	41	5	1	0	3	9	0	59
RHB	25	4	0	0	4	8	0	41
AMK	10	5	15	20	31	16	25	122
AMRET	12	5	3	1	59	9	53	142
HKT	10	14	23	3	42	19	36	147
PRASAC	13	8	20	16	64	36	57	214
SATHAPANA	13	10	5	7	53	17	29	134
Total	239	89	94	62	362	177	279	1,302

5. Empirical Analysis

5.1 Trend of dollarization by types of financial institutions

First of all, using the consolidated financial statement by banks, we investigate the currency used in total loans, deposits, and borrowings by types of financial institutions. Figure 3 shows the amounts of loans, deposits, and borrowings by currencies. On the whole, we found that growth rates of deposits, loans, and borrowings were high both for CBs and MFIs during the time period. More specifically, we found that growth in loans, deposits, and borrowings were higher in MFIs than CBs, showing the recent flourishing of the Cambodian MDI sector. Meanwhile, the total amount of loans and deposits is still much higher in CBs than in MDIs. In CBs, the growth of loans and deposits was higher in FX currency than in local currency.

Figure 5 shows the currency composition of assets and liabilities. In addition to loans, deposits, and borrowings, we collected information on cash holdings and balances in other banks by currencies. On the whole, we found that MDIs have more KHR currency in their balance sheets than CBs do. For example, MDIs keep around 20 percent of total loans, deposits, and borrowings denominated in KHR as of 2013, while CBs kept less than 10 percent in KHR.

We also found that shares of FX currency in MDI loans have been increasing over the period, suggesting that MDIs have shifted toward providing more FX currency loans and away from providing local currency loans over the period. Presumably, this could be the consequence of commercialization in MDIs. Specifically, MDIs might start to provide FX currency to make more profits.

In line with the figure illustrated by aggregated data in section 3, despite the recent rapid growth in deposits, KHR deposits as a share of total deposits have been stable both in CBs and MDIs. As we discussed earlier, this suggests that demands for local currency deposits have also increased at the same rate as FX currency deposits have in this period.

However, shares of FX currency in loans from MDIs fell from around 40 percent in 2009 to 20 percent in 2013, reaching almost the same level as shares of FX currency in deposits and borrowings. It can be interpreted that MDIs changed their attitude toward the risk of currency mismatch on their balance sheets, and as a result started to decrease the risks by matching the composition of loans to those of deposits and borrowings.

Figure 3: Changes in Currency Compositions and Amounts of Loans, Deposits, and Borrowings

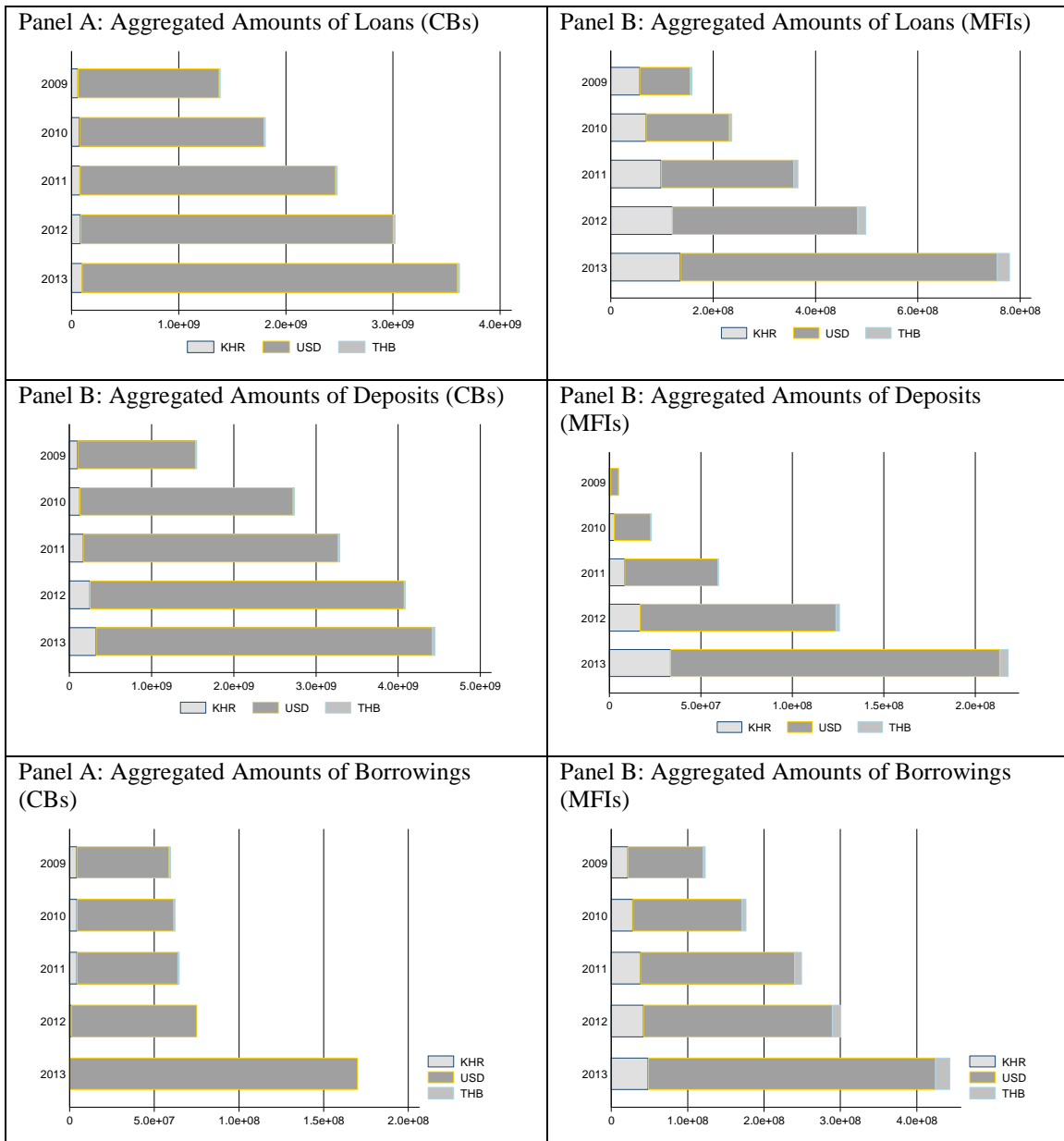
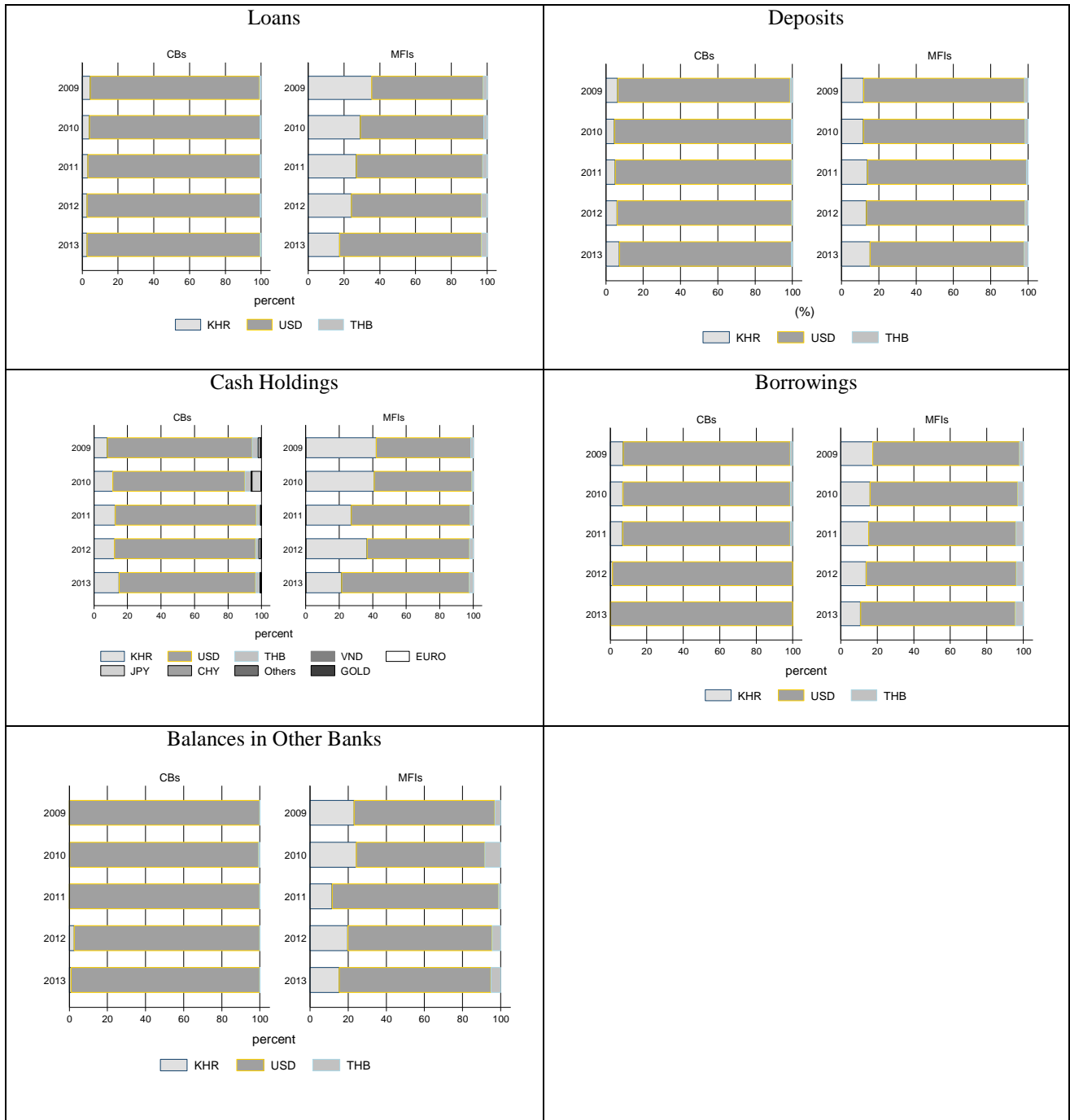


Figure 4: Currency Compositions of Assets and Liabilities



5.2 Branch-level Analysis on Financial Dollarization

5.2.1. Regional Differences and Bank Behaviors in Deposits and Loans

In this section, we analyze branch-level financial data to investigate the regional differences in the dollarization of banks' and MDIs' deposits and loans. As argued by Duma (2011), there may be differences in industrial structures between urban and rural areas. The urban economy is expected to be US dollar-based; a lot of companies make profits from services relating to tourism, and there are massive capital inflows through foreign direct investments and aid. Furthermore, the garments sector flourishes in urban areas, contributing through exports to the recent rapid growth. On the other hand, the rural areas, where the agricultural sector largely contributes to the regional growth, are expected to be a riel-based economy. Accordingly, there are possibly differences in the extent of dollarization between urban and rural areas.

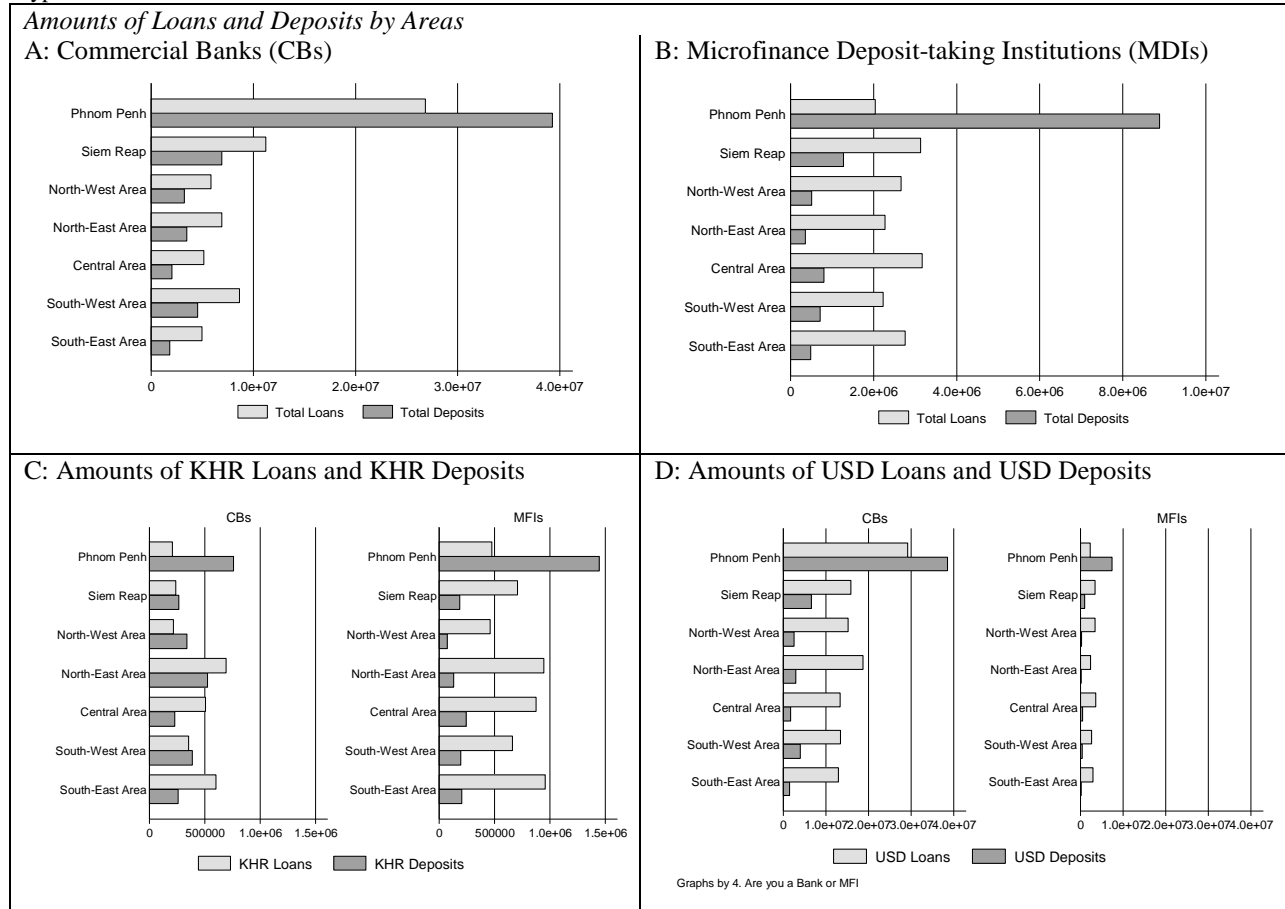
First of all, it is useful to show the general trend of lending and deposits. Recent empirical studies found that nation-wide banks are likely to reallocate the funds over the country (Morgan et al., 2004; Imai and Takarabe, 2011; Cremer et al., 2011). We investigated how the Cambodian banks reallocate funds over the country. In Table 4, we present the average of total amounts of loans and deposits per branch by regions. To investigate the regional difference in dollarization, we divided sample into seven regions: (1) Phnom Penh, (2) Siem Reap, (3) North-East Area, (4) North-West Area, (5) Central Area, (6) South-West Area, and (7) South-East Area.

Interestingly, we found that there was a clear tendency in fund allocations in both CBs and MDIs. We found that, in urban areas, the amounts of loans were smaller than those of deposits, while the opposite was true in rural areas. For example, the amounts of loans were smaller than that of deposits in Phnom Penh, while amounts of loans were larger than those of deposits in other areas. Although the difference in amounts between deposits and loans in the Phnom Penh area does not completely compensate for the total difference in other rural areas, the difference is due to the exclusion of the headquarters' financial data from the analysis. It suggests that banks collect funds mostly in urban areas, where wealthier people more likely live, and banks mobilize the rest of funds to rural areas, where firms are mostly small- and medium-sized and face shortages of funds. It may also imply that the investment opportunity is currently higher in rural areas than urban areas in Cambodia. Furthermore, it is noteworthy that the results seem specific to the Cambodian banking sector, compared to other neighboring countries. For example, in the Philippines, the financial institutions tend to collect funds in rural areas and extend loans mainly in urban areas, due to the low business opportunities in rural areas.

Next, we looked into trends of loan provision and deposits by currencies. Panel C and Panel D of Figure 4 represent the amounts of loans and deposits per branch in each region by KHR and FX currencies. We found that distributions of USD loans and deposits per branch show the same trends as those of gross loans and deposits, while the distributions of KHR loans and deposits per branch show different results. This is particularly true for CBs, which collect KHR deposits in Phnom Penh, but don't allocate excess KHR funds to rural areas. Furthermore, in some areas, the amounts of KHR loans are less than the amounts of KHR deposits, and even though the amounts of KHR loans in other areas exceed the amounts of KHR deposits, the differences are small. The results suggest that CBs are not active in providing KHR loans, and they do not internally allocate the excess KHR funds to rural areas. In the meantime, the amounts of KHR loans from MDIs are more than amounts of KHR deposits, and the difference between the amounts of loans and deposits are large. Thus, the results suggest that MDIs actively collect KHR funds in developed areas, and allocate those funds to rural areas.

Figure 4: Trends of Loans and Deposits

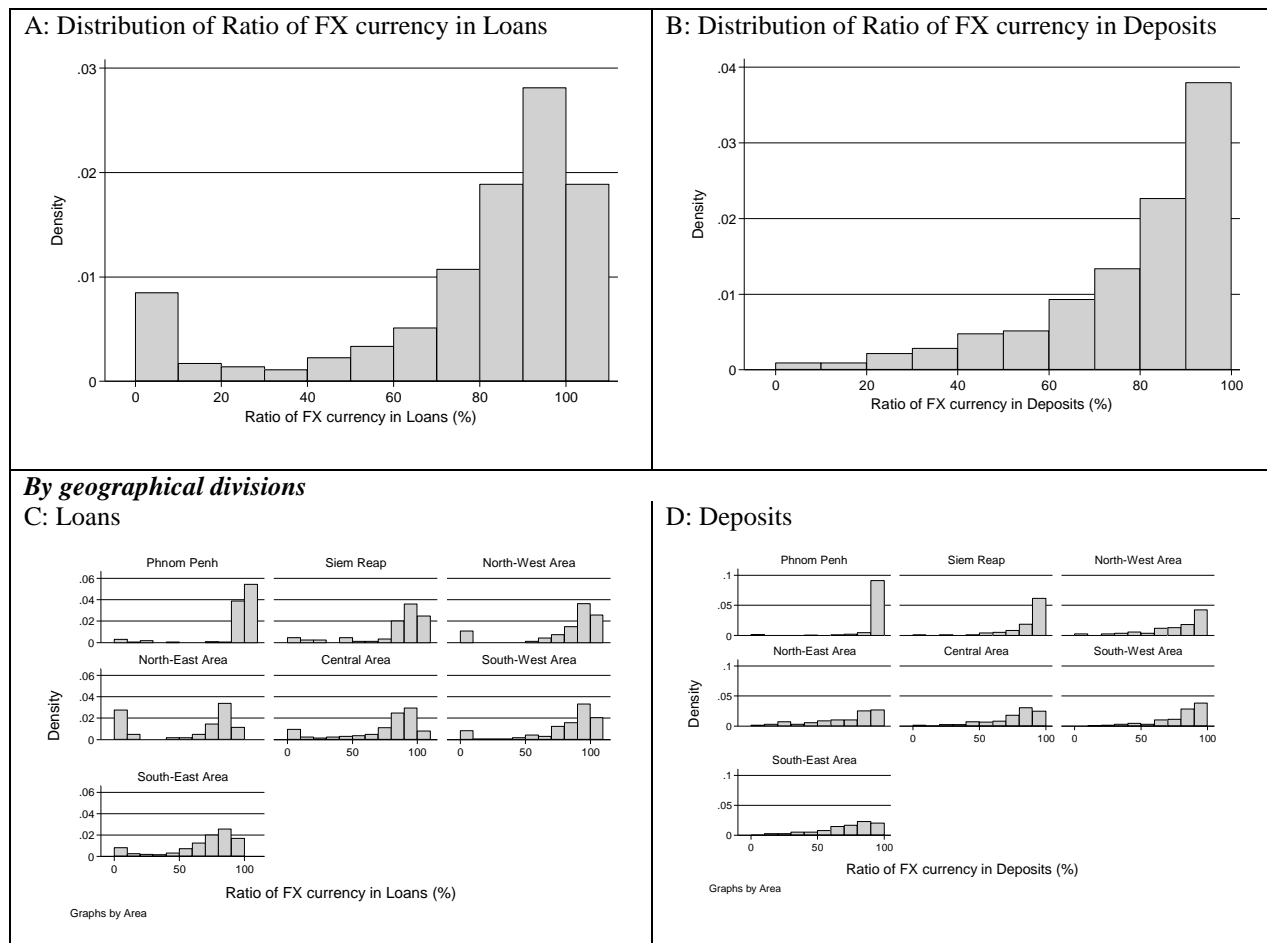
Note: figures show the average amounts of loans and deposits per branches by regions, as of 2013. We calculated the averages by types of financial institutions: CBs and MDIs.



Next, we investigate the distribution of shares of FX currency in deposits and loans by areas (Figure 5). We find that the distributions of FX currency shares are biased and concentrated on 100 percent both in deposits and loans, suggesting that most branches mainly deal with FX currencies rather than the local currency (Panel A and Panel B). However, it can be observed that the distribution of FX currency shares in loans also concentrated around 0 percent, suggesting that some branches extended loans largely in the local currency (Panel A), while it cannot be observed in deposits. Therefore, even though the Cambodian banking sector is highly dollarized when looking at the aggregated measure, such as the ratio of FCD to M2 and the ratio of FCD to total deposits, some branches of Cambodian banks mainly extend local currency loans. The difference in the shape of distribution between loans and deposits might be explained by the fact that in the rural areas most of MDIs aims to extend loans rather than collect deposits. In other words, MDIs as well as CBs tend to collect deposits in urban areas.

In Panel C and Panel D, we further investigated the geographical differences in deposit and loan dollarization by regions. We divided the sample into seven regions according to geographical location and main economic activities. We find that there were differences in the shape of distributions between regions. Although statistical significance is not clear here, the distributions of the FX currency share both in loans and deposits in the Phnom Penh area seems to concentrate around 100 percent, while in the other areas the distributions are more flat both in deposits and loans, and there is also the concentration around 0 percent. The results might imply that there are high riel demands in rural areas relative to the Phnom Penh area.

Figure 5: Distributions of Ratio of FX currency in Loans and Deposits



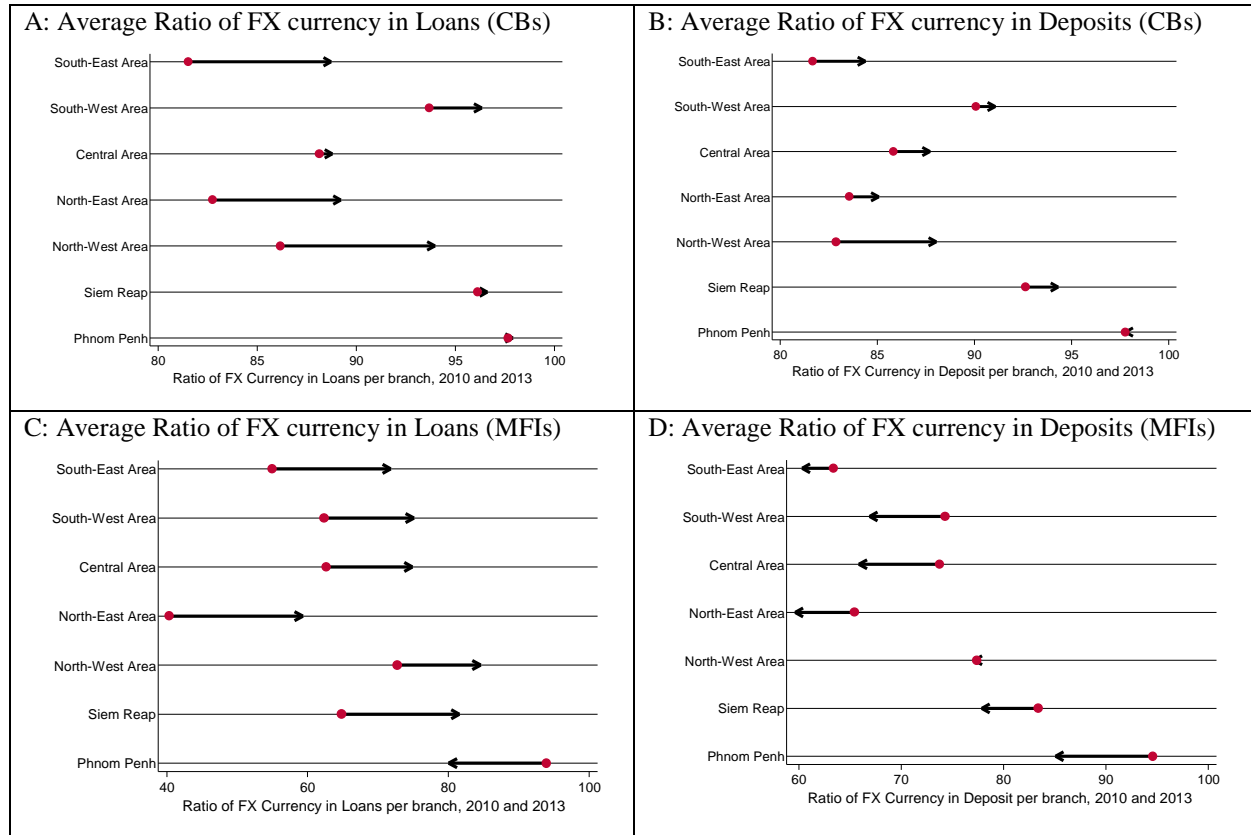
In Figure 6, we present the historical changes in regional dollarization in deposits and loans between 2010 and 2013 by types of banks. The small circles represent the ratios of FX currency in total deposits per branch in 2010, and the head of the arrows represent those in 2013. We find that the recent changes in the shares of FX currency in deposits and loans differed between CBs and MDIs, especially on the deposit side. For CBs, shares of FX currency in both deposits and loans have increased from 2010 to 2013. It might suggest that, for CBs, dollarization in deposits and loans have constantly increased both in rural and urban areas. In the meantime, for MDIs, shares of FX currency in deposits have decreased, while those of loans have steadily increased as loan shares of CBs did.

The results depicted in Figure 6 may reflect the recent commercialization of MDIs. As was discussed in an earlier section, in recent years MDIs started to collect deposits from the public, and have developed a nationwide network in Cambodia. Therefore, increases in financial inclusion might facilitate local currency deposits in rural areas. In other words, people in rural areas, who did not have access to bank deposits due to their geographic distance from banks, might in recent years have gained access to bank deposits.

However, the shares of FX currency in MDIs' loans have increased except for in Phnom Penh. This might suggest that commercialization has a negative impact on local currency loans, in contrast to deposits. The dollarization of deposits has increased its share of total MDIs' deposits as we have already seen, even though local currency loans by MDIs have increased in rural areas. Finally, the Cambodian financial institutions may reallocate excess funds from urban areas to rural areas.

Figure 6: Trend of Dollarization in 2010 and 2013

Note: Figures below show the changes in shares of FX currency between 2010 and 2013. The small circles represent the ratios of FX currency in total deposits per branch in 2010, and the heads of arrows represent those in 2013.

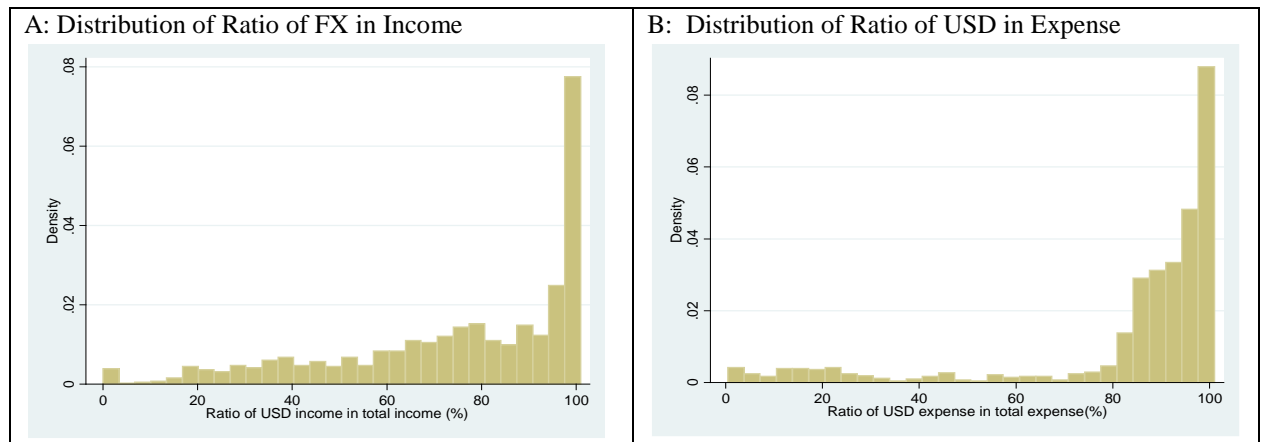


5.2.2 Currency Compositions of Revenues and Expenditures

We investigated the currency composition of revenues and expenditures using branch-level income statements from CBs and MDIs. Although currency compositions of interest incomes are proportionate to the currency composition of loans, revenues of banks include non-interest income, such as commission fees and profits from exchange rate business. Expenditures also include the personnel or other operational costs, apart from interest expenses on deposits. Therefore, the currency usage of revenues and expenditures could show different figures from what was revealed by the balance sheet data. In Figure 7, we present a ratio of FX currency generated on the income statement.

Figure 7 shows the distributions of ratios of FX currency in revenues and expenditures of branches in the observed period from 2009 to 2013. In panel A of Figure 7, the distributions of ratios of FX income concentrated at 100 percent, in line with the results of analysis on balance sheets. Probably because they generate more income in FX currency, they also expend more in FX. The distributions of ratios of FX expenditures concentrated on the right-hand side, reflecting that they spent mostly in FX currency.

Figure 7: Distribution of ratio of FX currency in income



We further investigated revenues and expenditures from various aspects. Figures 8 and 9 show the distributions of the ratios of FX currency by areas, years, and types of financial institutions. When the distribution was divided by areas, most of the ratio of FX revenues concentrated on the right-hand side, in particular in Phnom Penh and Siem Reap, while the distributions are lower and flat in other areas, especially in the Southeast Area (Panel A). Furthermore, we found that CBs tended to generate more income in FX than MDIs (Panel C and Panel D of Figure 9).

Figure 10 shows the distributions of the ratios of FX in expenditure of branches by areas, years, and types of financial institutions. It revealed that CBs used more FX in their expenditures than MDIs did (Panel C and Panel D in Figure 10).

Figure 8: Distribution of ratio of FX currency in income

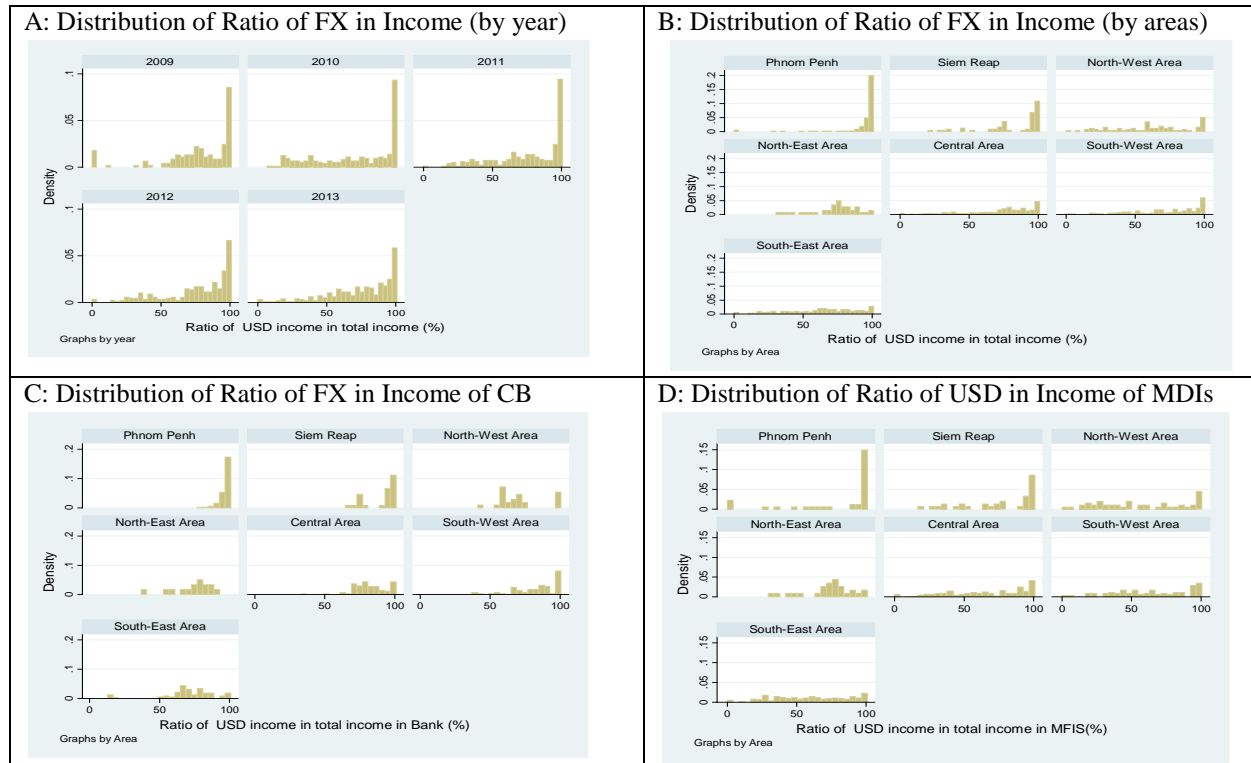


Figure 9: Distribution of ratio of FX currency in expense

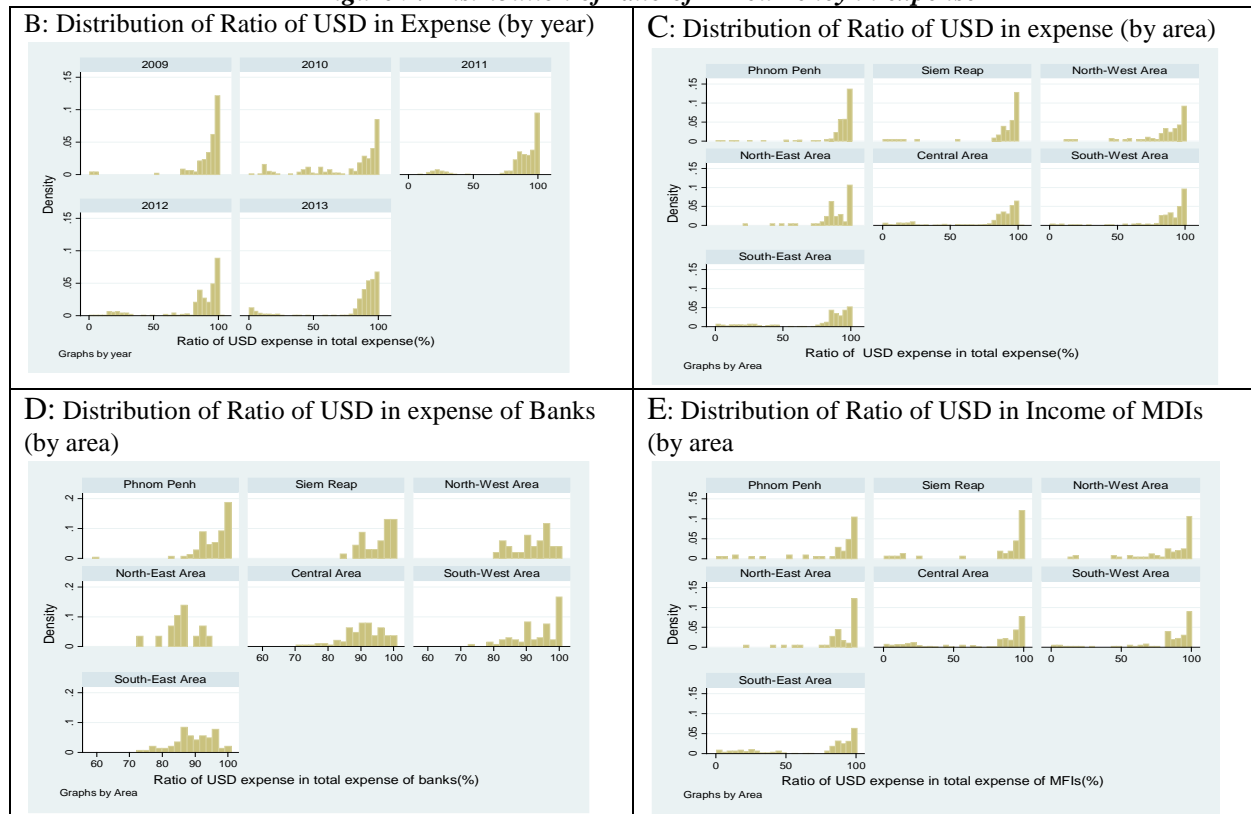
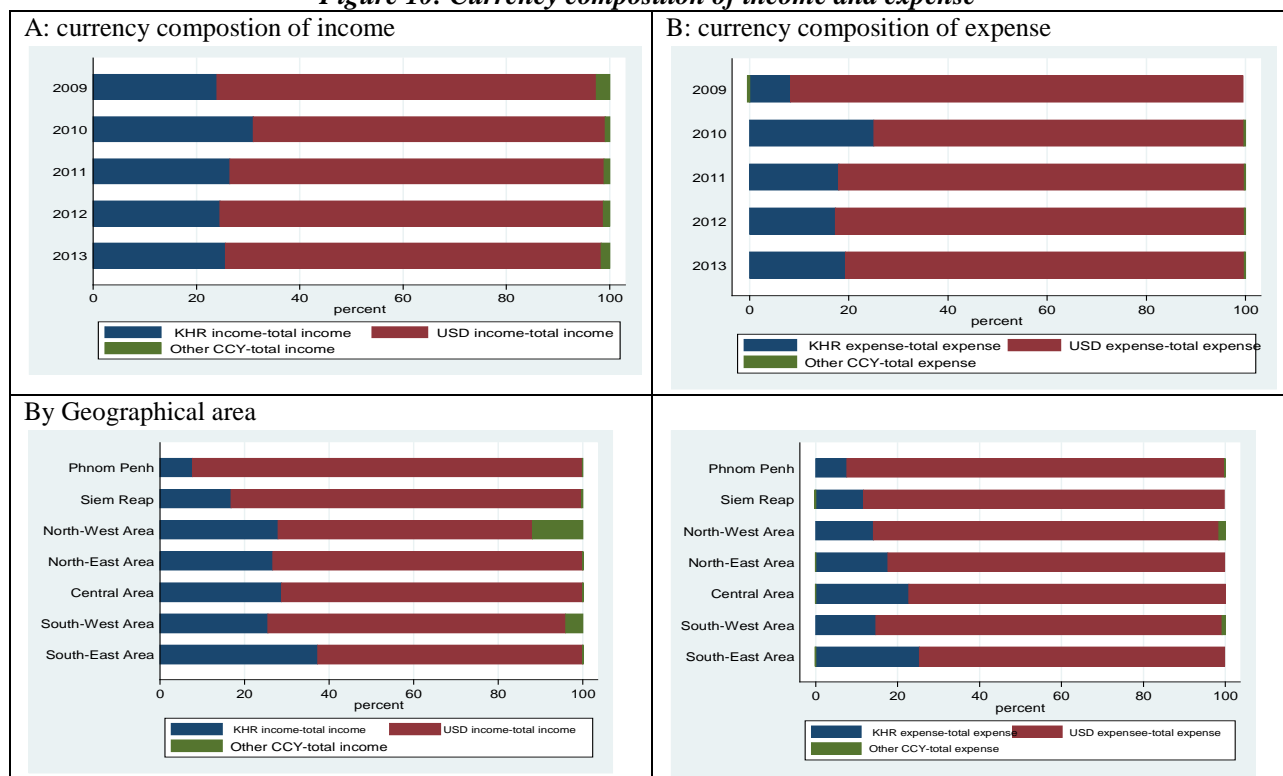


Figure 11 presents the average currency compositions in revenues and expenditures per branch. Panel A and Panel B show the historical changes in currency compositions of CBs and MDIs. It was revealed that Cambodian financial institutions were likely to spend more in FX than they generated (Panel A and Panel B).

Panel C and Panel D of Figure 11 show the geographical differences in currency composition of revenues and expenditures. Phnom Penh shows high dollarization, while the South-East Area shows a lower level of dollarization in their revenues and expenditures. Interestingly, we found that branches in the North-West and South-West Areas generated income in the local currency THB, and VND. Also of interest, CB branches in the North-East and South-East Areas generated more income in KHR compared to other areas. On the expenditure side, bank branches used USD almost 95 percent of the time (Panel B). In addition, the usages of other foreign currencies are smaller in expenditures than in revenues. The results reveal that banks do not use THB and VND in expenditures, even if they receive those currencies.

Figure 10: Currency composition of income and expense



We next investigated the differences in currency compositions of revenues and expenditures per branch between CBs and MDIs. Figure 11 shows the results for CBs and Figure 12 for MDIs. In Panel A and Panel B, we found that there was a clear trend in the historical changes of currency compositions of revenues and expenditures. KHR shares in revenues and expenditures have decreased over the observed period. Panel C and Panel D of Figure 11 depict the currency compositions of aggregated income of CBs and confirm that CBs have increased their income in USD and are highly dollarized in Phnom Penh and Siem Reap.

Figure 12 shows currency composition in aggregate revenues and expenditures of MDIs. The result showed that 30 to 40 percent of income is generated in KHR, especially in the South-East Area. It revealed that MDIs rely more on KHR in their operations. In contrast to CBs, there are no clear trends in the historical

changes of average currency composition of revenues and expenditures for MDIs. In 2010, the ratios of KHR currency were high, while they were low in the other periods.

Similar to CBs, MDI branches in the North-West and South-West Areas generated revenues in other currencies, such as THB or VND (Panel A). On the whole, the expenditure sides are more dollarized than the revenue sides in both CBs and MDIs.

Figure 11: Currency composition of income and expense of CBs

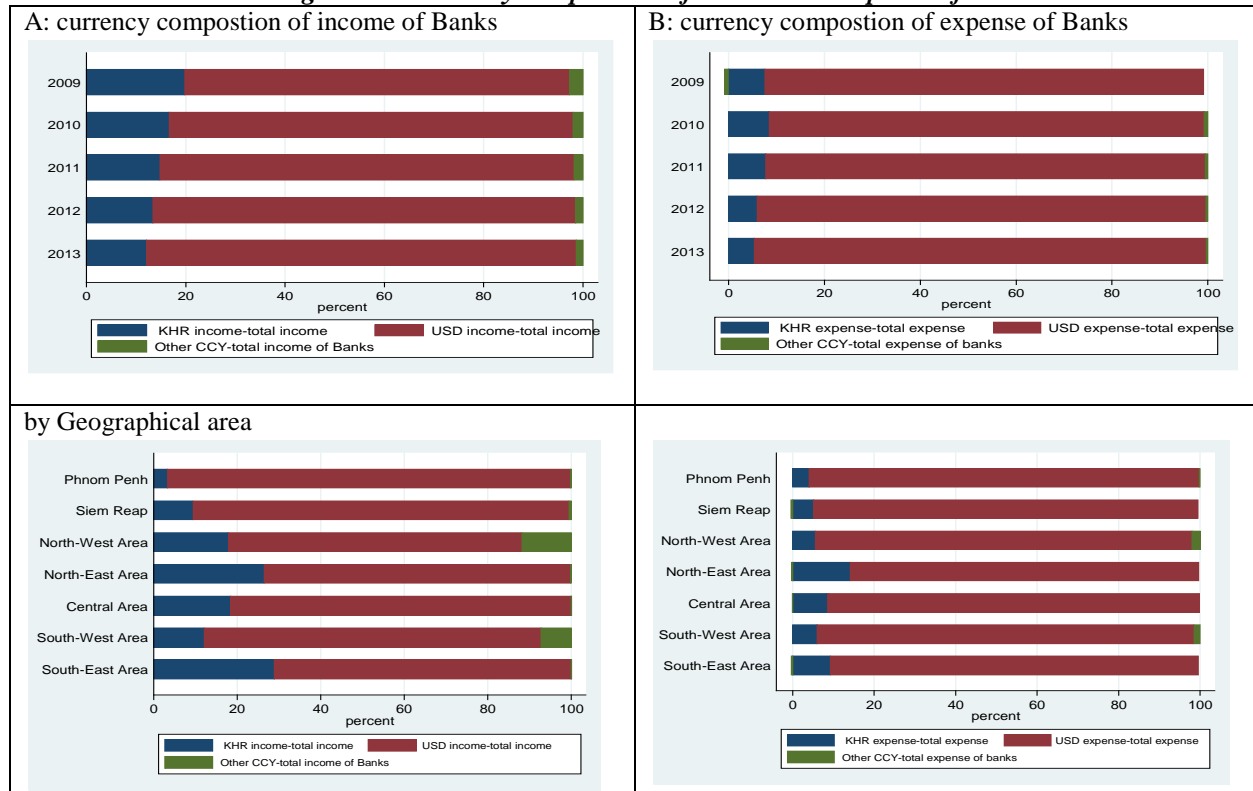
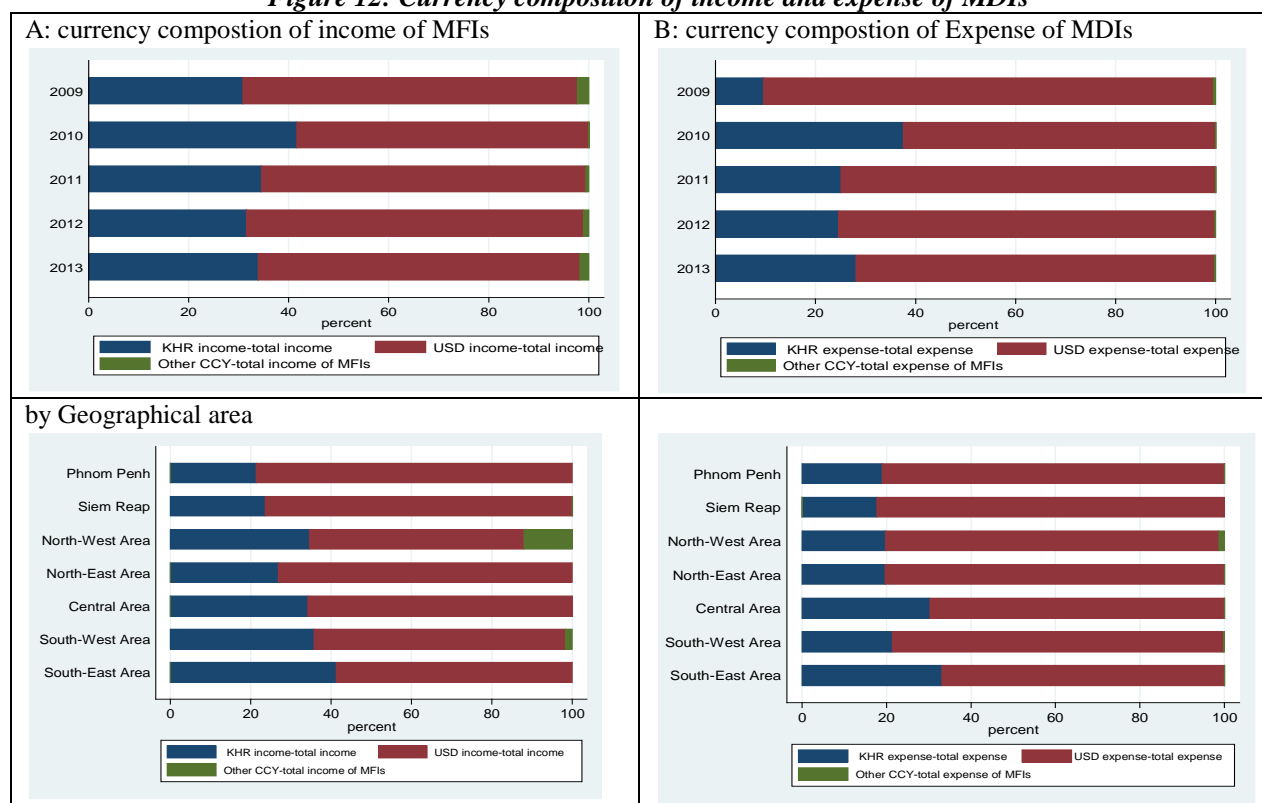


Figure 12: Currency composition of income and expense of MDIs



6. Conclusion and Policy Implications

The dollarization of the Cambodian financial sector has been referred to as extreme, with about 95 percent of foreign currency deposits (loans) in total deposits (loans) in the entire banking sector, and 85 percent of foreign currency deposits to M2 as of 2013. Although there have been several previous studies which investigated dollarization and which argued the advantages and disadvantages of the dollarization in Cambodia, there have been no studies that employed individual-bank-level data for Cambodian dollarization. As a result, the actual situation across sectors and regions has been unclear. As the previous literature points out, there might be heterogeneity in banks' behaviors, and also differences in economic activities among regions.

The key to better understanding of dollarization is to collect comprehensive data on a sector basis. In order to develop our understanding of the Cambodian dollarization, we conducted a survey of financial institutions in Cambodia. In the survey, we collected financial data from branches of financial institutions, which allowed us to ascertain the exact amounts of financial assets and debts by currency in the financial institutions both at bank- and branch-levels. We collected unique data from 15 financial institutions spanning the period from 2009-2013. Our study is the first study to reveal the actual situation of Cambodian financial dollarization. We believe that our findings can be useful for making policies to achieve de-dollarization, and the stabilization and facilitation of financial development.

Our main findings are as follows. First, we found that CBs rely much more on FX currencies in their operations than MDIs do. However, the shares of the local currency in deposits have been stable in the period from 2009 to 2013, despite recent rapid growth in the amounts of total deposits. Second, we found that

financial institutions were likely to allocate excess funds (deposit amounts minus loan amounts) to branches that were short of funds. Meanwhile, commercial banks did not allocate KHR funds, although they had a large excess of KHR funds in Phnom Penh. Third, in rural areas, shares of FX currency in loans and deposits were lower than in Phnom Penh, although there were indications that shares of FX currency in loans have been increasing in rural areas in the period. Forth, shares of FX currency in MDI deposits have decreased in both rural and urban areas. It might be because recent improvements in financial inclusion have allowed people in rural areas, who mainly use KHR in their daily transactions, to have access to bank deposits. Furthermore, from the perception survey, we found the possibility that financial institutions pass the exchange rate risks onto their borrowers.

These findings can lead to several important implications for policy-making regarding de-dollarization and financial stability. Firstly, the government should facilitate the allocation of KHR funds for commercial banks (CBs), to promote KHR loan provisions. We found that financial institutions have larger amounts of deposits than loans in Phnom Penh, and smaller amounts of deposits than loans in other areas, reflecting that financial institutions collect funds in developed areas and allocate excess funds to rural areas. However, we found that, even though they have excess KHR deposits in Phnom Penh, the amounts of KHR deposits are larger than or the same as KHR loans in rural areas for CBs. This suggests that CBs are not actively engaged in the fund allocation of KHR. In the meantime, MDIs are actively engaged in both KHR and FX fund allocation across the country. For some reason, CBs are reluctant to extend excess KHR funds from urban areas to rural areas. Since KHR is commonly used especially in rural areas, and there seems high demand for KHR, it is effective to promote KHR loans by facilitating the transfer of excess KHR funds from urban areas to rural areas.

Secondly, financial inclusion also help promote KHR deposits. In line with recent arguments by Menon (2008) and Duma (2011), local currency deposits have increased at the same pace as FX deposits, while the growth of local currency deposits is higher in rural areas, and KHR loans and deposits are more common in rural areas. Especially for MDIs, the ratio of KHR deposits have increased across the regions over the period, probably because their branch network penetrated even in rural areas, and recent progress in financial inclusion allowed the poor to access deposits. Therefore, in order to achieve de-dollarization via market mechanisms, facilitating the fund collection of financial institutions in rural areas can be a feasible strategy, which would likely lead to an increase in the KHR shares in deposits and facilitate the provision of local currency loans. For example, by facilitating financial institutions to expand their branch networks, the government can promote the provision of deposit services to rural areas, which may increase KHR deposits.

Thirdly, introducing hedging instruments against the currency mismatch risks for CBs and MDIs is urgent to stop the recent rapid increase in the provision of FX loans. Even though the shares of KHR deposits out of total deposits has been increasing rapidly over the period, the provisions of FX loans and the shares of FX loans out of total loans have risen in CBs and MDIs. In particular, the increase in shares of FX loans are notable in MDIs. This might reflect that MDIs became risk-averse after starting to collect commercial funding sources, and have been trying to reduce the risks of currency mismatch by increasing shares of FX currency in loans to the shares of FX currency in deposits. As of 2009, shares of KHR in MDI loans exceeded the shares of FX currency in MDI deposits and borrowings, and afterward the gap between shares of KHR of MDI loans and MDI deposits has decreased over the period (Figure 5). This might imply that MDIs tended to extend KHR loans in response to the local demand for KHR loans. However, it is a natural response for risk-averse MDIs to reduce currency risks against the large shares of FX deposits because they need to improve their resilience to collect deposits from the public. Accordingly, it is expected that MDIs will continue to increase the provision of FX loans over the next few years at the same pace, although it may be beneficial in terms of resilience of bank managements. Thus, if policy measures are to be taken to reduce FX loans, some financial instruments would be required to offset the currency mismatch risks on MDIs' balance sheets. Given the large branch networks of MDIs and the recent expansion of the entire microfinance sector, the MDIs can be the good drivers to promote the local currency loans and deposits to rural areas.

However, there are limitations on our study. In the data we used, there are errors in deposits and loans which possibly stem from the data collection process. Since the format to collect data was different across some of CBs and MDIs, some financial institutions failed to complete the survey correctly. Our sample of financial institutions was reduced to 11 for consolidated financial statements and 12 for branch-level financial

statements. In the future study, collecting data from more financial institutions and increasing the quality of data by reducing errors will be required for better understanding of dollarization.

Moreover, investigating a causal relationship of financial dollarization is still one of the main challenges of our study. Whether regional demand or banks drive FX currency deposits/loans is still unclear, and the results could be a mixture of both effects. Further investigation is also needed into the determinants of the growth of local currency deposits and loans using econometric models.

Reference

- Brown, M., Ongena, S., & Yeşin, P. (2011). Foreign currency borrowing by small firms in the transition economies. *Journal of Financial Intermediation*, 20(3), 285-302.
- Brown, M., & De Haas, R. (2012). Foreign banks and foreign currency lending in emerging Europe. *Economic Policy*, 27(69), 57-98.
- Brown, M., Kirschenmann, K., & Ongena, S. (2014). Bank funding, securitization, and loan terms: Evidence from foreign currency lending. *Journal of Money, Credit and Banking*, 46(7), 1501-1534.
- Brown, M., & Stix, H. (2014). The euroization of bank deposits in Eastern Europe. *Economic Policy*, eiu002.
- Brown, M., & De Haas, R. (2015). *Regional Inflation and Financial Dollarization (No. 22)*. Institute of Economic Research, Hitotsubashi University.
- Cremers, K. M., Huang, R., & Sautner, Z. (2010). Internal capital markets and corporate politics in a banking group. *Review of Financial Studies*, hhq121.
- De Zamaróczy, M., & Sa, S. (2002). Macroeconomic adjustment in a highly dollarized economy: The case of Cambodia. *IMF Working Paper*, No. 02/92.
- Duma, N. (2011). *Dollarization in Cambodia: causes and policy implications*. IMF Working Papers, 1-25.
- Delechat, C., Arbelaez, C. H., Muthoora, M. P. S., & Vtyurina, S. (2012). *The determinants of banks' liquidity buffers in central America (No. 12-301)*. International Monetary Fund.
- Degryse, H., O. Havrylchyk, E. Jurzyk and S. Kozak (2011). Foreign bank entry, credit allocation, and lending rates in emerging markets: empirical evidence from Poland. *Journal of Banking and Finance*.
- Fidrmuc, J., Hake, M., & Stix, H. (2013). Households' foreign currency borrowing in Central and Eastern Europe. *Journal of Banking & Finance*, 37(6), 1880-1897.
- Menon, J. (2008). Cambodia's Persistent Dollarization: Causes and Policy Options. *ASEAN Economic Bulletin*, 25(2), 228-37.
- Ongena, S., & Schindele, I. (2016). In lands of foreign currency credit, bank lending channels run through?. *CFS Working Paper*, No. 474.
- Siregar, Y.R. & Chan, N. (2014). *Factors behind Foreign Currency Holding by Household in Cambodia*. Crawford School of Public Policy.