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Measuring Interregional Fund Flows in a Dollarized Economy: Evidence from Branch-level Data of Deposits and Loans in Cambodia

Daiju Aiba[*†‡] and Vithyea You[†]

Abstract

Partial dollarization is a prevailing phenomenon in the banking sectors of many developing countries. However, there is still a lack of evidence on how dollarization expands in a country through the banking sector, which is generally comprised of a complex network of multiple bank branches. This paper aims to empirically examine the interregional capital flows within the complex bank branch networks using branch-level deposit and loan data from Cambodia, a nation characterized by the coexistence of multiple currencies within its financial system. To quantify the interregional fund flow, we further develop an empirical approach originally proposed by Uesugi et al. (2022) to suit the specific contextual realities of the banking sector in developing countries. Using our modified approach, we describe the pattern of interregional fund flows by currencies in Cambodia, and examine the difference in the pattern of interregional fund flows between currencies. In, addition, we illustrate how the pattern has evolved from 2013 to 2017. The findings show that a significant proportion of lending in all the provincial regions was covered by excess funds collected through deposits in Phnom Penh and through wholesale funding and/or funding from parent companies; the trend is the same both for US dollars and Khmer Riel. However, while banks do not actively reallocate excess funds in Khmer Riel in comparison to US dollars, the number of deposits in Khmer Riel has increased over the years. Moreover, it is observed that the interregional fund flows between some provincial areas in Khmer Riel are opposite to those of US dollars. This means that there were regional differences in demand for loans and deposits between currencies. Overall, the study provides insights into the patterns and dynamics of interregional fund flows in Cambodia, emphasizing the importance of understanding currency-specific trends and the potential for promoting local currency and financial inclusion.

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1.Introduction

Partial dollarization is a prevailing phenomenon in the banking sectors of many developing countries, with a significant reliance on foreign currencies, particularly the United States Dollar (US dollar). Previous literature argues that financial institutions play an active role in promoting dollarization. One of the motivations for financial institutions to lend in a foreign currency is to hedge against the currency mismatch risks between liabilities and assets (Basso et al. 2011; Luca and Petrova 2008). If a bank's liabilities are denominated in a foreign currency, they may have an incentive to extend foreign currency loans, since they pass the risk of the currency mismatch in assets and liabilities on to their customers (Brown et al. 2014). Additionally, the interregional integration of the banking sector is also important for explaining the determinates of dollarization. Brown and De Haas (2012) documented empirical evidence that regions with higher inflation experience an increase in the dollarization of household deposits and a decrease in the dollarization of loans. Moreover, they showed that the impact of inflation on dollarization is weaker in regions with less integrated banking markets.

However, the previous literature lacks evidence on how dollarization spreads through the country via the banking sector. Our study aims to quantitatively illustrate the interregional fund flows in local currency and foreign currency through the bank branch network, in order to assess how the banking sector collects US dollars and local currency as deposits and extends them as loans across regions within a country. In additional to the focus on dollarization, monitoring interregional fund flows through the banking sector is also crucial from the perspective of financial inclusion and fund mobilization efficiency. Banks have expanded their operations beyond a single region, engaging in interregional financial intermediation by collecting deposits and extending loans across multiple regions within a country. Thus, the banking sector plays a vital role in mobilizing funds from one region to another to fill the gaps between loan demand and fund availability in each region, thereby facilitating structural transformation in rural areas. However, asymmetric information and transaction costs can impede the flow of funds between regions, resulting in significant disparities in credit access. The cost of the transactions occurs from the transfer of liquidity across region through branch network, and there is an information gap between the headquarters and the branches (Pham et al. 2022). Consequently, government monitoring of fund flows across regions via the banking sector is necessary to promote fund mobilization across regions and to achieve an efficient banking market. [1]

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[1] Previous research in the field has primarily concentrated on analyzing either the loan or deposit aspects of the financial market. For instance, Corbae and D'Erasmo (2010) have directed their attention to the loan side. On the other hand, Dick (2008) has focused on estimating differentiated demand models for bank deposits and Egan et al. (2017) explored the distinctions between insured and uninsured deposits,

In this study, we investigate the fund flows in one of the most dollarized economies, Cambodia, where banks operate with dual currencies for fund collection and loan extension.[2] Cambodia also suffers under the persistent dollarization despite recent resilient macroeconomic conditions (Odajima and Aiba 2019).[3] In addition, financial inclusion is still low in Cambodia, even though bank branch networks have significantly expanded over the past decades. This study is essential for monitoring fund mobilization within the Cambodian banking sector, and offers valuable insights into the overall functioning of banks within a dollarized economy and the challenges to financial inclusion. To examine the flow of funds within the banking sector, we use currency-wise and branch-level bank deposit and loan data from selected Cambodian financial institutions.

To measure the interregional fund flow, we propose a modified approach of interregional fund flow, which was originally advanced by Uesugi et al. (2022). Their approach is suitable for capturing the heterogeneous behavior of banks in mobilizing funds. Generally, banks exhibit regional disparities in their capabilities for lending and deposit collection, leading to complex interregional fund flows at a macro level. Uesugi et al.'s approach uses micro data on bank deposits and loans by regions and by banks to capture the interregional fund flow within each bank branch network. However, their original approach is based on the assumption that funds collected in a region are assumed to be distributed to the other regions in proportion to the region's share of total deposits. In other words, deposits in a region equally contribute to lending in the same region and lending in other regions. However, banks may exclusively reallocate excess funds in the region where funds collected in local deposits exceed local demand for loans. Particularly in the case of a developing country, the direction of most funds is one way from large cities to rural areas, because of problems in financial inclusion and the concentration of capital in large cities. Thus, their original approach overestimates fund flows from rural areas to large cities and underestimates the flows from large cities to rural areas. To circumvent the problem, we modified their approach to focus on the flows of excess funds, which are defined as deposit amounts minus loan amounts in the region. In our approach, banks only reallocate the funds from regions with excess deposits over loan demand to areas where the demand for loans is higher than

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taking into account bank defaults and bank runs. Aguirregabiria et al. (2016) studied the geographic location of bank branches and the role of geographic risk diversification in configuring bank branch networks. However, Aguirregabiria et al. (2020) studied the effect of imbalance between loans and deposits in the regions of the country. Recently, UESUGI et al. (2022) proposed a novel approach to measuring the interregional flow of funds via deposits and loans of financial intermediaries within a country. This indicator facilitates insights into the allocation of funds between regions. The authors presented the methods employed to construct an interregional credit and deposit flow matrix for Japan. This comprehensive approach is crucial for addressing the specific research questions posed in our study.

[2] For the detail of Cambodian dollarization, see (Okuda 2017; Okuda and Chea 2023).

[3] In previous studies, it has been observed that the level of partial dollarization decreased after stability of the macroeconomy was recovered.

the available deposits. This assumption is more reasonable for capturing the interregional capital flows in a developing country.

Applying our modified approach to the Cambodian banking sector, we find that the majority of funds used by banks for lending purposes in all regions except Phnom Penh, originate from Phnom Penh and other financing sources. Furthermore, we found evidence that interregional fund flows have evolved to be large between provincial regions in 2017, particularly from the southeast areas to other provinces. In contrast, the interregional fund flows between provincial areas were not observed in 2013. These findings may reflect the expansion of the banking sector's branch network to provincial regions and an increased collection of funds in the rural areas. Additionally, by examining interregional fund flows by currencies, we find that for both the US dollar and the Khmer Riel, lending in provincial areas is primarily covered by excess funds in Phnom Penh and other financing sources, while the portion of lending covered by deposits within the same region is relatively high in Khmer Riel. However, the analysis highlights that unlike US dollars, excess funds in Khmer Riel are not actively reallocated to lending in other regions and kept in other form of assets, even though Khmer Riel deposits have increased over the years. This suggests a need for more efficient fund mobilization to promote the local currency in Cambodia. Moreover, it is observed that interregional fund flows of Khmer Riel and US dollars move in opposite directions, indicating a difference in loan and deposit demands between currencies.

Our study contributes to the literature on dollarization. Previous empirical studies do not illustrate how dollarization spread over the country, nor do they give an clear insight into the question of why dollarization is persistent in Cambodia despite long-lasting resilient macroeconomic conditions (Duma 2014, 2011; Samreth et al. 2023). We fill this gap by employing branch-level data on deposits and loans by currencies, and adopting the novel measure proposed by Uesugi et al (2022). Our findings reveal that the banking sector spread the US dollars that were collected in the capital city and from abroad, suggesting that banks distribute US dollars that come from remittance, FDIs and an influx of foreigners. Furthermore, our study presents empirical results that show that unlike the US dollar, excess Khmer Riel funds are not actively reallocated to other regions. Those findings suggest that the recent persistent dollarization is not due to a lack of trust in the local currency by residents, but due to bank's active credit creation in US dollars and the malfunction of fund mobilization in Khmer Riel. Thus, the strategy of local currency promotion should be formulated to enhance the reallocation of local currency funds through the banking sector.

Our study also complements the literature on interregional fund flows by documenting new findings in a developing country. Uesugi et al (2022) found that in the case of Japan, most of

funds are flowing from rural prefectures to large cities, such as Tokyo and Osaka, meaning that there is a surplus of funds in rural areas, which banks then mobilize to large cities. However, we found that in the case of Cambodia, the flow of most funds was from the capital city to rural areas, while fund flows between provincial areas have increased as the banking sector evolved. Our findings reveal that collection of funds is concentrated in the capital city, even though banks have wide branch networks in rural areas. The findings might suggest that banks set the interest rates to be optimal for collecting in the capital city. In that case, there would be a need to collect more funds in rural areas through the establishment of local banks.

The rest of this paper is organized as follows: Section 2 provides a background to the Cambodian banking sector. Section 3 outlines the methodologies used to measure interregional fund flows using data from financial institutions. Section 4 describes the data used in our analysis. Section 5 presents the results of our analysis. Finally, Section 6 concludes the paper.

2. Background of the Cambodian Banking Sector

2.1 Overview of the Cambodian Banking Sector

The financial system in Cambodia is segmented into three distinct verticals: banking, stock and bond markets, and insurance markets. According to the National Bank of Cambodia (2017), the Cambodian banking landscape is a diversified portfolio comprising commercial banks, specialized financial institutions, microfinance entities, rural credit agencies, and leasing corporations.

As of the fiscal year-end 2017, the banking sector was made up of 39 commercial banks, which were further categorized into 12 foreign branch banks, 12 domestic banks, and 15 subsidiary entities. Additionally, the sector hosted 15 specialized financial institutions, one of which was a state-owned entity. The microfinance vertical included 7 micro-deposit-taking institutions (MDIs), 69 microfinance institutions (MFIs), 313 rural credit facilities, and 11 leasing companies. Geographically, the banking and microfinance footprint was expansive, with a total of 2,164 branches strategically located across the 25 provincial jurisdictions and the capital city.

From bank's balance sheet data, the aggregate assets of the banking and microfinance sectors stood at 135.1 trillion riels at year-end 2017, with the credit portfolio accounting for 81.4 trillion riels. On the liabilities side, customer deposits represented 76.8 trillion riels, while borrowing and capitalization were recorded at 12.6 trillion and 25.7 trillion riels, respectively. In the context of credit risk diversification, the majority of the lending activities of commercial banks were concentrated in construction and mortgage financing (18%), followed by retail trade finance (17.6%), wholesale trade finance (12.4%), and agribusiness, forestry, and fisheries (10.3%). In

contrast, the MFIs exhibited a more diversified asset allocation, with significant exposure to household financing (33.2%), agricultural lending (26.9%), and commercial trade finance (18.6%).

This analytical overview serves to illuminate the complexities inherent in Cambodia's banking sector, emphasizing the necessity for an in-depth understanding of its asset-liability management, credit risk profile, and geographical distribution to glean insights into the broader financial architecture of the nation.

2.2 Development of dollarization in Cambodia

Since its economic liberalization in 1993, Cambodia has operated as a small, open economy characterized by pervasive dollarization. The majority of wholesale and retail transactions are conducted in US dollars, while the Khmer Riel is used less frequently. This dollarization extends into the banking sector, where a substantial proportion of deposits and loans are denominated in US dollars, creating a financial milieu that is highly dollarized. However, this dollarization poses challenges for the effective transmission of monetary policy, which is formulated primarily around the Khmer Riel.

As seen from the key financial indicators published by the National Bank of Cambodia in 2017, the extent of dollarization in Cambodia is significant. The ratio of foreign currency deposits to the broad money supply (M2) is as high as 84%, signifying a considerable proportion of foreign currency within the aggregate money supply. Additionally, the ratio of foreign currency deposits to total deposits stands at an elevated 95%, underscoring the dominance of foreign currency in the deposit base of Cambodian banks.

The dollarization phenomenon presents substantial impediments to the implementation of efficacious monetary policy measures. Dollarized economies are vulnerable to external financial shocks, especially in the face of heightened volatility in international financial markets. For example, if the US Federal Reserve increases interest rates, it could lead to an appreciation of the US dollar. Due to dollarization, while a rise in US Federal Reserve interest rate may result in lower import prices and subdued imported inflation, it could also undermine the international competitiveness of local enterprises. Moreover, interest rate hikes in the US and the tapering of asset purchases in other developed economies could exert downward pressure on Cambodia's economic performance. Such actions may escalate borrowing costs, diminish capital inflows, and curtail investment activities, thereby constraining domestic credit supply. As a corollary of this, inflationary pressure in Cambodia may abate due to increased borrowing costs, thereby stymieing

economic growth and development. In short, the pervasive dollarization in Cambodia constrains the efficacy of monetary policy instruments and heightens the country's susceptibility to global financial market fluctuations.

2.3 Role of the National Bank of Cambodia

As the monetary authority of Cambodia, the National Bank of Cambodia (NBC) is responsible for maintaining monetary stability within the national economy. In addition to this core mandate, the NBC serves as a regulatory and supervisory authority, overseeing the licensure, operational conduct, and activities of a diverse array of financial institutions in Cambodia. These include commercial banks, microfinance institutions, rural credit operators, leasing companies, money changers, and payment service providers. Since its initial regulatory framework established in 1996, the NBC has mandated that these financial entities rigorously report their activities and comply with its supervisory guidelines. Through the implementation of such robust regulatory protocols, the NBC aims to ensure the prudent and efficacious operation of the financial sector under its jurisdiction.

Given its cardinal role in engendering monetary stability and safeguarding the overall integrity of the banking sector, the NBC places significant emphasis on understanding the intricacies of fund flows across various regions within the country. Such comprehension is pivotal for the NBC in formulating strategies aimed at bolstering the efficiency and resilience of the banking system. By assiduously monitoring inter-regional fund flows, the NBC is better positioned to identify latent vulnerabilities, thereby enabling it to take preemptive actions to mitigate associated risks and maintain price stability.

3.Measure of interregional flows in the banking sector

The measuring of interregional fund flows was first proposed by Uesugi et al. (2022). In this section, we firstly introduce their methodologies for measuring interregional fund flows, and then propose our modified approach to capturing interregional fund flows in the context of developing countries where the banking sector is underdeveloped.

According to Uesugi et al. (2022), the amounts of assets, including loans and other assets, in a bank's balance sheets must meet the deposit and other liabilities. Thus, for bank i, the total amount of loans and other assets as a sum of all the regions ($\Sigma_j L_{ij} = L_i$ and $\Sigma_j A_{ij} = A_i$) meets the total amount of deposits and other liabilities.

$$A_i + L_i = D_i$$

Where $\Sigma_j D_{ij} = D_i$, $\Sigma_j L_{ij} = L_i$ and $\Sigma_j A_{ij} = A_i$. If the loan amounts exceed the deposit amounts, it is interpreted as bank i covers shortage of funds by accessing to other funding sources (if $L_i > D_i$, $A_i < 0$). If the deposit amount exceeds the loan amount, it is interpreted as bank i invests excess funds in other assets, or the bank keeps the excess funds as liquidity ($A_i > 0$ if $L_i < D_i$).

The bank's branches collect deposits from the residents in the operating regions, and the headquarters reallocate the funds to other branches based on the loan demand in each operating region. Specifically, bank i extends certain amounts of loan L_{ij} in a region j, and the funds for the loans are collected through deposits in other regions. The portion of extended loans by bank i in region j' which are backed by a deposit in region j can be denoted as $\frac{D_{ij}}{D_i} \times L_{ij'}$. In the analysis, the amounts of loans in region j' which are covered by a deposit in region j are calculated as follows.

$$\Sigma_i \frac{D_{ij}}{\Sigma_j D_{ij}} \times L_{ij'} \qquad : \text{fund flows from region } j \text{ to region } j' \qquad (1)$$

Formula 1 represents amounts of interregional funds flows from region j to region j' in the whole banking sector. However, in Formula 1, it is assumed that the funds collected in a region contribute to the lending in the same region and in other regions equally. Thus, the original approach detects the funds flow between every pair of regions within a bank, as long as there is a branch of the bank in the region. However, it is more natural to assume that only the headquarters reallocates excess funds from branches to the branches which are short of funds. Thus, the fund flows should be detected if and only if there are excess amounts of local deposits over local demand for loans. In our model, we advance the assumption that the headquarters reallocate funds only when $D_{ij} - L_{ij} > 0$. If $D_{ij} - L_{ij} \leq 0$, the branch j will receive the funds from other branches to cover the shortage. In other words, funds from deposits in region j are primarily used to meet the demand of loans in region j, and then banks reallocate the excess funds to branches that do not have enough funds from their own deposit.

$$\Sigma_i \frac{ED_{ij}}{\Sigma_j ED_{ij}} \times EL_{ij'} \qquad : (j \neq j') \qquad (2)$$

$$\Sigma_i (D_{ij} - ED_{ij}) \qquad : (j = j') \qquad (3)$$

where ED_{ij} is excess deposits defined as $\max(D_{ij} - L_{ij}, 0)$, and EL_{ij} is excess loans defined as $\max(L_{ij} - D_{ij}, 0)$. When we calculate the fund flow from region j to region j' ($j \neq j'$), we only consider how much of the excess loans are covered by the excess deposits in other areas. When we calculate the fund flows within the same regions ($j = j'$), we consider how much of the loans in the region are covered by deposits collected in the same region (D_{ij}). If there is an excess of deposits in the region, the number of deposits exceeding the loan amount is subtracted from the fund flow within the regions.

Our modified approach is more appropriate in the context of a developing country, where the banking sector is still underdeveloped, and capital flows are mostly one way from large cities to rural areas.

4.Data Description

In order to measure fund flows, we employ bank-branch level data from a joint survey undertaken by JICA and NBC in 2017-2018[4]. In 2017 and 2018, JICA and the NBC conducted a survey of households, enterprises, and financial institutions. The purpose of the survey was to investigate the real situation of dollarization in Cambodia, with interviews carried out in households and enterprises in all of the provinces in Cambodia.[5] In the joint survey, branch-level data on deposits and loans were also collected from 15 selected commercial banks and 10 microfinance institutions for investigating financial dollarization at region-level and for understanding the mechanism of

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[4] The survey was done in 2017 under the research project "Empirical Study on the Promotion of Home Currency in Cambodia" in JICA Ogata Research Institute.

[5] Using the data from the survey, Aiba et al. (2018) investigated the household foreign currency borrowing behavior by households, and Okuda and Aiba (2018) investigated borrowing behavior by enterprises.

dollarization.[6] The 25 financial institutions were selected based on asset size and number of branches, and each was asked to fill out the form of deposits and loans for all the branches.

However, there is a limitation to our data. Some commercial banks did not respond or refused to provide the reports. The final sample we collected in the survey was collected from 8 commercial banks and 10 microfinance institutions.[7] Note that some branches do not keep a record of financial activities because the branch functions as a liaison office, or the data is only collected at a level higher than the branches. Thus, the number of reports we collected is different from the number of branches reported in the NBC's annual report. Although 21 financial institutions provided data to us, some of them failed to report data about deposits and loans by branches. This may be because some banks were not prepared to provide the data by branches or because banks were not able to spare enough time to fill out all the forms for all branches.

For the simplicity of the analysis, we aggregate the amounts of deposits and loans by financial institutions and regions. When defining the regions, we follow Aiba and Sok (2017) by categorizing the 25 provinces in Cambodia into 5 regions and 2 cities. Specifically, we categorize the provinces into 7 regions according to the geographical characteristics and the main types of economic activities as follows: (1) Phnom Penh city; (2) Siem Reap city; (3) the Northeast Area, which includes Kratie, Modul Kiri, Ratanak Kiri, and Stung Treng; (4) the Northwest Area, which includes Banteay Meanchey, Otdar Meanchey, and Preah Vihear; (5) the Central Area, which includes Kampong Cham, Kampong Chhnang, Kampong Speu, Kampong Thom, and Kandal; (6) the Southeast Area, which includes Kampot, Kep, Prey Veng, Svay Rieng, Takeo, and Tboung Khmum; and (7) the Southwest Area, which includes Koh Kong, Preah Sihanouk, Pursat, Battambang, and Pailin.

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[6] Using the same deposit and loan data, Aiba and Chey (2023) provide descriptive analysis on dollarization in the Cambodian banking sector.

[7] See Appendix Table A1 for further information of which financial institutions were include in the sample.

Figure 1: Amounts of deposits and loans by regions as in 2017

AMOUNTS OF DEPOSITS AND LOANS BY REGIONS

(Values shown: CENTRAL AREA — Loan 2,333.6, Deposits 641.8; NORTH EAST — Loan 431.9, Deposits 95.7; NORTH WEST — Loan 713.0, Deposits 201.3; PHNOM PENH — Loan 2,778.3, Deposits 5,390.5; SIEM REAP — Loan 698.5, Deposits 269.4; SOUTH EAST — Loan 2,017.8, Deposits 497.9; SOUTH WEST — Loan 1,635.7, Deposits 516.7)
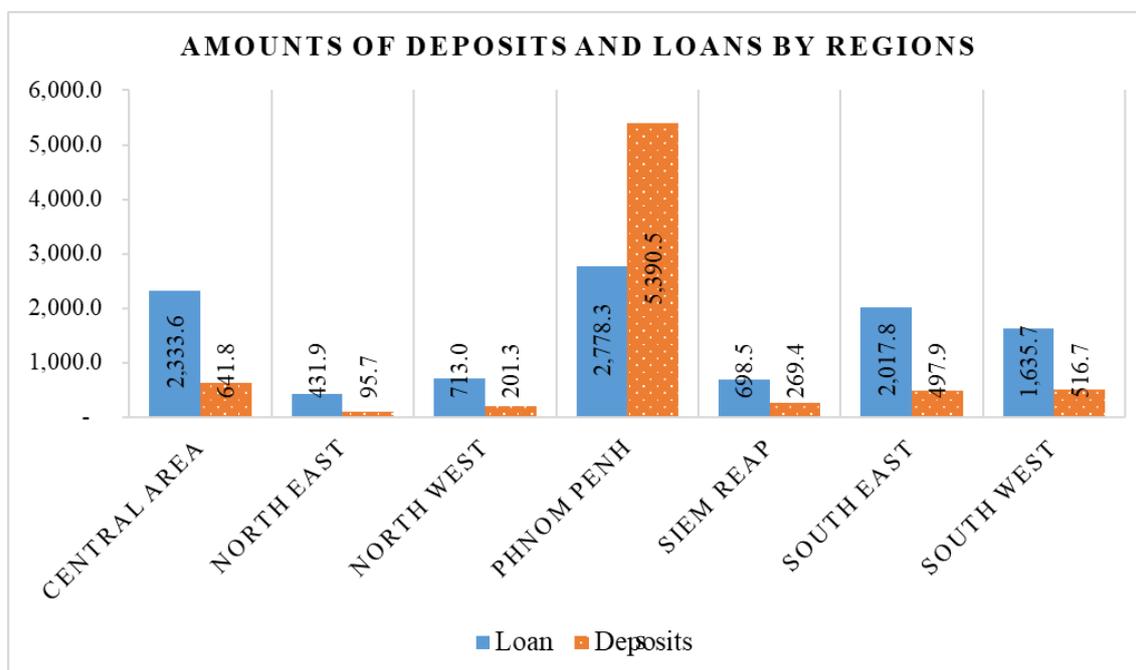
Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Figure 1 shows the aggregated deposits and loans in 2017.[8] In the Cambodian banking sector, most of the deposits are collected in Phnom Penh, while loans are widely distributed across regions. In addition, it is also noted that the amount of loans exceeds the amount of deposits in rural provinces, while in Phnom Penh the opposite is true with the amount of loans being less than the amount of deposits. As mentioned by Aiba and Sok (2017), the Cambodian banks tend to collect funds in Phnom Penh city via deposits and distribute the funds to rural areas through lending. However, when we look at the branch-level micro data, the excess demand for loans in rural provinces is different from bank to bank, and some bank branches haver excess deposits in rural provinces. Thus, the interregional fund flows within the bank branch networks are more complicated than what is seen in Figure 1; for this reason, we need to apply a model that more clearly allows for the visualization of the interregional fund flows.

5.Results

5.1 General trends of fund flows in the Cambodian banking sector

We calculated the interregional fund flow (Formula 2 and 3) for all of the combinations of regions. The results are presented as matrices in Table 1 and 2 for years 2017 and 2013, respectively. Each

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[8] Table A2-A7 present the aggregated amounts of loans and deposits by regions and banks. Using those matrix tables, we calculate the measures of interregional fund flows.

element of the matrix presents fund flows from region j to region j'. In Figure 2, we visualized the results of Table 1 and 2 as graphs. In Figures 3 and 4, we also visualize the results to examine the percentages of the lending covered by the types of fund flow.

Table 1: Interregional fund flows as in 2017 (in total amount of all currencies).

		Central	North East	North West	Phnom Penh	Siem Reap	South East	South West	Oher Asset
						j'			
j	Central	641.7532	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	North East	0.0000	95.7059	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	North West	0.0000	0.0000	201.3000	0.0000	0.0000	0.0000	0.0000	0.0000
	Phnom Penh	864.7068	164.6623	263.2460	2465.2090	216.1553	743.1977	543.3456	129.9775
	Siem Reap	0.0000	0.0000	0.0000	0.0000	269.4255	0.0000	0.0000	0.0000
	South East	0.3594	0.0000	0.4684	0.0000	0.6942	483.6196	12.7350	0.0000
	South West	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	516.7422	0.0000
	Other Financing	826.7586	171.5714	247.9891	313.0606	212.2056	790.9525	562.8375	0.0000

Note: Each element shows the fund flows from region j to region j'.

Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Table 2: Interregional fund flows as in 2013 (in total amount of all currencies)

		Central	North East	North West	Phnom Penh	Siem Reap	South East	South West	Oher Asset
						j'			
j	Central	204.0947	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	North East	0.0000	43.0514	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	North West	0.0000	0.0000	71.1818	0.0000	0.0000	0.0000	0.0000	0.0000
	Phnom Penh	134.6630	25.2291	30.4407	857.9808	31.2361	128.0109	43.4968	121.3366
	Siem Reap	0.7357	0.0000	0.0000	0.0000	81.6795	0.0000	0.0000	7.6844
	South East	0.0000	0.0000	0.0000	0.0000	0.0000	125.4848	0.0000	0.0000
	South West	0.0694	0.0000	0.0000	0.0000	0.4428	0.0000	148.2265	2.8031
	Other Financing	394.5073	69.0676	89.6967	214.6204	98.5659	367.1567	140.2552	0.0000

Note: Each element shows the fund flows from region j to region j'.

*Source:* The JICA-NBC Joint Survey 2017 , and authors' calculation.

From Table 1 and Figure 2, we found that Phnom Penh and other financing sources are the largest sources of bank lending in all the regions, while the interregional fund flows between provincial regions are small. Even though there are also large cities, such as Siem Reap, Battambang (in north-west area) and Sihanouk Ville (in south-west area), the most funds flows are from Phnom Penh or wholesale funding, which may come primarily from abroad. The lending covered by deposits in the same regions is small, representing 20-30% of total lending in most of the regions except Phnom Penh and Siem Reap (Figure 3).

Figure 2: Interregional Fund Flows of Total Funds
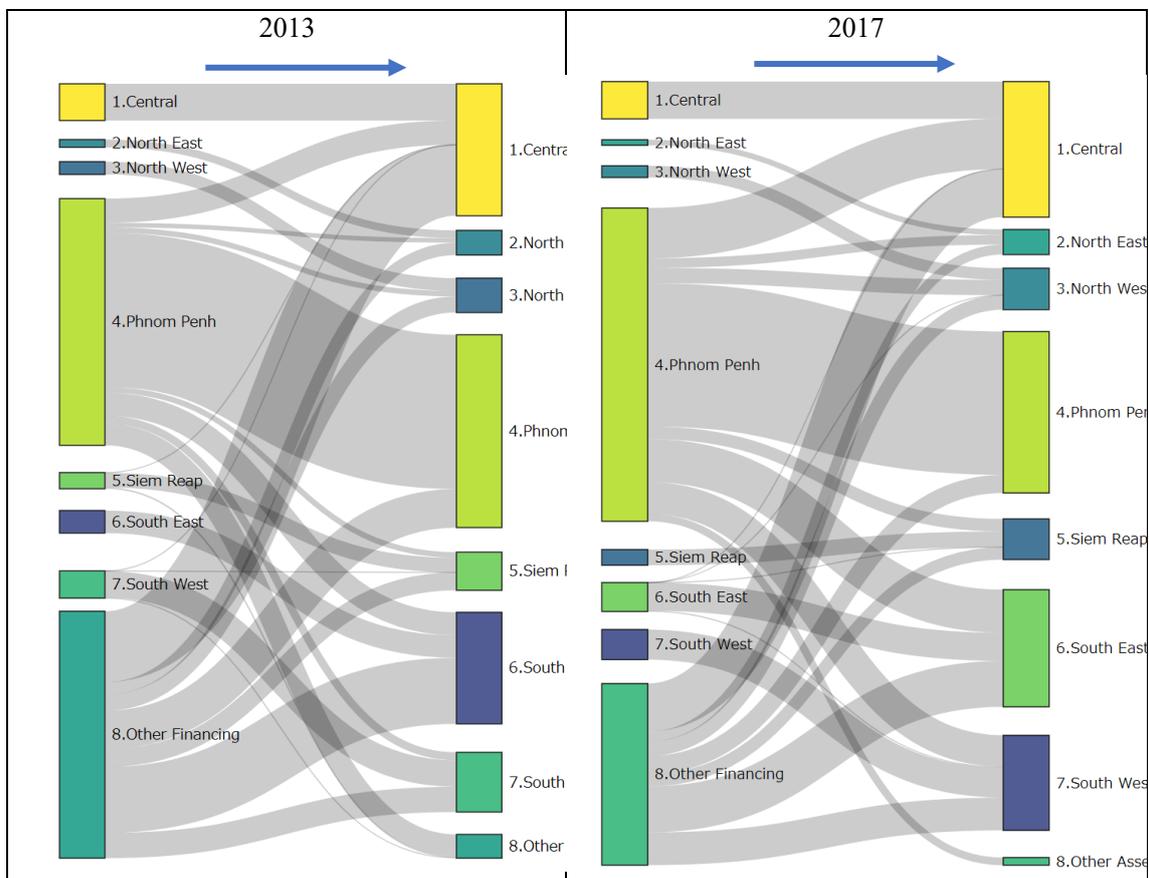
Note: The figure is made from the results in Table 1 and 2. The left-hand side represents funds collected through deposits or wholesale borrowing, and the right-hand side represents loans in each region.
Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Figure 3: Funds Inflows for Lending in Each Region by Sources in 2017

(a) Amounts of Fund Inflow   (b) Percentages
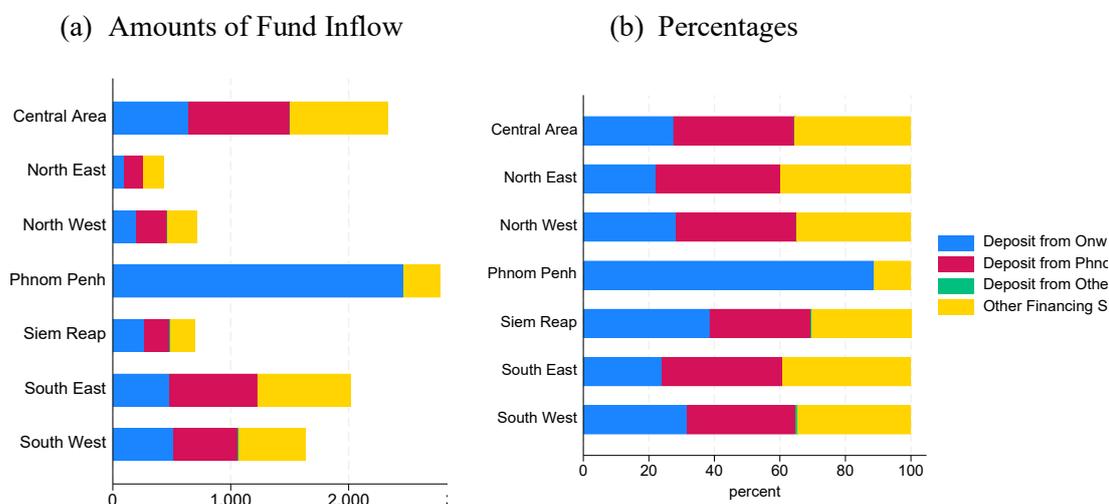
Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Figure 4: Funds Inflows for Lending in Each Region by Sources in 2013

(a) Amounts of Fund Inflow   (b) Percentages
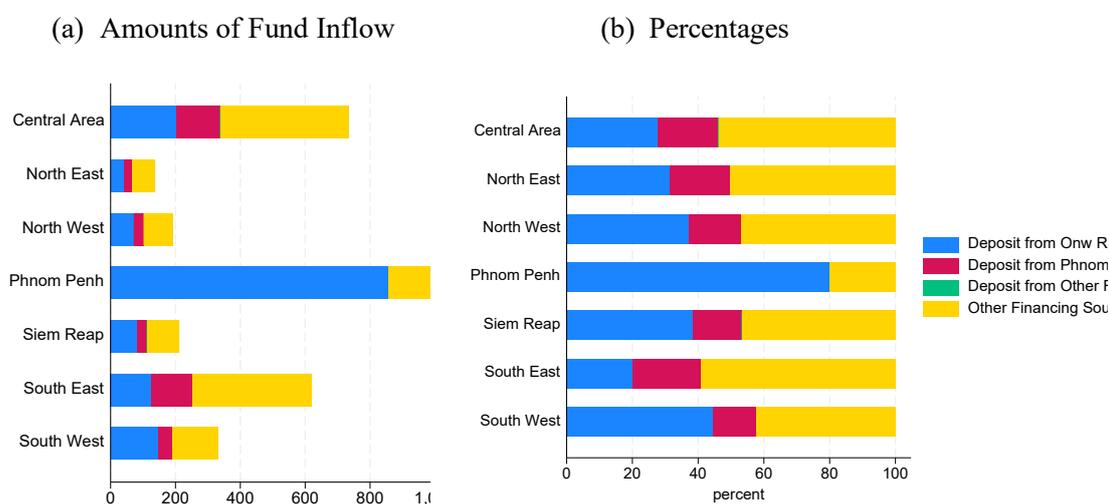
Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

By comparing the results of 2013 with those of 2017, we found that there were changes in the structure of source of funds for lending in each region. In 2013, the proportion of fund inflow from Phnom Penh was relatively small compared to 2017 in all the regions (Figure 3 and 4).

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Lending in each region was covered by deposits in the same regions or other financing sources, possibly mainly foreign and domestic wholesale funding. In 2017, fund inflows from Phnom Penh increased, along with an increase in the total number of loans in the banking sector. Furthermore, the proportion of excess fund inflows from Phnom Penh to other assets decreased from 2013 to 2017 (Figure 4). This suggests that the banking sector became more active in mobilizing surplus funds to provincial areas over the years.

In addition, we found that there were interregional fund flows between provincial regions, particularly from the south-east areas to other provincial regions, while there were no interregional fund flows between provincial regions (Table 1). The results may reflect the development of the banking sector between 2013 and 2017. Over the years, the branch network expanded significantly to the provincial regions, and fund collection in rural areas increased.

5.2 Interregional fund flows by currencies

Cambodia is a country with a high degree of dollarization, where transactions can be conducted in both US dollars and Khmer Riel. To further analyze interregional fund flows in the Cambodian banking sector, we introduce additional matrices: one for fund flows in US dollars and another for those in Khmer riel. Table 3 and 4 represent the matrices of US dollars in 2017 and 2013, respectively, while Table 5 and 6 represent the matrices of Khmer Riel in 2017 and 2013, respectively. We also visualize the fund inflows in each region for US dollars in Figure 5 and for Khmer Riel in Figure 6. Figures 7 to 10 present the percentages of fund flows by source.

Table 3: Coefficients of interregional fund flows as in 2017 (in US dollars currency)

| | | \(j'\) | | | | | | |
		Central	North East	North West	Phnom Penh	Siem Reap	South East	South West	Oher Asset
	Central	491.5068	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	North East	0.0000	62.4473	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	North West	0.4343	0.0412	133.4970	0.1676	0.2129	0.7484	0.0319	0.0000
j	Phnom Penh	786.6483	138.3284	220.3255	2605.0360	212.7834	660.7322	258.2163	187.7867
	Siem Reap	0.0000	0.0000	0.0000	0.0000	231.6941	0.0000	0.0000	0.0000
	South East	1.5131	0.0000	1.9718	0.0000	2.9224	354.8701	0.0575	7.7922
	South West	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	417.5641	0.0000
	Other Financing	815.9772	157.1967	195.9971	327.5659	196.6360	766.2588	270.7553	0.0000

Note: Each element shows the fund flows from region *j* to region *j'*.

Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Table 4: Coefficients of interregional fund flows as in 2013 (in US dollars currency).

| | | \(j'\) | | | | | | |
		Central	North East	North West	Phnom Penh	Siem Reap	South East	South West	Oher Asset
	Central	164.2667	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	North East	0.0478	35.1844	0.0000	0.0000	0.0449	0.0823	0.0012	0.0000
	North West	0.0886	0.0000	52.2608	0.0000	0.0831	0.1525	0.0022	0.0000
j	Phnom Penh	116.1609	21.2379	24.9161	855.2109	28.7824	103.1256	38.0312	120.6746
	Siem Reap	0.7390	0.0000	0.0000	0.0000	73.4264	0.0000	0.0000	7.6763
	South East	0.0000	0.0000	0.0000	0.0000	0.0000	94.2463	0.0000	0.0000
	South West	0.0635	0.0000	0.0000	0.0000	0.4405	0.0000	118.6286	2.7104
	Other Financing	327.8613	53.6844	63.8360	214.0638	88.9203	284.5416	110.8542	0.0000

Note: Each element shows the fund flows from region *j* to region *j'*.

Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Table 5: Interregional fund flows as in 2017 (in Khmer Riel currency)

		Central	North East	North West	Phnom Penh	Siem Reap	South East	South West	Oher Asset
					j'				
j	Central	143.7043	0.0000	0.0008	0.0000	0.0000	0.2084	0.0000	6.2444
	North East	0.0000	28.8047	0.0000	0.0000	0.0000	0.1405	0.0000	4.3131
	North West	0.0772	0.0312	24.5936	0.0000	0.0039	0.2825	0.0094	5.3630
	Phnom Penh	26.3739	18.8927	13.4998	8.6962	1.8905	48.5292	10.6607	156.9560
	Siem Reap	0.3618	0.2472	0.2541	0.0000	30.9636	0.7536	0.2396	3.0373
	South East	0.0000	0.0000	0.0000	0.0000	0.0000	127.8943	0.0000	0.0000
	South West	0.0277	0.2586	0.0010	0.0000	0.0272	0.4612	61.8695	10.7685
	Other Financing	62.1291	25.6916	17.2566	0.7436	13.4631	56.8904	26.1992	0.0000

Note: Each element shows the fund flows from region *j* to region *j'*.

Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

**Table 6:** Coefficients of interregional fund flows as in 2013 (in Khmer Riel currency)

		Central	North East	North West	Phnom Penh	Siem Reap	South East	South West	Oher Asset
					j'				
j	Central	39.7391	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0195
	North East	0.0000	7.6802	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	North West	0.7604	0.1170	6.2208	0.0000	0.0071	1.1182	0.0000	0.1478
	Phnom Penh	19.8804	3.5514	0.8470	2.1480	1.1551	28.5739	2.7242	3.3433
	Siem Reap	0.1614	0.0555	0.0437	0.0000	7.2147	0.1462	0.0564	0.0343
	South East	0.0000	0.0000	0.0000	0.0000	0.0000	31.1981	0.0000	0.0000
	South West	0.1667	0.0256	0.0000	0.0000	0.0016	0.2451	18.1319	0.1767
	Other Financing	66.3684	15.8117	9.0159	1.1833	9.9529	77.2224	25.9776	0.0000

Note: Each element shows the fund flows from region *j* to region *j'*.

Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Table 3 and Figure 5 illustrate two main findings related to interregional fund flows in US dollars in 2017. First, the results exhibit a similarity to the overall fund flow patterns; many provincial areas predominantly depend on financial resources in US dollars originating from Phnom Penh. The ratios of funds collected in Phnom Penh for lending to other regions range from about 30% to 40%, except in Phnom Penh (Figure 9). Second, US dollar loans are mainly provided from Phnom Penh, and the sources of funding for lending are deposits predominantly from the same

region. Meanwhile, only 10% of the lending in Phnom Penh was covered by other finance sources, possibly reflecting some lending by small microfinance institutions.

Figure 5: Interregional Fund Flows of US Dollar
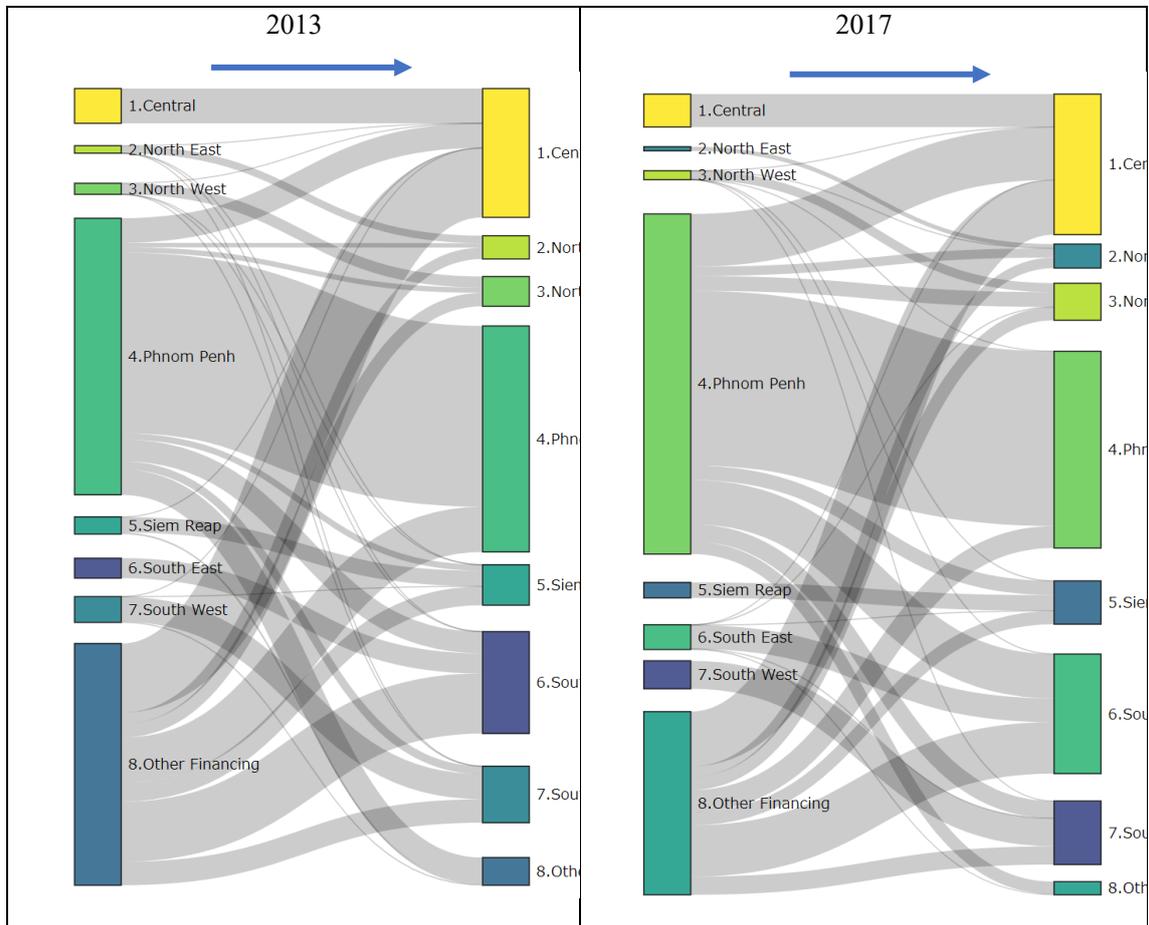
Note: The figure is made from the results in Table 3 and 4. The left-hand side represents funds collected through deposits or wholesale borrowing, and the right-hand side represents loans in each region.
Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

In Figure 5, we also found that there were interregional US dollar fund flows from some provincial areas to other provincial areas, while this was not observed in the analysis of total deposits and loans. In particular, interregional flows of excess US dollars from the south-east region to the central regions, the northwest, and Siem Reap were observed, even though the amount of the flow was trivial. In contrast, the interregional fund flows between provincial regions were not observed in 2013 (Table 4). This suggests that interregional US dollar fund flows in the banking sector became more active due to the expansion of the bank branches between 2013 and 2017.

Figure 6: Interregional Fund Flows of Khmer Riel
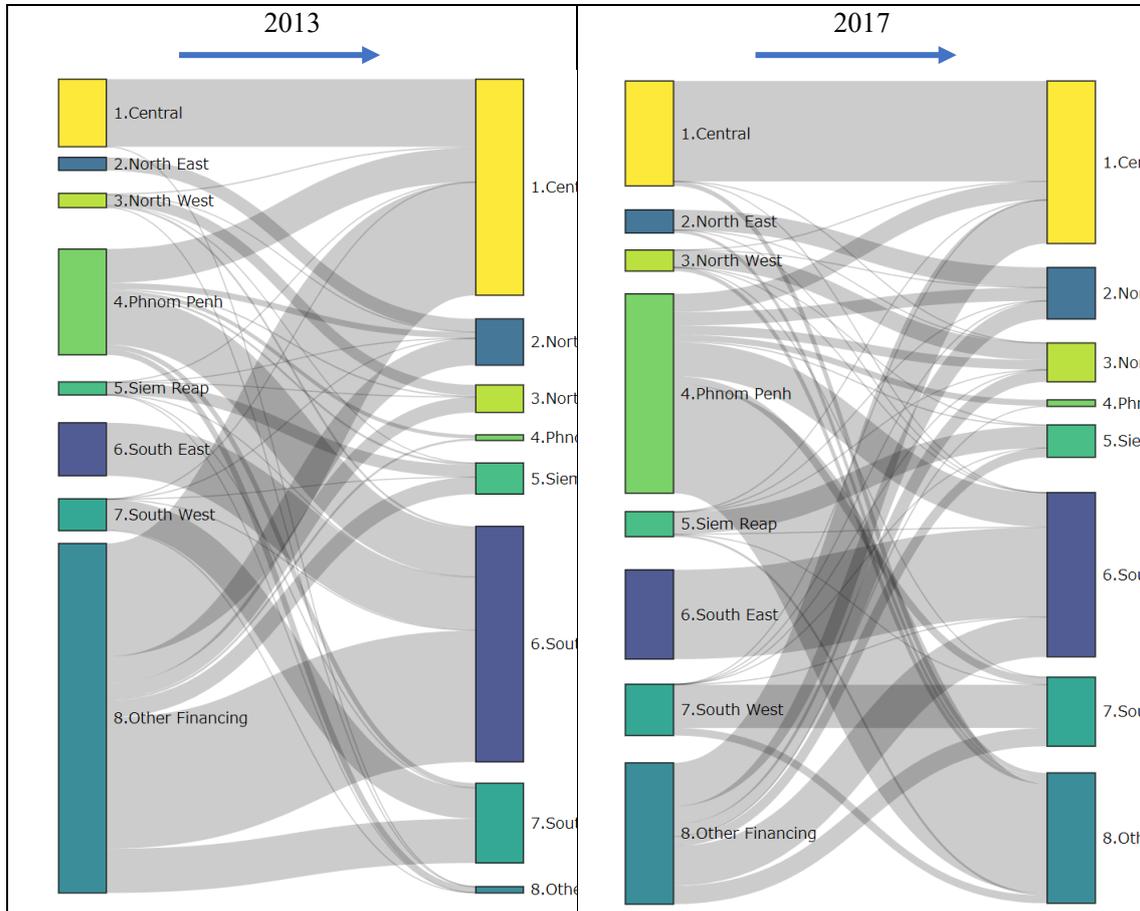
Note: The figure is made from the results in Table 5 and 6. The left-hand side represents funds collected through deposits or wholesale borrowing, and the right-hand side represents loans in each region.
Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Table 5 and Figure 6 show the results of calculation of interregional fund flows in Khmer Riel. We found that lending in provincial areas was also covered mainly by excess funds of Khmer Riel in Phnom Penh and other financing sources. However, the coverage by deposits in the same region was also high for Khmer Riel when compared to US dollars. It is also observed that the largest portion of excess funds of Khmer Riel in Phnom Penh were kept in other assets, possibly in the form of liquidity assets. The proportion of fund flows to other assets is even larger in Khmer Riel than in US dollars, and it increased between 2013 and 2017 (Figure 6). The findings show that compared to US dollars, excess funds of Khmer Riel are not actively reallocated to other regions, even though Khmer Riel deposits significantly increased between 2013 and 2017. The results

suggest that more efficient fund mobilization for excess Khmer Riel in provincial regions is required to promote the local currency in Cambodia.

Furthermore, we found that there were interregional fund flows of Khmer Riel from Siem Reap to other provincial regions (Table 5). The result is in contrast to those for the fund flows of US dollars (Table 3). The results might reflect the difference in demand for loans and demand for deposits between currencies. Since Siem Reap is the region where most international tourists visit, local people also use US dollars in daily transactions and business operations, and loans in the city were demanded in US dollars. At the same time, some bank branches in Siem Reap had a surplus of funds in Khmer Riel, which were reallocated to other regions through the bank branch network. However, most of the excess funds in Khmer Riel in Siem Reap went to other assets (possibly liquidity assets in each bank). Again, the results suggest that the excess Khmer Riel funds were not actively mobilized to meet the Khmer Riel loan demands in other regions.

Figure 7: Funds Inflows for Lending in Each Region by Sources as in 2017.

(a) Amounts of Fund Inflow

(b) Percentages
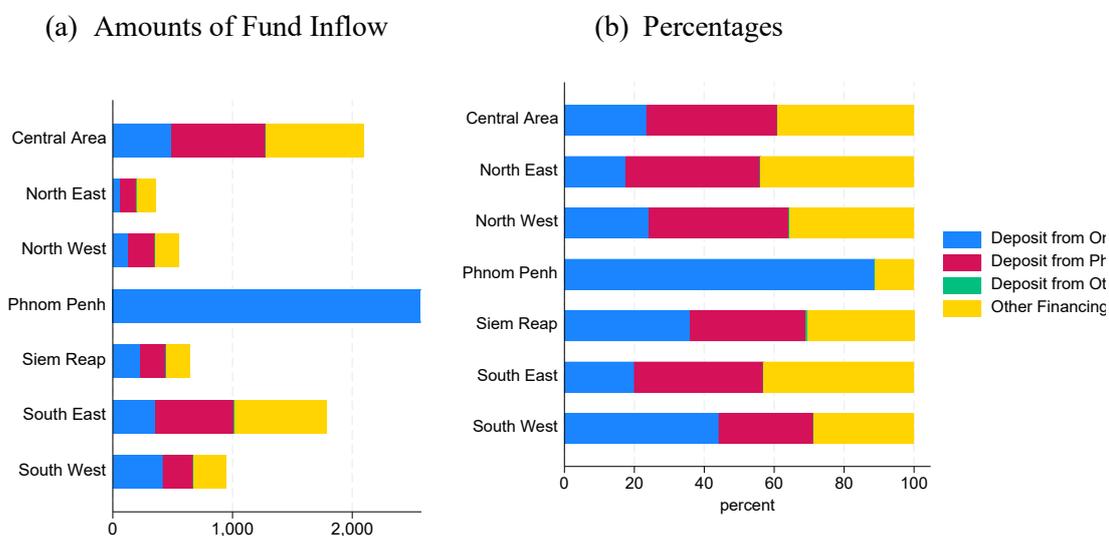
Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Figure 8: Funds Inflows for Lending in Each Region by Sources as in 2013.

(a) Amounts of Fund Inflow

(b) Percentages
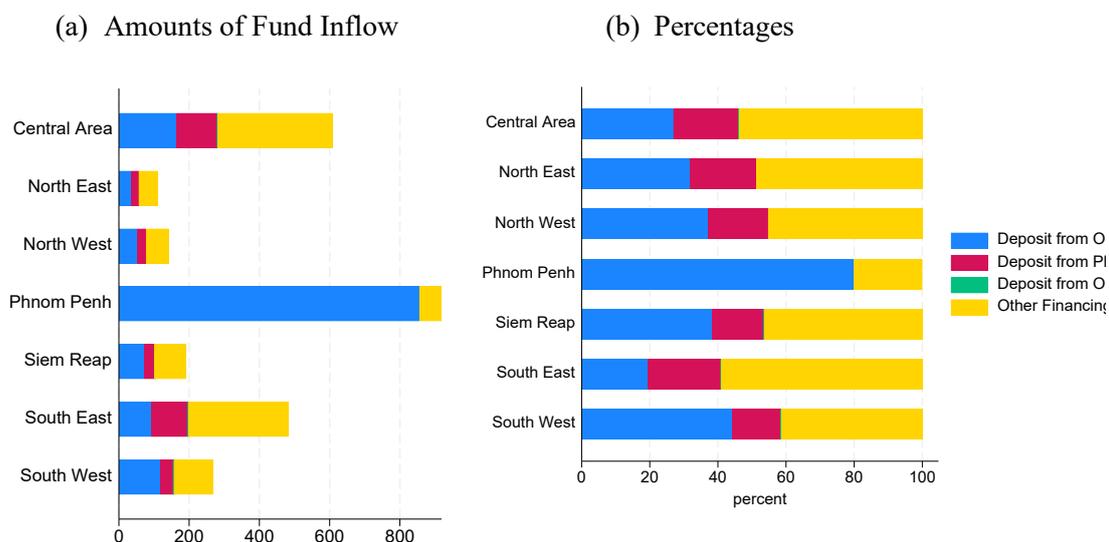
Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Figure 9: Funds Inflows for Lending in Each Region by Sources as in 2017.

(a) Amounts of Fund Inflow   (b) Percentages
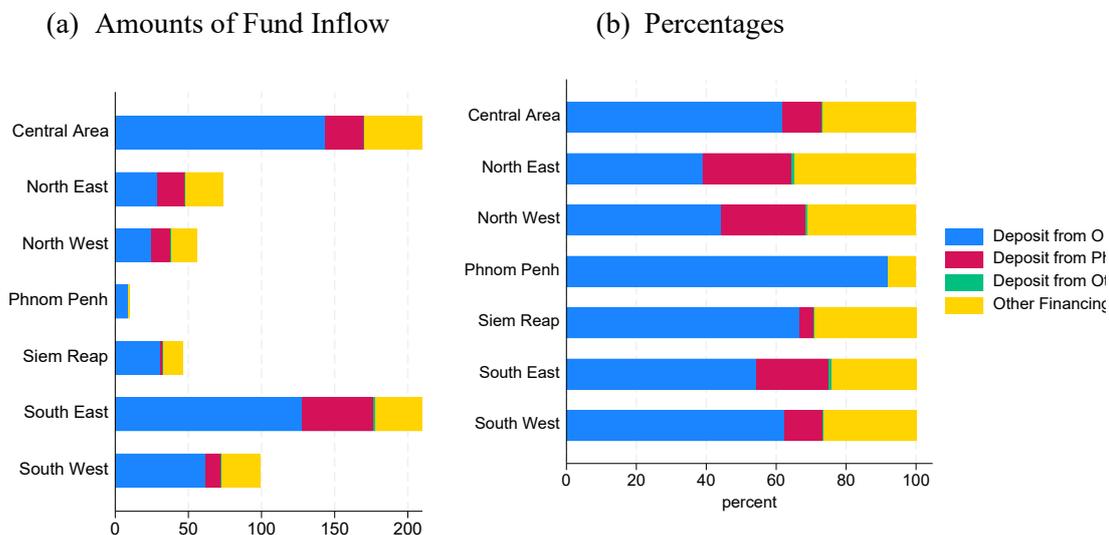
Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

**Figure 10:** Funds Inflows for Lending in Each Region by Sources as in 2013.

(a) Amounts of Fund Inflow   (b) Percentages
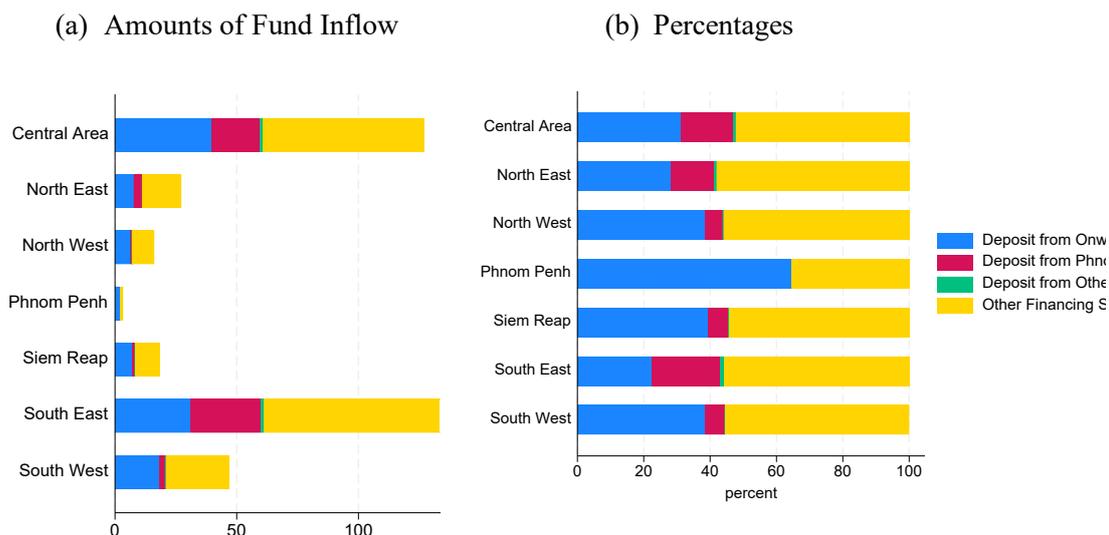
Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

6.Conclusion

In recent decades, the gap between different countries has become narrowed, while the gap within countries, particularly in income and wealth between rural and urban areas, has been widened. Financial constraints have been seen as one of the major challenges to addressing this issue. Since people in rural areas often do not have the title to their land and have only low-level business skills, they have limited access to the formal financial sector, even though they have business opportunities or a need for investment in human capital. Thus, it is important to understand how funds are mobilized within a country, and assess whether it achieves efficient levels of fund reallocation.

In line with this motivation, the study investigates interregional fund flows via the banking sector in Cambodia, by modifying the measures proposed by Uesugi (2022). Since Cambodia is a country where multiple currencies are circulating in the banking system, we went further in applying the measures in order to capture the fund flows by currencies. Using the adapted measures, we were able to describe the pattern of interregional fund flows in Cambodia, and illustrate how the pattern evolved from 2013 to 2017. Finally, we presented the fund flow patterns for both US dollars and the local currency.

Our findings reveal that most of funds for lending come from Phnom Penh and other financing sources, with limited interregional flows between the provincial regions. However, compared to US dollars, funds in Khmer Riel show less reliance on Phnom Penh. Over time, there has been a shift towards increased fund inflows from Phnom Penh and greater mobilization of surplus funds to provincial areas. There are also interregional fund flows between provinces, particularly from the southeast to other regions. From the perspective of dollarization, we find that banks actively reallocate US dollar excess funds from Phnom Penh to other regions, while excess funds in Khmer Riel are not actively reallocated to other regions. These findings highlight the need for more efficient fund mobilization of local currency within bank network for the promotion of local currency.

Lastly, we describe the limitation and perspectives of the research. Firstly, there were limitations on the data available in the study. The data covers only a portion of the entire banking sector, but it includes a large part of the sector's loan sizes. Thus, the study may underestimate inter-regional fund flows in the Cambodian banking sector. There is possibility that small banks have different pattern in inter-regional fund flows. Future study needs to overcome the problems by using more comprehensive datasets. Secondly, our study rather focuses on illustrations of the pattern of interregional fund flows in the banking sector. Thus, the model does not fully explain the mechanism of interregional fund flows in detail. In order to discuss the impact of possible policy

strategies and regulation, a simulation analysis using structural estimation for demand of deposits and loans, similar to that carried out by Aguirregabiria et al (2020) in the US banking sector, is required. Alternatively, one possible strategy is to use a reduced-form regression analysis with our estimated interregional fund flows and region-specific factors, as demonstrated by Uesugi et al (2022).[9]

Thirdly, we suggest that further studies are required to estimate the impact of government measures, such as the impact of financing via LPCOs or minimum quotas on local currency lending on interregional fund flows in US dollars and Khmer Riel. Lastly, the measures can be further modified by inserting the actual amounts of liquidity assets, non-resident deposits and wholesale borrowing both from abroad and from domestic sources. Such modifications would allow researchers to capture the fund flows more clearly including how much the lending in each region is dependent on foreign funding sources, and the amount of US dollars that have been flowing from abroad.

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[9] In our study, the number and time frequency of the observations is limited. Thus, it is challenging to apply regression analysis in our data.

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Appendix

Table A1: List of financial institutions in a the Survey

	Financial institutions name	Abbreviation	Type of institution
1	Advanced Bank of Asia Limited	ABA	Bank
2	ACLEDA	ACL	Bank
3	BIDC	BID	Bank
4	MAYBANK	MAY	Bank
5	PRASAC	PRA	Bank
6	RHB	RHB	Bank
7	SATHAPANA	SAT	Bank
8	UCB	UCB	Bank
9	AMK	AMK	Microfinance
10	AMRET	AMR	Microfinance
11	CHAMROEUN	CHM	Microfinance
12	Hattakakeskar	HKL	Microfinance
13	KREDIT	KRE	Microfinance
14	LOLC (Thaneakea Phum (Cambodia))	LOL	Microfinance
15	LY HOUR	LYH	Microfinance
16	NIRON	NIR	Microfinance
17	Vision Fund Cambodia (WB finance)	WB2	Microfinance
18	SEILANITHIH	SLT	Microfinance

Source: The JICA-NBC Joint Survey 2017.

Table A2: Amounts of loans by regions and by banks as in 2017

Name of Fis	Central Area	North East	North West	Phnom Penh	Siem Reap	South East	South West	Grand Total
SAT	253.7	65.0	58.6	99.9	57.5	171.5	88.7	795.0
MAY	20.5		25.7	335.0	47.6	24.6	608.7	1,062.2
ABA	219.4	23.4	68.8	486.2	97.0	186.8	112.8	1,194.4
ACL	676.5	172.0	250.9	708.9	185.7	516.8	305.8	2,816.6
AMK	66.5	17.1	18.8	4.4	14.3	56.0	26.6	203.7
AMR	224.1	20.7	31.6	67.7	22.5	244.3	72.6	683.6
BID	1.0			309.8	24.0			334.8
CHM	4.3		0.3	1.5	1.2	0.8	1.3	9.4
HKL	150.6	19.2	48.7	69.9	55.8	110.4	92.0	546.5
KRE	51.2	10.3	10.1	19.5	18.0	59.2	20.6	188.8
LOL	72.3	26.4	34.6	8.4	33.9	105.8	40.6	322.0
LYH	15.8	1.7		2.6		17.3	7.7	45.2
NIR	0.5		0.1	2.3	0.4		0.8	4.1
PRA	494.9	64.8	149.7	106.0	88.0	482.6	168.1	1,554.1
RHB	21.5			282.0	42.2		52.0	397.8
SLT	0.4		1.3	0.4	0.3		1.6	4.0
UCB	4.2			263.1			11.6	279.0
WB2	56.1	11.2	13.6	10.7	10.0	41.7	24.2	167.5
Grand Total	2,333.6	431.9	713.0	2,778.3	698.5	2,017.8	1,635.7	10,608.7

Source: The JICA-NBC Joint Survey 2017 , and authors' calculation

Table A3: Amounts of deposits by regions and by banks as in 2017

Name of Fis	Central Area	North East	North West	Phnom Penh	Siem Reap	South East	South West	Grand Total
SAT	47.8	7.8	8.4	491.7	22.8	25.5	20.2	624.2
MAY	5.2		5.8	618.3	18.2	38.9	68.1	754.5
ABA	35.3	2.1	12.8	1,038.4	65.7	18.3	73.3	1,246.0
ACL	279.0	58.0	119.3	1,264.4	88.5	245.1	208.8	2,263.1
AMK	27.1	6.2	8.1	3.6	4.9	22.9	14.0	86.7
AMR	73.1	5.4	12.6	161.3	9.2	61.8	24.8	348.1
BID	0.1			25.8	2.9			28.8
CHM	0.1		0.0	0.1	0.0	0.0	0.0	0.2
HKL	60.4	3.2	16.9	211.0	16.9	18.4	32.4	359.2
KRE	13.5	1.5	1.7	54.7	5.6	12.6	7.0	96.5
LOL	15.4	1.0	1.3	62.9	3.3	4.8	3.2	91.8
LYH	-	-		-		-	-	-
NIR	-		-	-	-		-	-
PRA	77.3	10.3	13.8	736.5	23.6	47.1	33.3	941.9
RHB	1.1			453.6	6.6		14.9	476.2
SLT	0.0		0.1	0.0	0.0		0.1	0.2
UCB	0.3			241.5			11.2	253.0
WB2	6.1	0.2	0.7	26.6	1.3	2.6	5.4	42.9
Grand Total	641.8	95.7	201.3	5,390.5	269.4	497.9	516.7	7,613.3

Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Table A4: Amounts of loan by USD currency by regions and by banks as in 2017

Name of Fis	Central Area	North East	North West	Phnom Penh	Siem Reap	South East	South West	Grand Total
SAT	241.1	56.6	51.0	99.9	54.4	160.5	80.4	743.9
MAY	20.5		25.7	485.8	47.6	24.6	68.6	672.9
ABA	218.9	23.4	68.7	486.0	97.0	185.9	112.6	1,192.6
ACL	628.4	159.4	217.9	702.0	173.7	467.6	270.8	2,619.8
AMK	13.7	2.1	1.1	4.0	4.2	16.1	5.0	46.2
AMR	184.0	15.2	21.7	67.6	19.0	198.1	59.4	565.1
BID	1.0			309.8	24.0			334.8
CHM	1.5		0.0	0.8	0.5	0.3	0.1	3.3
HKL	140.2	16.4	32.9	69.8	53.1	101.9	76.4	490.7
KRE	44.3	7.4	8.0	19.4	16.3	50.0	17.1	162.3
LOL	56.5	14.1	17.2	7.9	24.9	83.4	27.1	231.0
LYH	15.2	1.5		2.6		14.7	6.2	40.1
NIR	0.0		0.0	2.2	0.0		0.0	2.3
PRA	467.6	55.7	101.5	105.8	79.5	448.0	141.9	1,399.9
RHB	21.5			282.0	42.2		52.0	397.8
SLT	0.2		0.1	0.3	0.1		0.2	1.0
UCB	4.2			276.2			11.6	292.1
WB2	37.3	6.4	5.9	10.4	7.6	31.5	17.2	116.4
Grand Total	2,096.1	358.0	551.8	2,932.8	644.2	1,782.6	946.6	9,312.1

Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Table A5: Amounts of Deposits by USD currency by regions and by Banks as in 2017

Name of Fis	Central Area	North East	North West	Phnom Penh	Siem Reap	South East	South West	Grand Total
SAT	36.0	4.9	5.3	418.8	20.0	18.6	15.0	518.5
MAY	5.2		5.8	615.3	18.2	38.9	68.0	751.4
ABA	34.6	2.1	12.8	1,029.7	65.4	17.3	72.9	1,234.7
ACL	224.6	40.9	84.3	1,179.8	75.6	199.1	162.5	1,966.7
AMK	8.0	1.5	2.8	1.8	1.4	6.3	4.6	26.4
AMR	45.9	2.9	4.7	136.0	6.3	33.1	14.7	243.6
BID	0.1			25.2	2.9			28.2
CHM	0.0		0.0	0.0	0.0	0.0	0.0	0.0
HKL	52.4	2.5	9.8	188.1	12.4	14.5	23.1	302.7
KRE	6.8	0.6	1.1	44.0	4.5	4.6	3.1	64.7
LOL	13.3	0.7	0.5	52.6	2.3	3.4	2.5	75.3
LYH	-	-		-		-	-	-
NIR	-		-	-	-		-	-
PRA	60.4	6.2	7.8	665.3	15.5	32.0	22.1	809.2
RHB	1.1			450.3	6.5		14.8	472.6
SLT	0.0		0.0	0.0	0.0		0.0	0.0
UCB	0.2			241.2			11.2	252.7
WB2	2.9	0.1	0.3	21.7	0.9	1.3	3.3	30.6
Grand Total	491.5	62.4	135.1	5,069.9	231.7	369.1	417.6	6,777.3

Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Table A6: Amounts of loan by KHR currency by regions and by banks as in 2017

Name of Fis	Central Area	North East	North West	Phnom Penh	Siem Reap	South East	South West	Grand Total
SAT	12.6	8.4	4.2	0.0	3.1	11.0	5.0	44.2
MAY	-		-	-	-	-	-	-
ABA	0.5	0.0	0.1	0.1	0.0	0.9	0.2	1.9
ACL	48.2	12.6	13.6	6.9	10.9	49.3	22.1	163.5
AMK	52.8	15.0	10.5	0.4	9.8	39.9	19.4	147.8
AMR	40.1	5.5	2.3	0.1	3.3	46.2	9.6	107.2
BID	-			-	-		-	-
CHM	2.8		0.3	0.6	0.7	0.5	1.2	6.2
HKL	10.4	2.8	2.7	0.0	2.3	8.4	7.2	33.8
KRE	6.9	3.0	0.2	0.1	1.2	9.2	2.2	22.8
LOL	13.7	12.3	7.4	0.5	5.8	22.4	9.0	71.3
LYH	0.6	0.3		0.0		2.6	1.2	4.7
NIR	0.5		0.1	0.1	0.4		0.7	1.8
PRA	27.3	9.2	10.1	0.2	6.2	34.6	14.0	101.6
RHB	-			-	-		-	-
SLT	0.2		0.0	0.1	0.2		0.9	1.3
UCB	-			-			-	-
WB2	16.0	4.8	4.1	0.4	2.4	10.2	6.2	44.0
Grand Total	232.7	73.9	55.6	9.4	46.3	235.2	99.0	752.1

Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Table A7: Amounts of deposits by KHR currency by regions and by banks as in 2017

Name of Fis	Central Area	North East	North West	Phnom Penh	Siem Reap	South East	South West	Grand Total
SAT	11.8	3.0	1.9	42.3	2.8	6.9	4.4	73.0
MAY	-		-	1.8	-	-	0.1	1.8
ABA	0.7	0.0	0.0	8.5	0.3	0.2	0.5	10.3
ACL	54.4	17.1	19.0	84.0	12.3	46.0	31.7	264.4
AMK	19.1	4.7	3.1	1.8	3.4	16.6	8.2	56.8
AMR	27.1	2.4	2.5	25.3	2.9	28.7	8.0	97.0
BID	0.0			0.6	0.0			0.6
CHM	0.1		0.0	0.0	0.0	0.0	0.0	0.2
HKL	8.1	0.7	1.3	22.6	4.2	3.9	5.3	46.1
KRE	6.7	0.9	0.3	10.7	1.0	8.0	3.7	31.1
LOL	2.1	0.3	0.2	10.3	1.0	1.3	0.7	15.9
LYH	-	-		-		-	-	-
NIR	-		-	-	-		-	-
PRA	16.9	4.1	1.7	69.3	7.4	15.0	8.7	123.2
RHB	0.1			3.3	0.1		0.1	3.6
SLT	0.0		0.0	0.0	0.0		0.0	0.1
UCB	0.0			0.3			0.1	0.3
WB2	3.1	0.1	0.3	4.8	0.4	1.2	2.0	12.0
Grand Total	150.2	33.3	30.4	285.5	35.9	127.9	73.4	736.4

Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Figure A1: Amounts of deposits and loans by regions in US dollars as in 2017

AMOUNTS OF DEPOSITS AND LOANS BY REGIONS (USD AND OTHERS CURRENCY)
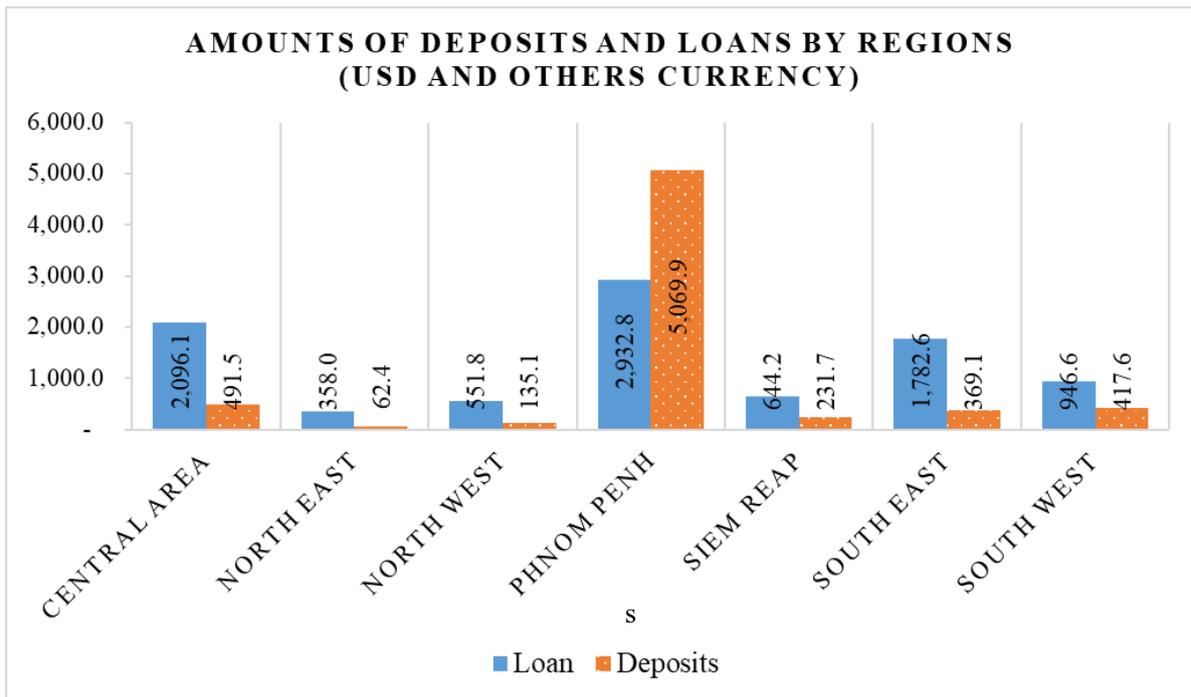
Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Figure A2: Amounts of deposits and loans by regions in Khmer Riel as in 2017

AMOUNTS OF DEPOSITS AND LOANS BY REGIONS (KHMER RIEL CURRENCY
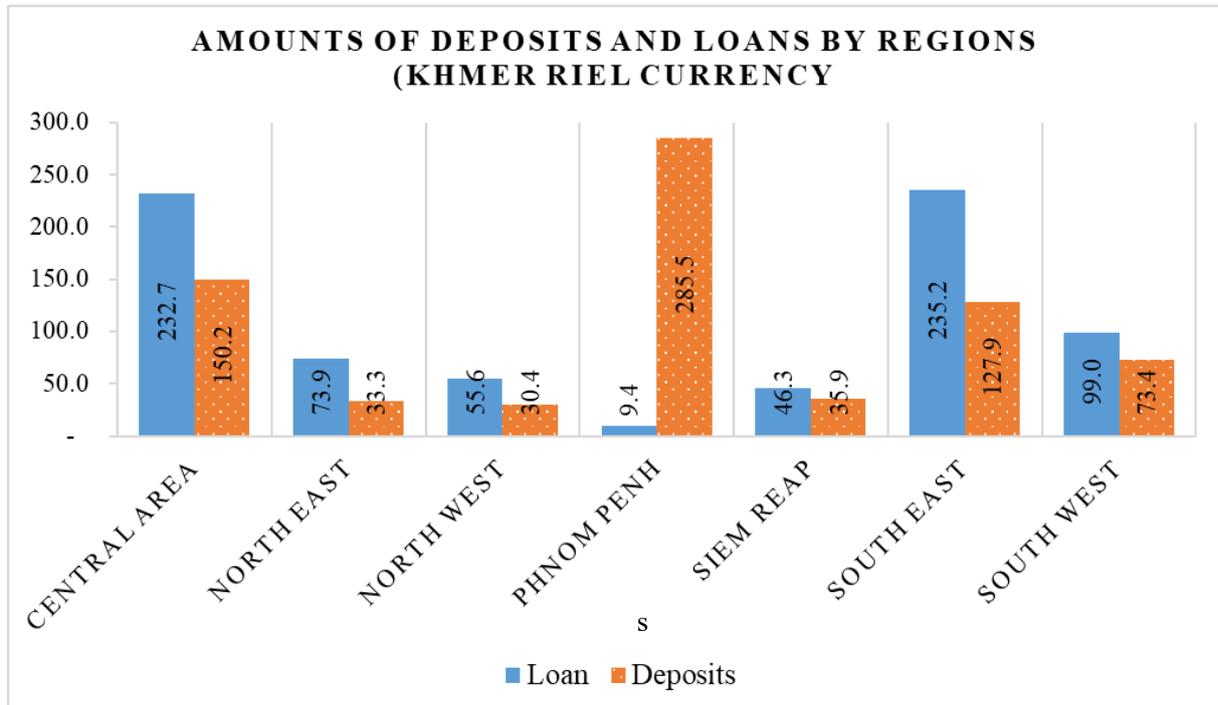
*Source:* The JICA-NBC Joint Survey 2017 , and authors' calculation.

Figure A3: Interregional Fund Flows of Thai Baht
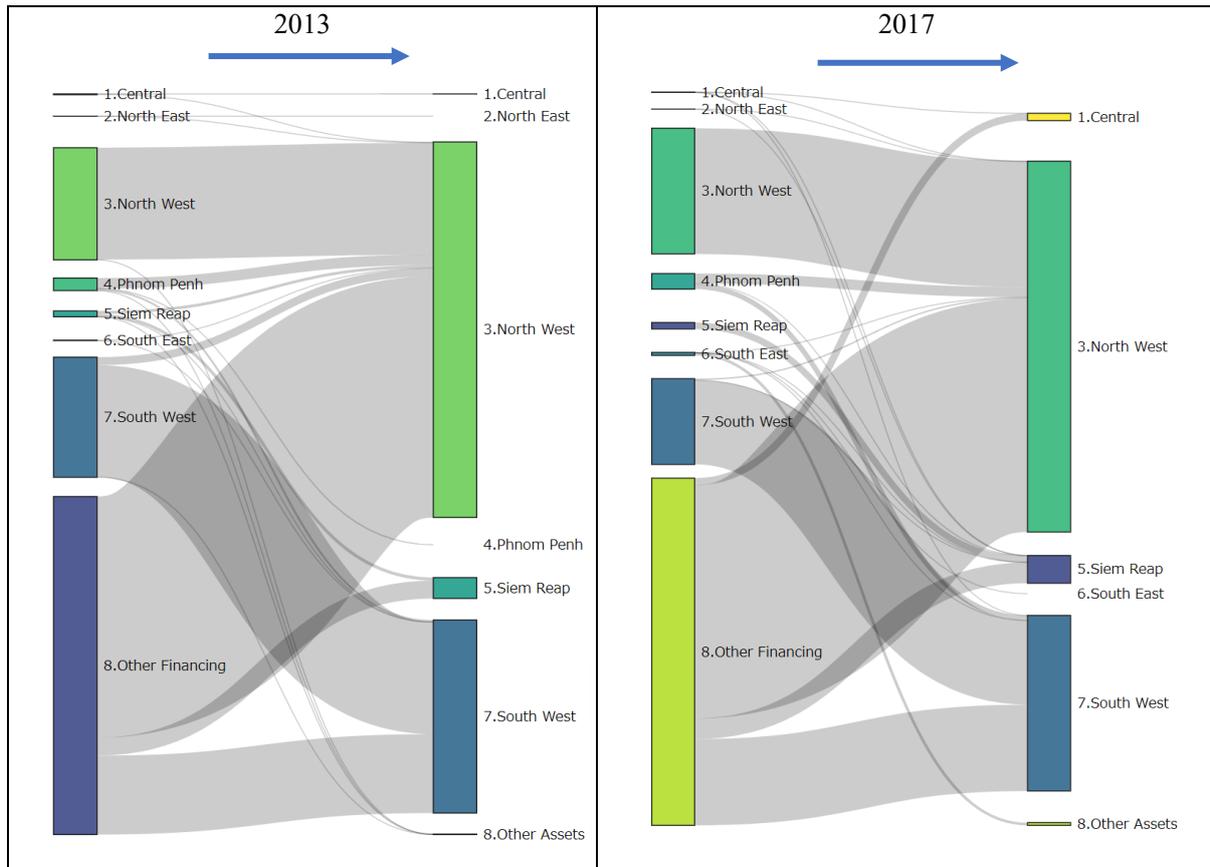
Note: The left-hand side represents funds collected through deposits or wholesale borrowing, and the right-hand side represents loans in each region.

Source: The JICA-NBC Joint Survey 2017 , and authors' calculation.

Abstract (in Japanese)

要　　約

　多くの途上国の銀行セクターにおいて、部分的なドル化（Partial Dollarization）は一般的な現象として見られる。しかし、銀行セクターを通じてドル化がどのように国内に広がるのかに関する実証的なエビデンスは少ない。また、銀行セクターは通常、複数の銀行がもつ支店ネットワークが重なり複雑に構成されているため、銀行セクター内での資金移動を分析するには詳細なデータが必要となる。本論文では、複数の通貨が金融システム内で共存するカンボジアを対象に、銀行支店レベルの預金と融資データを用いて、銀行支店ネットワーク内での地域間資金移動を実証的に明らかにした。本論文では、地域間の資金移動を定量化するために、開発途上国の銀行セクターの実態に合わせ、植杉他（2023）によって提案された計量分析手法を発展させた。そして、その手法を用いて、カンボジアにおける通貨別の地域間資金移動のパターンを記述し、銀行を通じて資金がどのように流れているのか、さらに通貨別の資金移動のパターンが 2013 年から 2017 年にかけてどのように変化したか分析する。分析の結果、地方では融資の大きい割合が、プノンペンでの預金から集められた余剰資金や、ホールセール借入あるいは親会社からの資金で調達されていることが明らかになった。そして、この結果は米ドルとクメール・リエルの両方で見られた。ただし、クメール・リエルにおいては、預金額は年々増加しているにも関わらず、米ドルと比較して余剰資金の再配分が積極的に行われていないことが観察された。さらに、一部の地域間では、クメール・リエルの資金移動と米ドルの資金移動が逆向きであることも観察された。これは、通貨間の融資需要や預金需要に地域間での差異があることを意味する。これらの結果は、部分的なドル化経済においては通貨固有の資金移動のトレンドを分析する必要性、さらに現地通貨を促進するうえでは金融機関の余剰資金の再配分の効率性を改善していく必要性があることを示唆するものである。

キーワード：ドル化、バンキング、金融仲介、効率的な信用の資源配分