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Empirical Study on the Promotion of Home Currency in Cambodia

## Determinants of Firms' Capital Structure Decisions in Highly Dollarized Economies: Evidence from Cambodia

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**Hidenobu Okuda and Daiju Aiba**

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JICA Research Institute  
10-5 Ichigaya Honmura-cho  
Shinjuku-ku  
Tokyo 162-8433 JAPAN  
TEL: +81-3-3269-3374  
FAX: +81-3-3269-2054

# Determinants of Firms' Capital Structure Decisions in Highly Dollarized Economies: Evidence from Cambodia

Hidenobu Okuda<sup>\*</sup> and Daiju Aiba<sup>†</sup>

## Abstract

This paper empirically investigates the features and determinants of capital structure decisions of firms in an almost completely dollarized credit market using survey-based data collected by the National Bank of Cambodia and JICA Research Institute in 2014. Specifically, we estimate the determinants of the ratio of bank loans to total assets, using a sample selection model. The major findings are as follows: Firstly, we find that loans from commercial banks are important funding sources for Cambodian firms, and all of the bank loans are denominated in FX currency, especially US dollars. Secondly, the ratio of bank loans to total assets depends positively on how much collateral they can provide for bank loans. Thirdly, firms that possess property and casualty insurance have higher ratios of bank loans to total assets. Lastly, in the Cambodian situation where bank loans are only available in FX currency, currency mismatch risks push firms to reduce the ratio of bank loans to total assets, especially for highly profitable firms. We find that highly profitable firms tend to decrease (increase) the ratio of bank loans in response to an increase (a decrease) in currency mismatch risk, although less profitable firms are not affected by such currency mismatch risks. These results suggest that, as well as other developing countries, external debt procurement heavily depends on how much collateral the Cambodian firms can provide and the extent of their business risks. Furthermore, our results also suggest that, in highly financially dollarized economies with underdeveloped financial systems such as Cambodia, firms with currency mismatch risks tend to reduce bank loans to deal with currency mismatch risks. Therefore, development of a local currency loan market would allow Cambodian firms with local currency revenues to hedge their currency mismatch risks, leading to improvements in financial deepening and inclusion.

*JEL Classification Codes:* G30, G31

**Keywords:** Cambodia, Dollarization, Capital structure, Sample selection model

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<sup>\*</sup> Hitotsubashi University (Email: hokuda@econ.hit-u.ac.jp)

<sup>†</sup> JICA Research Institute (Email: Aiba.Daiju@jica.go.jp)

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## **1. Introduction**

As globalization of the world economy increases, a lot of emerging economies have experienced so-called ‘dollarization’, which means that FX currencies are used in lieu of the domestic currency (Reinhart, Rogoff and Savastano 2003). In these countries, the proportion of FX funds, which are mainly in US dollars (henceforth USD), increase. At the same time, there are growing concerns that this might escalate currency mismatches in the balance sheets of firms and financial institutions. In recent years, an increasing number of countries in Eastern Europe have taken steps to avoid exposing their financial systems to the risk of increased FX debt; for example, countries such as Ukraine have banned FX borrowings (Brown, Ongena and Yeşin 2011). In this context, numerous studies in Eastern European and Latin American countries have examined the determinants for raising the FX funds of firms.

Along with neighboring countries, such as Vietnam, Laos, and Myanmar, Cambodia shows a remarkable degree of dollarization. According to the World Bank (2015), over the past twenty years, Cambodia’s USD bank deposits increased to the level of 92–98% of its total bank deposits and, by December 2014, its USD deposit balances accounted for at least half of its GDP. Furthermore, since the Cambodian economy dollarized from an early stage of its financial development in the 1990s, USD currency has generally evolved to perform all three functions of a country’s currency—that is, it not only fulfils the usual function as a store of value but it also serves as a unit of account and medium of exchange (National Bank of Cambodia 2012). The dollarization of Cambodia has several exceptional features worth noting: among emerging economies, Cambodia, in particular, has a remarkably unregulated financial system, with financial inclusion strongly lacking even in urban areas. In spite of favorable macroeconomic conditions, dollarization has persisted in Cambodia, partly due to the strong network externalities related to USD usage. Thus, we need to examine the factors in the Cambodian economy that differ from previous research as well as the contexts.

In this article, we attempt to empirically investigate Cambodian firms' capital structure decisions by exploiting a unique survey-based dataset, collected in a joint project between the National Bank of Cambodia (NBC) and JICA Research Institute (JICA-RI).<sup>1</sup> Such a highly financially dollarized environment also affects firms' ability to raise external funds. Figure 1 provides a glimpse into the current situation of the Cambodian corporate loan market, as of 2013. Except for one bank, all of the commercial banks extend loans only in FX currency, indicating that firms face difficulties in raising local currency funds from commercial banks. As mentioned in Section 2, some Cambodian firms have revenues in local currency. Thus, this unique Cambodian environment could affect firms' capital structure decisions by exposing them to currency mismatch risks.

Figure 1: The Ratios of FX Currency in Corporate Loans (as of June 2013)

Despite these unique features of Cambodian dollarization, there remains a paucity of empirical investigation. While Cambodian dollarization has been examined by several studies from a macroeconomic viewpoint (Duma 2011; Samreth 2011), there have been few studies focusing on the microeconomic behaviors of economic agents such as households, firms, and financial institutions. A search of previous literature by the authors found no studies that empirically examined firms' fund procurement behaviors under dollarization in Cambodia.

The main contributions of this article are twofold. This is the first attempt to analyze firms' capital structure decisions in highly dollarized environments from the view of corporate finance theory. In the literature of capital structure, Allayannis, Brown, and Klapper (2003) empirically investigated the capital structure decisions of South-east Asian listed firms by

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<sup>1</sup> In the 2013 national election, the Cambodian government included the promotion of use of the riel as one of its policy objectives, outlining its intention to expand the future use of the riel in its report, "Action Plans and Measures to Promote the Use of Riel." In line with this, in 2014, the NBC and JICA-RI began the "Empirical Study into Promoting the Use of Domestic Currency in Cambodia."

examining the determinants of debt-to-value ratio for local currency loans and FX loans, respectively. However, the institutional settings of the subject countries of their study ensure that local currency loans are generally available, and exporting or large firms primarily borrow from abroad to finance their investments. In contrast, Cambodia is a highly dollarized country where only FX loans are available—even for domestic firms.<sup>2</sup> This study documents empirical evidence by using survey-based data of firms in Cambodia and examining non-listed firms' capital structure decisions in such an environment.

Secondly, this study develops an analytical framework to examine the unique circumstances where firms are able to take out only FX-denominated loans. Previous studies on dollarization have analyzed firms in countries where both FX and local currency loans are available. These studies have mainly examined the problem of currency choice, in terms of which currency a firm chooses when taking out a loan (Gelos 2003; Brown Ongena and Yeşin 2011; Kamil 2012; Mora, Neaime and Aintablian 2013). Different from these cases, there is no option for taking out local currency loans for Cambodian firms if they have access to commercial bank loans. This unique feature of the Cambodian loan market might affect the capital structure decisions of a firm. This market situation makes it difficult for firms to hedge currency mismatch risks since they are not able to choose the local currency even though they have local currency income. Furthermore, this potential risk could discourage firms from accessing commercial bank loans. In addition, we employ Heckman's selection model to reduce the potential bias that comes from borrowing constraints in commercial bank loan markets. The analytical framework adopted in this study might be appropriate for use in developing economies.

As a result of our empirical analysis, we find that firms' borrowings in Cambodia are dominated by USD currency. We also find that conventional corporate finance theories, such as

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<sup>2</sup> Appendix Figure 1 provides a glimpse into the corporate loan market in Cambodia, as in 2013. Except for one bank, all of the commercial banks extend loans only in FX currency.

trade-off theory, agency cost approach, and pecking order theory, can explain Cambodian firms' borrowing behaviors. In addition, we tested the hypothesis that firms might engage in risk-hedging behaviors so that the proportion of FX currency in revenues is an additional significant factor when taking out FX loans. However, this hypothesis is only confirmed for firms with high profitability, meaning that there exists heterogeneity in the effect of currency mismatch risks among firms, and firms with low profitability do not consider carefully the currency mismatch risks when taking out FX loans. Since low profitability could be translated as the low availability of internal funds, this result can be interpreted as firms that have low availability of internal funds are likely to take out loans without risk-hedging. It might indicate that some Cambodian firms are exposed to currency mismatch risks, which could be a source of potential fragility in the Cambodian financial sector.

This article is structured as follows. Section 2 reviews the literature of studies on capital structure. Section 3 presents our data in detail and provides descriptive statistics related to borrowing behaviors and operations of Cambodian firms. In Section 4, we articulate our analytical framework and hypotheses in the case of Cambodian firms' FX borrowing behaviors. Section 5 presents our empirical model and Section 6 examines the estimation results. Finally, Section 7 offers our conclusions.

## **2. Literature on Capital Structure Decisions**

Most previous empirical studies on firms' capital structure decisions have focused on firms in developed countries, although there is an increasing number of studies that deal with firms in developing countries as a result of the recent improvement of data availability in those countries. These recent studies focus on whether conventional capital structure theories are also valid for firms in developing countries,<sup>3</sup> and whether specific factors for developing and transition

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<sup>3</sup> Those studies mainly assess the trade-off theory, agency cost theory, and pecking order theory.

economies, such as concentrated ownership structures, the importance of political connections and underdeveloped financial systems, influence the capital structure. Booth et al. (2001) undertook pioneering work in this field to investigate the determinants of capital structure of listed firms in 10 developing countries from Latin America, Asia, and Africa in the period from 1980-1990. De Jong, Kabir and Nguyen (2008) tested the capital structure theories using data of listed firms from 42 developing countries. While most extant capital structure theories have been developed through the study of developed countries, a series of studies confirmed that these theories can also explain firms' decisions on capital structure in developing countries. In the current literature, several studies have constructed large datasets from firms both in developed and developing countries. Gao and Zhu (2015) investigated the role of information asymmetry in the choice of debt or equity capital for listed firms from 39 developed and developing countries, finding that intense information asymmetry leads to an increase in the use of debt capital and a decrease in financing through the stock market.

For South-east Asian countries, Wiwattanakantang (1999) empirically investigated the capital structure of listed firms in Thailand and found that the trade-off theory satisfactorily explained capital structures of Thai firms after controlling for the effects of business group ownership. Likewise, Pandey (2004) reached a similar conclusion by testing trade-off theory and pecking order theory in Malaysian firms. In Chinese listed firms, Chen (2004) found evidence that certain firm-specific factors used to explain capital structures in developed economies are significant in Chinese listed firms, although the author suggests a need for some modifications in the pecking order theory for Chinese firms. The order of preference on sources of funds for Chinese firms' should be: internal funds first, the stock market second, and finally long-term borrowings. Furthermore, Huang and Song (2006) found that the capital structure of Chinese firms is strongly affected by the tax regime, in addition to the conventional determinants of capital structure.

Recently several studies on firms' borrowing behaviors in developing countries have investigated borrowing behaviors in FX currency, although there remains a paucity of empirical evidence. This is because firms that are in a better financial condition started to access to FX funds in the wake of globalization and also because FX currencies started being used even in domestic transactions due to growing dollarization in developing countries. Those studies focused on interest rate differentials between local and FX currencies, and exchange rate risks as factors behind FX borrowing. In light of trade-off theory and pecking order theory, Allayannis, Brown, and Klapper (2003) investigated the determinants of capital structure of 320 listed firms from 8 Asian countries, including FX loans from overseas. The authors found that firms take out more FX loans if exchange rate risks are lower, if the interest rate differential between FX and local currency loans is higher, or if firms have more collateralized assets. Previous studies on FX borrowing behaviors mainly focused on East and Central European, and Latin American countries (Cowan 2006; Kamil 2012). However, local currency and FX currencies are both available in the loan markets of those countries. It is noted that the institutional settings in those countries are different from Cambodia since local currency loans are limited and FX currencies are only available in Cambodian loan markets for firms.

### **3. Dollarization and Corporate Finance in Cambodia**

We describe several features of Cambodian corporate finance using unique survey-based micro data. The data used in this study was collected between October 2014 and January 2015 for the research project "An Empirical Study on Promotion of Home Currency in Cambodia," carried out jointly by NBC and JICA-RI. The survey was aimed at uncovering the real picture of currency usage of Cambodian firms in their operations and financing. The survey covered 856 firms that were randomly sampled from all 25 provinces of Cambodia, ranging from

microenterprises to SMEs to large enterprises.<sup>4</sup> The number of firms interviewed was determined by region and by firm size, based on the size of economic activities in each region.<sup>5</sup> During the survey, firms were interviewed about their business operations and financial activities in 2013; and information on currencies from income statements and balance sheets was collected. In cases where firms declined to take the interview, another firm of the same firm size in the same province was selected for the interview; firms were interviewed until the total sample reached the target number for each category of firm sizes in each region. The aims of the survey were explained at the interviews to the head of the targeted administrative division for the survey; after obtaining approval, the interviewers visited the firms, ensuring that the response rate was relatively high.

The data encompasses relevant information on outstanding loans, such data on lenders, initial and outstanding amounts of loans, maturity of loans, and interest rates. At the time of the survey, out of 856 firms, 223 firms responded that they currently had loans. Since some firms had more than a single loan, the total number of outstanding loans was 237 in our data. Table 1 shows the currency choice of loans by funding sources. Results showed that only 11 loans were denominated in the local currency, Khmer Riel (KHR), while the remainder were denominated in USD. A total of 172 loans (approximately 75% of all loans) were provided by commercial banks, indicating that commercial banks are the most significant funding sources for Cambodian firms. All the loans from formal lenders, such as commercial banks and microfinance institutions were in USD, while KHR loans were provided only by family members, relatives, and friends (henceforth ‘kinship network’) or informal lenders.

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<sup>4</sup> In the survey, firms are classified into four categories based on asset size: (1) firms with asset size below USD 50,000 are classified as microenterprises; (2) firms with asset size ranging from USD 50,000 to USD 250,000 are considered small enterprises; (3) firms with asset size ranging from USD 250,000 to USD 500,000 are as medium-sized enterprises; (4) firms with asset size above 500,000 are categorized as large enterprises. There are 204 large enterprises, 183 medium-sized enterprises, 251 small enterprises, and 218 microenterprises in the sample.

<sup>5</sup> Specifically, the target sample size for each province and firm size was determined according to the Economic Census 2011. For details, see Aiba and Tha (2017).

In Cambodia, collateral is normally required when firms borrow from commercial banks and microfinance institutions (MFIs). Consistently, in our dataset, collateral was required, with 180 loans from commercial banks and MFIs out of 191 loans (no information was provided for the remaining 11 loans), and almost all of the collateral was provided in the form of land titles (in 2 loan contracts, business contracts were required as collateral).<sup>6</sup> This might suggest that the existence of collateralized assets is a significant factor for firms to reduce the issues from information asymmetry in the Cambodian loan market.<sup>7</sup>

Table 1: Currency Choices in Loans (by Funding Sources)

In order to reveal which currency those Cambodian firms with loans mainly use in their operations, we collated the responses to the question “Which currency does your enterprise mainly use?” Table 2 shows the results within firms with loans. We find that, although the majority of firms with loans responded that they used USD, 60 firms (about 27%) responded that they mainly used KHR. The results of Table 1 and 2 indicate that even the firms mainly using local currency have loans in USD. The results might show that, although the firms required loans in KHR, they were not able to take out the loan in local currency. In other words, the currency choice of loans might be decided based on financial institutions’ requirements rather than the firms’ needs. The results also suggest that the firms using local currency could be exposed to currency mismatch risks between loans and operations.

Table 2: Main Currencies Used by Firms with Loans

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<sup>6</sup> No collateral was required with 42 loans from family/relatives, 2 loans from informal lenders, and 1 loan from other sources.

<sup>7</sup> However, the land registration system has remained underdeveloped in Cambodia. As of the end of 2015, the government has issued over 4.15 million land titles, which is 59 percent of the estimated total number of land parcels in Cambodia. (Ministry of Land Management Urban Planning and Construction 2016)

Table 3 shows the number of KHR earners and the number of USD earners among those who have USD loans and who have KHR loans. The result shows that most firms have revenues in a combination of USD and KHR (Panel A and C). We further compared the ratio of FX currency in revenues between KHR loan holders and USD loan holders (Panel C). We find that the ratio of FX currency in revenues is on average higher for the USD loan holders than for KHR loan holders. Although the statistical validity is questionable due to the small sample for the KHR holders, we confirm a similar trend found in previous studies, such as Brown, Ongena and Yeşin (2011) and Mora, Neaime and Aintablian (2014).

Table 3: Number of USD Earners and KHR Earners Among Loan Holders

In Table 4, we present the descriptive statistics of firm characteristics by size. Since our data does not include a variable that would allow us to confirm whether firms faced borrowing constraints, we reduced the sample to the firms with loans. The firms are divided by size into four size categories: microenterprises, small firms, medium-sized firms, and large firms. First, regarding the dummy variable for whether firms would borrow from a bank, we find that larger firms are more likely to borrow from commercial banks.

Table 4: Comparison of Loan and Firm Characteristics (by Firm Size)

There is no trend observed for the return on assets (ROA) across sizes of firms, although the average ROA of microenterprises is slightly greater and the standard deviation of the ROA is extremely large. Regarding the year of establishment and firm sizes, we find that firms with loans are older and larger, reflecting that, in many cases, microenterprises have been founded very recently and their management tends to be unstable.

We also find that large firms have, on average, higher proportions of FX revenues in their total revenues. The average of the dummy variable for whether firms export also shows greater average values in relation to firm sizes, suggesting a positive relationship between revenue and exporting. However, compared with the proportion of FX revenues, the proportion of FX expenditure shows no clear trend across firm sizes, with an average of around 60% across all firm sizes.

Table 5: Comparison of Loan and Firm Characteristics (by Funding Sources)

In Table 5, we present the descriptive statistics of loan and firm characteristics across funding sources. Regarding the amounts of loans, we find that loans from commercial banks are approximately ten times larger than those from MFIs and five times larger than those from kinship networks. In addition, commercial banks extend loans with better conditions than MFIs and kinship networks in terms of interest rates and maturity. Again, the results might indicate that commercial banks are significant funding sources for Cambodian firms. In fact, NBC regulates MFI activities and restricts the maximum amount at which MFIs can grant loans.

Moreover, the proportion of FX revenue is much higher in firms with bank loans. While no discernible difference is found in the proportion of FX expenditures, FX revenues are higher for firms with bank loans. Furthermore, the average of the dummy variable for whether a firm is involved in exporting activities is higher for firms with bank loans. No vast difference can be observed with regard to ROA, although firms with bank loans on average showed an ROA 1–2% lower than those with loans from other funding sources. We also find that firms with bank loans are older, suggesting that older firms are less likely to suffer from the problems of information asymmetry, possibly because of their reputation.

Interestingly, we find that there is a gap in currency composition between revenues and expenditures, apart from currency mismatch between loans and revenues. Figure 2 illustrates the

proportions of FX revenues and FX expenditures of 856 firms. The figure indicates that many Cambodian firms face gaps in the proportions of FX revenues and expenditures. Thus, these firms might face the exchange rate risks of multiple mixed currencies in their operations; they need to convert currency in their operations frequently. In other words, they may face risks from cash flow uncertainties, which is one of the specific risks in highly dollarized environments.

Figure 2: The Ratios of FX Revenue and FX Expenditure

#### **4. Analytical Framework for Firms' Borrowing Behaviors in Cambodia**

In this section, we present the analytical framework and hypothesis on firms' borrowing behaviors in the case of Cambodia. As seen in Section 2, most borrowing is in USD, indicating that Cambodian firms can only raise external funds in FX currency.<sup>8</sup> In the previous empirical literature on FX borrowing, it has been found that firms typically raise funds using both local currency and FX-denominated loans, and there is a wide dispersion in the ratios of FX loans in liabilities. On the other hand, as observed in Section 2, the tendency in usage of FX loans in Cambodian firms is different. In particular, loans from commercial banks, which might be the most important source of borrowing for many firms, are almost entirely issued in USD. Accordingly, the conventional estimation of the determinants of the FX loan ratio to total loans, which frequently appears in prior research, is not applicable to the case of Cambodia.

Therefore, since they cannot choose their desired loan currency, Cambodian firms' capital structure problems could involve another determinant in addition to conventional corporate finance theories, such as trade-off theory, agency cost approach, and pecking order theory. In practice, the financing sources for Cambodian firms consist of three choices: internal funds, loans from non-banking sources, and FX bank loans. There are two aspects to this choice:

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<sup>8</sup> As shown in Appendix Figure 1, almost 100% of bank loans in Cambodia are US dollar-denominated.

how much external credit they use, and the size of the FX loans they take out. In other words, Cambodian firms with local currency revenues face inevitably currency mismatch risks when they access loans. In the following section, we develop the theory and hypotheses for the determinants of capital structure, based on the context of a highly dollarized economy.

## **4.1 Determinants of debt financing**

### **4.1.1 Trade-off approach**

Modigliani and Miller (1958, 1963) argued that, in the case of a perfect capital market without information asymmetry—meaning that there are no transaction costs, no corporate taxes or risks of corporate insolvency—corporate value would not rely on capital structure, and the method of corporate financing would not impact on corporate value. In the real world with corporate tax, however, debt financing can provide a tax shield against corporate tax. Thus, firms have an incentive to raise the debt ratio to increase corporate value. However, the merits of debt tax shields weaken when a firm can use various tax deductions and preferential systems besides the corporate tax systems, such as depreciation, investment incentives, and the like (called non-debt tax shields). In Cambodia, there is little awareness of the use of debt tax shields, because knowledge of corporate accounting is poor except for a few companies, and the government's ability to collect taxes is weak. Moreover, in practice, firms do not use non-debt tax shield frameworks, not only because knowledge of accounting and the tax system is not widespread but also because the Cambodian government follows almost laissez-faire policies. Thus, one can expect to see practically no debt tax shield effect on financing behavior.

On the other hand, companies do have the incentive to lower insolvency risk by lowering their debt ratio because, when their dependence on debt increases, the insolvency risk rises due to exposure to exogenous shocks. One can expect a lower debt ratio because the cost of debt financing rises as the firm's insolvency risk rises (Rajan and Zingales 1995; Köksal, and

Orman 2015).<sup>9</sup> Moreover, because companies with higher rates of return have lower default risk due to their larger cash flows, these companies may have an incentive to take out larger amounts of debt financing.

*Hypothesis 1: As firms' business risks increase, the leverage ratio of firms will decrease.*

#### **4.1.2 Agency cost approach**

In a world with information asymmetry and imperfect contracts, firms may encounter an agency problem, characterized by a conflict of interest among a firm's stakeholders, including shareholders, managers, and creditors. In Cambodia, few hostile takeovers occur, firstly because high concentration ownership is normal, not only for microenterprises and medium-sized enterprises but also for large companies; and secondly, because there is no well-established stock market. On the other hand, there is a large information gap between external creditors, such as financial institutions and firms, and high costs to screen and monitor investment targets, which is an impediment for firms seeking external financing (Allayannis, Brown and Klapper 2003). The low level of business acumen and the slow adoption of bookkeeping systems makes it difficult for external creditors to evaluate the operational standing of a firm.<sup>10</sup> Thus, the issue of agency costs involved in Cambodian firms is likely to occur between large shareholders who also serve as management and external creditors.

Firms can resolve agency issues between external creditors and managers by providing collateral (Allayannis, Brown, and Klapper 2003). Significant problems exist related to

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<sup>9</sup> Desai, Foley and Hines (2008) empirically verify that firms adjust the size of risk by adjusting the capital composition for large management risks. On the other hand, Booth et al. (2001) empirically analyze the relationship between the capital composition among Asian countries and the standard deviation of sales as management risk, finding differing results that are in a positive or negative direction depending on the country.

<sup>10</sup> According to an exhaustive survey of the company census performed in 2011, close to 99% of Cambodian companies operate informally, without operating licenses from the supervising government agency.

information asymmetry in new projects for small-scale firms and firms with high growth potential (Clark and Judge 2008). Therefore, one can expect that it becomes easier to secure financing from external creditors as the firm acquires more fixed assets to use as collateral or the firm grows in size.

*Hypothesis 2: As agency cost caused by information asymmetry between firms and creditors increases, firms' leverage ratio will decrease.*

#### **4.1.3 Pecking Order Theory**

Under conditions of information asymmetry between a lender and a borrower, the cost of financing will depend on its source (Froot, Scharfstein and Stein 1993). In Cambodia, there are large differences in information asymmetry depending on the financing source. Therefore, in line with the suppositions of the pecking order theory, one can also assume that companies will first secure financing from their own funds and from related parties with which there is little information asymmetry. They will then seek financing from microfinance institutions with which there is relatively little information asymmetry, and they will finally seek to secure financing through bank loans, which have the highest information asymmetry.<sup>11</sup> Generally, the sufficiency of a company's internal reserves increases as its potential retained earnings increases. Since companies with high rates of profit have higher amounts of internal reserves available for financing, these companies are not likely to secure access to external funding. In other words, the higher a company's rate of profit, the smaller its debt ratio is expected to be.

*Hypothesis 3: As firms' rate of profit increase, the leverage ratio will decrease.*

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<sup>11</sup> Presenting objective information is crucial for a creditability evaluation for bank loans. More than half of micro and small enterprises cannot access bank loans because they cannot submit documents to allow for an objective evaluation.

## **4.2 Additional problems related to FX denominated loans**

When debts in FX currency are incurred, additional insolvency risk factors and agency costs can arise when compared to incurring debt in the local currency. It is important to make adjustments for the situation in Cambodia with regard to such risks and issues.

### **4.2.1 Currency mismatch risks between cash inflow and debts**

In Cambodia, in addition to regular insolvency risks, there is also the potential for insolvency arising from a currency mismatch between cash flow and liabilities due to dollarization in the economy. In developing countries in which dollarization has occurred, the interest rate on US dollar-denominated debt is generally lower than that on national-currency denominated debt. When a company that has national-currency denominated revenues uses US dollar loans, it has an advantage in that the loan interest rate is lower than that for national-currency denominated loans. However, there is also the disadvantage of higher costs in case of financial ruin due to the currency mismatch between revenue and loans repayable.

Previous studies on currency choice in debts documented the theoretical models and showed empirical evidence that firms choose FX loans to avoid currency mismatch risks. Jeanne (2005) and Cowan (2006) theoretically revealed that, in cases where the aforementioned trade-off relationship exists, risk-averse firms tend to have more FX loans if the ratio of FX revenue to total revenue is higher. Luca and Petrova (2008) also provided a theoretical model incorporating both banks and firms in order to support this theory. They demonstrated that firms with a high level of risk aversion tend to match the denomination of loans with the currency in revenues. Meanwhile, Gelos (2003), Allayannis, Brown and Klapper (2003), Brown, Ongena and Yeşin (2011), Mora, Neaime and S. Aintablian (2011), and Kamil (2012) empirically verified that when firms choose a loan currency, they match the currency composition of debts

and revenues.<sup>12</sup> As these studies show, as the ratio of FX revenue to total revenue increases, the ratio of FX debt to total debt is expected to increase, *ceteris paribus*.

In the case of Cambodia, limitations on the availability of local currency loans make it difficult for firms to hedge currency mismatch risks when firms have local currency revenues. Thus, if firms have a larger portion of local currency in their revenues, they will have smaller amount of FX loans due to the currency mismatch risks. In other words, firms with FX currency revenues have an advantage when borrowing from commercial banks. If firms have a larger portion of FX currency in their revenues, they can raise more external funds from commercial banks.

*Hypothesis 4: If a firm has a larger share of FX currency in its revenue, its leverage ratio will rise.*

#### **4.2.2 Agency cost problems and debts in FX currency**

Prior research also finds additional agency costs related to FX currency borrowing. Allayannis, Brown, and Klapper (2003) uncovered a relationship in which firms owning higher amounts of fixed assets are more likely to use FX currency credit. This suggests that a company's ability to provide collateral is an important variable as a determinant for loans, even when the economy has shifted to US dollars. In addition, Allayannis, Brown, and Klapper (2003) revealed that the firms were inclined to have a higher debt ratio as their use of US dollar debt increased. This suggests that companies that use FX currency debt have an information asymmetry with external creditors that differs from that of other firms and that there is a propensity for these companies to find it easier to access financing. Moreover, according to Brown, Ongena, and Yeşin (2014),

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<sup>12</sup> Accordingly, the export company dummy used as a representative variable for FX revenue has a significantly positive relationship with the probability of selecting US dollar debt, and this evidence supports the argument of firms' risk-averse actions in selecting the currency denomination of debt.

when information is insufficient for external creditors to verify the currency composition of company revenues, there could be an adverse selection of companies with local currency revenues choosing FX debt because FX debt financing has a lower interest rate than local currency debt. This view also derives from Hypothesis 2 in the context of Cambodia.

#### **4.2.3 Difference in sensitivity to currency mismatch risks**

As pointed out in previous literature, the extent of corporate risk management may be different among firms (Froot, Scharfstein and Stein 1993; Allayannis, Brown, and Klapper 2003). In other words, there exists a possibility of heterogeneity in hedging behaviors against currency mismatch risks. In highly dollarized countries, where FX currency borrowings are only available for external funds, borrowing money always comes along with additional costs as currency mismatch risks, particularly for firms with local currency income. In this regard, hedging behaviors against currency mismatch risks may differ among firms, depending on their characteristics.

We conjecture that availability of internal funds could be a factor in deriving the heterogeneity in hedging behaviors against currency mismatch risks. In previous literature on corporate finance, it is argued that, if internal funds are available, external funds could become costly for firms (Fazzari, Hubbard and Petersen 1988). In addition, the previous study suggests that an increase in the cost of funds will lead to an increase in incentive for firms to take a hedging behavior (Froot, Scharfstein and Stein 1993). Therefore, firms that have greater internal funds would be more likely to adjust the risk of currency mismatches when taking out external funds. Accordingly, since there is only FX currency available for external funds in Cambodia, firms with greater internal funds will borrow less if they have less FX currency in income, due to the currency mismatch risk. Meanwhile, firms with smaller internal funds may be likely to

ignore the currency risk, since the benefit of obtaining sufficient funds outweighs the currency risk.

*Hypothesis 5: As availability of internal funds increases (decreases), the sensitivity to currency mismatch risks will increase (decreases).*

## 5. Empirical Methodology

### 5.1 Estimation strategy

As mentioned earlier, firms are likely to choose commercial banks when taking out loans, and such loans from commercial banks are on average much larger than those from other funding sources.<sup>13</sup> Given that borrowing from kinship networks and MFIs has different characteristics and in practice can be seen as a type of internal funds, bank borrowing is the only external and significant funding source for firms' financing in Cambodia. Based on the findings above, we examine what factors affect firms' capital structures in Cambodia, which is one of the most dollarized economies, using the survey-based data. In our study, we regress the ratios of bank borrowings to total assets on a firm's characteristics. Specifically, we estimate the following equation (1):

$$\ln(\text{Bank Loan}_i/\text{Total Assets}_{ij}) = \alpha + \beta X_i + \epsilon_i \quad (1)$$

where  $\text{Bank Loan}_i/\text{Total Assets}_i$  represents the ratio of bank borrowings to total assets of firm  $i$ .<sup>14</sup>  $X_i$  represents a vector of firm characteristics of firm  $i$ . It is natural to assume

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<sup>13</sup> In fact, we ran several regressions with MFI borrowings and borrowings from kinship networks as a dependent variable instead of bank loans. Most of the results in coefficients were different from the bank borrowings. These results are available on request.

<sup>14</sup> We found that bank borrowings were all denominated in USD in our dataset.

that the debt dependency varies across industries. Therefore, we control for the effect by including industry dummies in the model. In this study, we categorize industries into four types; the manufacturing sector, the retail and wholesale trade sector, the tourism sector, and others.

It is noteworthy that all of the bank borrowings of firms in our sample are denominated in USD. Thus, our regression model does not only capture the conventional factors in the relationship between capital structure and firms' characteristics, but also captures additional factors in the relationship between FX borrowing and firm characteristics, such as currency mismatch risks.

## **5.2 Explanatory variables**

First, we employ a volatility of monthly sales as an indicator of firms' operational risks, in order to test *Hypothesis 1* for the trade-off theory. Specifically, in our dataset, respondents self-evaluated changes in sales of each of 12 months, choosing from five categories: 'No sales', 'Decrease', 'Stable', 'Increase', and 'Highest'. We treat the variable as a continuous variable from 1 to 5, and calculate a standard deviation of the variable as the volatility of monthly sales for each firm. As a proxy for the operational risks, Booth (2001) employs the volatility of ROA during the subject period, and Köksal and Orman (2015) use the standard deviation of sales in the past three years. Those authors find that there is a negative correlation between a debt-asset ratio and an operational risk. In addition, we further control for the effect of having insurance, in order to capture the extent of operational risks of enterprises, since having insurance generally decreases the operational risk of firms. We use the insurance dummy which takes one if firms have insurance for their operations. We expect that this variable would negatively affect bank borrowings ratio.

Secondly, in the following manner, we test if agency cost theory and pecking order theory fit in Cambodian firms' behaviors. To test *Hypothesis 2* (agency cost theory), we use the

ratio of fixed assets to total assets as a proxy for collateral values of firms, which are considered to reduce information asymmetry problem between firms and lenders. Booth (2001) also employs this variable as a proxy for a firm's ability to provide collateral to reduce the agency cost. To test *Hypothesis 3* (pecking order hypothesis), we follow Allayannis, Brown, and Klapper (2003) and Gao and Zhu (2015), and employ profitability, which is supposed to reflect the availability of firms' internal funds. In order to capture profitability, we include ROA. ROA is created by subtracting the amount of expenditure from the total income and dividing it by total assets.

In order to investigate the effects of additional business risks stemming from dollarized environments, we use a ratio of FX income to total income in the model to examine the relationship between FX borrowing and the currency composition of revenues (*Hypothesis 4*). In previous studies, dummies for export firms or the ratio of income from exporting to total income have been used as a proxy for FX income due to limitations on data availability (Brown, Ongena, and Yeşin 2011; Brown et al. 2011; Mora, Neaime and Aintablian 2011). However, in the case of Cambodia, since a lot of firms use FX currency in domestic transactions as well as local currency, it is inappropriate to use income from exporting as a proxy for FX income. Accordingly, we employ the ratio of FX income. However, since there is a possibility that export firms tend to have larger borrowings, we also estimate the model with an exporter dummy to control for the effect.

Finally, it is expected that the extent of information asymmetry and business risks could differ across industries and the difference might affect firms' choices of capital structure. To control for the differences, we use industry dummies which represent categories of industrial sectors as (1) manufacture, (2) retail and wholesale, (3) hotel and tourism sectors, and (4) others.

### 5.3 Sample selection bias due to borrowing constraints

To estimate the coefficients in the equation (1), we employ Heckman's sample selection model.<sup>15</sup> In Cambodia, it is likely that many firms with the need for external borrowings cannot gain access to commercial bank loans due to informational opaqueness and low abilities of banks to extend loans to such firms.<sup>16</sup> In addition, Cambodia is categorized as a low-income country and most extant firms are small or medium-sized. Furthermore, there is no explicit standard for accounting and many firms do not keep official accounting records, although commercial banks require a solid financial statement to extend loans. Therefore, many firms are likely to be screened out (rejected) or discouraged by commercial banks, undermining their demand for loans. Thus, simple estimation within firms with bank borrowings could be biased due to missing firms that have been denied or become discouraged.<sup>17</sup>

Firms that only have borrowings from microfinance institutions (MFIs) and kinship networks might also face financial constraints. We found that some firms in our dataset only borrowed from MFIs, or their families and relatives (kinship networks), instead of commercial banks. It might be easier for firms to borrow from MFIs than from commercial banks, since MFIs use a specific lending scheme to lend to poor and small/medium-sized enterprises by exploiting soft information, while commercial banks mainly use hard information such as financial statements to screen out firms. In developing countries, MFIs and kinship networks are funding sources that firms can easily access because, among other sources, information asymmetry is the smallest. On the other hand, it is more difficult to borrow large amounts of

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<sup>15</sup> Even though we attempted to mitigate the endogeneity issue of sample selection biases, there could be other endogeneity issues, such as reverse causality and omitted variable biases. However, because of the limitation of the NBC-JICA survey, we could not use valid instrumental variables to deal with these potential biases. Constructing panel data could provide one solution by allowing for use of fixed effects and lagged dependent variables to model partial adjustment over time (Ayyagari, Demirguc-Kunt and Maksimovic 2013). These problems should be addressed in future research.

<sup>16</sup> According to World Bank Global Findex, financial inclusion rates in Cambodia are 28% as the percentage of people at the age of over 15 in terms of the rate of formal borrowing, 22% in terms of the percentage of accounts in formal financial institutions, and 4% in terms of the rate of formal savings.

<sup>17</sup> According to Brown, Popov and Yeşin (2011) and Cole and Sokolyk (2016), firms with no loans can be classified into three groups: (1) firms which have no need of loans, (2) firms for which loan applications are rejected by lenders, and (3) firms which did not apply or became discouraged.

money and firms are more likely to suffer from insufficient funds when borrowing from MFIs or kinship networks than in the case of commercial banks, as seen in Section 2. In addition, interest rates on loans from MFIs are generally higher than commercial banks. Therefore, it is natural to assume that firms would borrow from commercial banks if they can receive finance from commercial banks, and firms that have only loans from MFIs and kinship networks are likely to face borrowing constraints.

Accordingly, equation (1) estimations can be subject to sample selection biases due to firms that are not able to borrow from commercial banks despite the demand for external funds. To carry out an unbiased estimation, it is necessary to take into account the sample selection process in the estimation; that is, the process of whether firms gain access to commercial bank loans or not. However, our dataset does not cover the information on which firms are exactly facing borrowing constraints or were screened out (rejected) or discouraged by banks. Thus, we assume that firms with debt from MFIs or kinship networks were not able to borrow from commercial banks, and they borrowed from MFIs or kinship networks. Under such an assumption, we run the selection equation below.

$$Access\ to\ Bank\ loan_i = 1(\alpha + \gamma_1 X_i + \gamma_2 Z_i + e_i > 0) \quad (2)$$

where *Access to Bank loan<sub>i</sub>* represents the dummy variable that takes on one if firm *i* borrowed from commercial banks and zero if they borrowed from MFIs or kinship networks. *X<sub>i</sub>* and *Z<sub>i</sub>* are vectors of variables which are determinants of accessibility to bank loans. We use the same variables used in equation (1) as *X<sub>i</sub>* and use variables which satisfy the exclusive restriction as *Z<sub>i</sub>*. For the variable which satisfies the exclusive restriction, we employ the logarithm of total assets as a proxy for firm sizes. Hadlock and Pierce (2010) study the determinants of borrowing constraints for firms and find that firm size is one of the significant

factors in determining whether firms can access financial institutions to borrow more. Similarly, Cole and Sololyk (2016) focus on SME finance in the USA and find that larger firms are more likely to receive credit from commercial banks. Brown et al. (2011) study which kinds of firms have had loans approved in European countries, finding that small firms are not likely to apply for loans, although their study does not confirm the significant effect of firm size on loan rejection. These studies suggest that firm size could be a significant factor in determining whether firms are rejected or discouraged from bank loan applications. We conjecture that this is also likely the case in Cambodia since the lenders that can provide large amounts of funds are limited to commercial banks in Cambodia.

## **6. Empirical Results**

As described earlier, there are 223 firms with loans in our dataset. However, since we dropped part of the sample that had missing values in amounts of loans and explanatory variables, the sample size was reduced to 114 firms. Out of this 114, 70 firms borrowed from commercial banks and 38 borrowed from family/relatives or MFIs.

Table 6 shows the results of the estimation of determinants of Cambodian firms' capital structure.<sup>18</sup> Note that all of bank loans here are denominated in USD. Thus, we estimated the determinants of capital structure decisions for the Cambodian firms in terms of the dollar amount borrowed\*\*67\*\* in FX bank loans. In the estimation, we employed Heckman's sample selection model. We estimated equation 1 and 2 simultaneously using maximum likelihood estimation. In Table 5, we presented the estimation results of both equation 1 (Main equation) and equation 2 (Selection) from three different models. Model 1 is presented as the baseline model. In Model 2, we included an exporter dummy which takes one if firms export goods. In Model 3, we included

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<sup>18</sup> Correlation matrix of variables used in the estimation is presented in Appendix Table 1.

an interaction term of the ratio of USD in sales and ROA. In Model 4, we included all variables in the estimation.<sup>19</sup>

Table 6: Results of estimation of determinants of Cambodian firms' capital structure.

In Table 6, we find that rho, which represents the correlation between the residuals in equation 1 and 2, is significantly positive in all models. This means that, if firms without bank loans were able to take out bank loans, they would take out smaller bank loans than firms that currently have bank loans. We also find that the coefficients of the logarithm of total assets, which we included as the exclusive restriction in equation 2, are significantly positive. Those results suggest that sample selection bias exists in the estimation of the simple OLS method due to exclusion of some firms from the bank loan market. The results also indicate that firm size is an important factor in determining firms' access to bank loans in Cambodia, in line with previous studies (Hadlock and Pierce 2010; Brown et al. 2011; Cole and Sololyk 2016).

Regarding firms' borrowing behaviors, the results are consistent with our hypotheses (*Hypothesis 1-2*). Firstly, we find that the coefficient of the ratio of fixed assets to total assets (Ratio of Fixed Assets) is significant and positive in the main equation of all models. In line with Booth et al. (2001) and Allayannis, Brown, and Klapper (2003), the results indicate that firms with more fixed assets can borrow larger amounts when borrowing from commercial banks. Accordingly, the results imply that whether or not firms have non-financial and collateralizable assets is an important factor in determining how much firms can borrow from commercial banks

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<sup>19</sup> We also estimated the Heckman's selection model with a clustering method in calculation of standard errors among industries. The results are presented in Appendix Table 2. The results are largely the same, although the significance of some variables disappears. Some differences in statistical significance could be due to the small sample problem but our main results do not change. Thus, the additional analysis of the clustering method does not change our conclusion.

due to high information asymmetry in commercial bank loan markets, similar to other developing countries.<sup>20</sup>

Secondly, coefficients of the volatility of sales are not significant in all specifications in Table 5. Meanwhile, the dummy for firms with insurance (Having insurance) is positively and significantly associated with the FX bank leverage ratio in several models (Model 1, 3, and 4). The results can be interpreted as managers taking out large loans since they find that risks relating to their business are mitigated by having insurance. The results are in line with the prediction from trade-off theory (*Hypothesis 1*) that firms with smaller risk tend to borrow more. The results may imply that health or accident insurance can lower risks in business, and have a positive effect on firm management by reducing borrowing constraints in Cambodia.

We find that the estimated coefficients of the ratio of FX currency in sales (Ratio of FX sales) are not significant in the main equation of all models, although Cambodia is one of the most dollarized economies. The results do not support our hypothesis that firms with more FX currency in sales borrow more FX loans. Interestingly, it might seem that firms' borrowing is not affected by currency mismatch risks even in the heavily dollarized economy. Meanwhile, we find interesting results in Model 3 and 4, which both include the interaction term of ratio of FX currency in sales and ROA. Firstly, we find that the ROA is negatively estimated in Model 3 and 4. In line with our prediction from pecking order theory (*Hypothesis 3*), the results suggest that firms with plenty of internal funds are unlikely to have external debts, possibly because external debt funds are relatively costly. Secondly, we find that the interaction term of ratio of FX currency in sales and ROA is positively and significantly associated with the amount of FX borrowing. This means that the relationship between the ratio of FX currency in sales and FX borrowing differs depending on the availability of internal funds. In other words, firms with

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<sup>20</sup> We also regressed the total-loans-to-asset ratio which includes loans from MFIs or kinship networks. In that case, we did not find any significant signs with the ratio of fixed assets. This might suggest that collateralizable assets are not determinants of firms' borrowing from MFIs and kinship network, possibly because of low information asymmetry when borrowing from those sources. Results are available on request.

more internal funds tend to adjust the currency mismatch risk, while firms with less internal funds do not care about such risks. Therefore, the results are in line with our hypothesis (*Hypothesis 5*), and further provide an important implication that there exists heterogeneity in firms' behaviors relating to hedging against currency mismatch risks, and the insignificant results in Model 1 and 2 might come from the misspecification of heterogeneity.

Furthermore, the ratios of FX sales are significantly positive in selection equation of all models, suggesting that firms with larger shares of FX currency in sales are more likely to have accessibility to bank loans. These results may suggest that firms with a larger share of FX currency in sales will have a lower likelihood of facing borrowing constraints when accessing bank loans. In addition, when including an exporter dummy (Exporter Dummy), we find the same results, which implies that whether or not the firms are exporters does not affect the capital structure. This is possibly because the transactions are heavily dollarized in Cambodia, and occurs regardless of whether firms are exporters or not.

## **7. Conclusion**

In this paper, we empirically investigated the features and determinants of capital structure decisions in a highly dollarized economy, using micro data collected in a survey carried out by NBC and JICA-RI in 2014. We used the financial information of 223 firms which had received a loan during the period and examined the relationship between the firm's characteristics and the ratio of FX bank loans to total assets. Our contribution is that our study is the first to empirically investigate firms' fundraising behaviors in Cambodia using large-scale survey-based data. In addition, our study is the first one to focus on firms' capital structure decisions in a highly dollarized environment where only FX currency is available for external funds, while most previous studies in the literature of dollarization investigated currency choices in borrowings. Moreover, we took into account the selection bias problem of whether firms can access bank

loans, which is likely to be an issue in emerging and developing countries. Our findings on Cambodian firms may be helpful for understanding firms' capital structure decisions in the heavily dollarized environments of other emerging economies. In recent years, dollarization has become increasingly widespread around the world, and demand for FX borrowings has also increased. We believe that the findings in this paper can provide useful information for further discussion on global trends in dollarization.

Our empirical results reveal several interesting facts. Firstly, we found that loans from commercial banks are important funding sources for Cambodian firms, and all of the bank loans are denominated in FX currency, especially the USD. Secondly, Cambodian firms' capital structure decisions are rational and in line with the predictions from conventional economic theories. In particular, the ratio of fixed assets (availability of collateral) has a large effect on firms' borrowing from commercial banks. This suggests that provision of collateral is a significant factor in reducing agency costs. In other words, the immaturity of the financial market has led to information asymmetry between banks and firms. Thirdly, having insurance (a proxy for operational risks) has a significant effect on firms' borrowing from banks. This might be because firms recognize that insurance has efficacy on the reduction of operational risks, and also partly because it is easy for banks to verify whether firms have insurance. Fourthly, an increase in ROA (the availability of internal funds) can reduce the ratio of firms' borrowing from banks to total assets. This finding might suggest that, due to significant information asymmetry, there exists a clear difference in funding costs between internal and external funds in Cambodia. Fifthly, as a specific feature in heavily dollarized economies, the interaction term of the ratio of FX currency in sales (the proxy for currency mismatch) and ROA has a positive sign, while the ratio of FX currency in sales per se does not affect FX borrowing. It means that there is heterogeneity in firms' hedging behaviors against currency mismatch risks, and firms with plenty of internal funds are likely to take out smaller amount of FX loans if they have less FX currency in sales. In other words, the results imply that firms with lower internal funds

potentially have to take on currency mismatch risks in return for obtaining the external debts. Thus, there is a possibility that firms' reckless behavior in borrowing can be a potential risk to Cambodian financial markets. Lastly, the estimation results of the Heckman selection model indicate that sample selection bias is significant in the case where we run a simple OLS model. This suggests that some firms cannot access bank loans—an indication of the immaturity of Cambodian financial markets. In particular, we found that firms with lower FX revenues tend to have less accessibility to bank loans.

From the findings above, we can draw several implications in regard to policy issues. Firstly, it is necessary to reduce information asymmetry between firms and external funders. We found that having collateral and having insurance result in significant effects on firms' capital structure decisions, indicating that there exists significant information asymmetry in the Cambodian financial market. In order to reduce information asymmetry, it is necessary to develop banks' screening capacity, and for firms to keep accurate accounting records and to better organize their financial information. Furthermore, it is necessary for governments to establish accounting standards and develop financial markets.

Secondly, it is necessary to facilitate firms' use of collateral and insurance in their businesses. Although land titles are the most commonly used collateral, the land registration system is still insufficient in Cambodia. Promotion of land registration is important in enabling firms to acquire enough funds. Furthermore, since promotion of property insurance and workers' compensation insurance may also be effective in enhancing corporate finance, then corporate works of industrial associations, governments, and financial institutions will be necessary.

Lastly, it is necessary to deal with currency mismatch risks in dollarized economies. Since Cambodia is one of the most dollarized economies, the ratio of FX currency in sales widely varies across firms, and there are also mismatches in currency compositions between sales and expenditures and between sales and debts. Although the exchange rate of USD to KHR has been stable in recent years, there are potential risks of exchange rate changes in the firms'

operations. Even though it is unrealistic to stop the use of FX currency in short run, it is important for firms and financial institutions to pay attention to this potentially serious issue. Furthermore, our results suggest that firms with currency mismatch risks tend to reduce bank loans to deal with currency mismatch risks. Therefore, development of a local currency loan market might allow Cambodian firms with local currency revenues to hedge their currency mismatch risks, leading to improvements in financial deepening and inclusion.

However, there are several limitations to our study due to data availability. Our dataset is missing values in several variables used in the estimation, especially for the amount of sales. Thus, the sample size of our study became smaller. Furthermore, the data collected in the NBC/JICA-RI survey only covers the information on outstanding loans. Therefore, it is difficult to distinguish between firms which face borrowing constraints and firms which are not in need of funds. In this regard, we dealt with this sample selection bias by employing a sample selection model, and setting the selection equation of whether a firm has access to bank loans or access to MFI loans and kinship networks. However, we did not identify exactly which firms are excluded from bank loans and which firms do not require external funds. Thus, in our empirical methodology, there might be still a potential problem in selection of the firms that face borrowing constraints. Information on whether or not a firm has applied for loans in the past is needed to truly examine such selection biases, while we obtained the results which are consistent with our hypotheses despite these problems.

In addition, because of the limitations of the NBC/JICA-RI survey, we could not use valid instrumental variables to resolve other endogeneity issues such as reverse causality and omitted variable biases. Constructing panel data could provide a solution by allowing for use of fixed effects and lagged dependent variables to model partial adjustment over time (Ayyagari, Demirguc-Kunt and Maksimovic 2013). Similarly, it is difficult to examine currency mismatches between assets and liabilities using our dataset, since the data does not cover currency denominations of all financial assets. In this regard, future work will need to take into

consideration how to capture the relevant data, and the design of the next survey by NBC/JICA-RI should reflect on those results from our analysis.<sup>21</sup>

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<sup>21</sup> The second stage of our survey is planned to be conducted in August-November 2017. We are planning to expand our survey to collect more variables and we are going to track the same firms to construct panel data.

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**Table 1: Currency Choices in Loans (by Funding Sources)**

	KHR	USD	Total
Commercial Banks	0	172	172
Microfinance Institutions	0	19	19
Family, Friends, and Relatives	4	38	42
Informal lenders	2	1	3
Others	0	1	1
<b>Total</b>	<b>6</b>	<b>231</b>	<b>237</b>

*Source* : Survey data from JICA and NBC joint project

**Table 2: Main Currencies Used by Firms with Loans**

	Frequency	Percent.
KHR	60	26.91
USD	126	56.5
Other currencies	15	6.73
N.A.	21	9.42
Don't Know	1	0.45
<b>Total</b>	<b>223</b>	<b>100</b>

*Source* : Survey data from JICA and NBC joint project

**Table 3: Number of USD Earners and KHR Earners Among Loan Holders**

Panel A: USD loan holders				
		Earning in KHR		
		No	Yes	Total
Earnings in USD	No	0	10	10
	Yes	9	153	162
	Total	9	163	172
Panel B: KHR loan holders				
		Earning in KHR		
		No	Yes	Total
Earnings in USD	No	0	2	2
	Yes	0	2	2
	Total	0	4	4
Panel C: The ratio of FX currency in Sales				
		Obs	Mean	S.D.
USD loan holders		172	0.48	0.34
KHR loan holders		4	0.15	0.24

*Source:* Survey data from NBC and JICA-RI joint project

**Table 4: Comparison of Firm Characteristics (by Firm Sizes)**

		Bank loan (Dummy)	Amount of a loan when taken out	Amount of outstanding loans	Interest rate on loan per month (%)	Duration of Loan (Month)	ROA	Ratio of Sales in FX	Ratio of Expenditure in FX	Having insurance (Dummy)	Year of establishment	Exporter (Dummy)	Amount of Loans (as a ratio of total assets)
	Unit of observation	Loan	Loan	Loan	Loan	Loan	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Micro	Mean	0.50	13,178.26	16,321.25	1.61	29.12	0.09	0.35	0.60	0.02	2007.36	0.02	0.64
	S.D.	(0.51)	(13533.15)	(27100.01)	(0.53)	(16.32)	(0.59)	(0.34)	(0.37)	(0.14)	(5.8)	(0.14)	(1.36)
	Observations	48	46	48	28	34	41	41	45	48	47	48	36
Small	Mean	0.73	37,483.09	37,252.70	1.28	40.08	0.06	0.44	0.64	0.09	2005.12	0.09	0.27
	S.D.	(0.45)	(32260.96)	(47020.18)	(0.33)	(26.49)	(0.13)	(0.28)	(0.33)	(0.29)	(7.15)	(0.29)	(0.30)
	Observations	74	69	74	49	52	55	60	64	74	74	74	56
Medium	Mean	0.91	82,948.72	67,044.78	1.05	38.64	0.03	0.43	0.56	0.26	2002.80	0.20	0.19
	S.D.	(0.28)	(69298.34)	(98582.9)	(0.15)	(26.62)	(0.14)	(0.35)	(0.38)	(0.44)	(8.76)	(0.4)	(0.20)
	Observations	46	39	46	30	36	30	34	34	46	46	46	26
Large	Mean	0.95	542,484.80	563,400.00	0.94	42.78	0.09	0.68	0.62	0.64	2001.20	0.36	0.22
	S.D.	(0.23)	(1486897)	(2155509)	(0.20)	(44.52)	(0.19)	(0.34)	(0.36)	(0.49)	(7.01)	(0.49)	(0.14)
	Observations	55	44	55	26	41	38	40	51	55	55	55	31
Total	Mean	0.77	153,014.50	168,660.00	1.23	38.15	0.07	0.47	0.61	0.25	2004.14	0.17	0.33
	S.D.	(0.42)	(726631.5)	(1088361)	(0.41)	(30.68)	(0.32)	(0.34)	(0.35)	(0.43)	(7.52)	(0.37)	(0.72)
	Observations	223	198	223	133	163	164	175	194	223	222	223	149

*Note:* mean values, standard deviations, and the number of observations are presented in each cell. Standard deviations are presented in parentheses. “Bank loan (Dummy)” represents whether a firm has any loan from a commercial bank. “Amount of loans when taken out (per loan)” represents the amount of a loan per loan when a firm borrows. “Interest rate of loan per month” represents the interest rate on an outstanding loan. “Duration of loan (months)” represents how long the maturity of an outstanding loan is. “Amount of outstanding loans” represents the amount of an outstanding loan. “ROA” represents the profit over total assets. “Ratio of Sales in FX” represents the ratio of FX currency sales to total sales. “Ratio of Expenditure in FX” represents the ratio of FX expenditure to total expenditure. “Having insurance” is a dummy variable which takes one if a firm has business insurance. “Year of establishment” represents the age of a firm since it started operations. “Export (Dummy)” is a dummy variable which takes one if a firm is engaged in any exporting activities. “Amount of loans as a ratio of total assets” represents the amount of total loans held by a firm as a ratio of total assets.

**Table 5: Comparison of Firm Characteristics (by Funding Sources)**

		Amount of loans when taken out	Amount of outstanding loans	Interest rate on loan per month (%)	Duration of Loan (Month)	ROA	Ratio of Sales in FX	Ratio of Expenditure in FX	Having insurance (Dummy)	Year of establishment	Exporter (Dummy)	Total Assets (USD)	Amount of loans (as a ratio of total assets)
		Loan	Loan	Loan	Loan	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm
Bank Loan	Mean	213233.7	340287.6	1.18	33.83	0.05	0.52	0.61	0.26	2003.68	0.22	645360.2	0.35
	S.D.	(992448.9)	(1583808)	(0.40)	(25.64)	(0.22)	(0.33)	(0.35)	(0.44)	(7.76)	(0.42)	(1790049)	(0.81)
	Observation	102	103	79	94	80	85	95	103	102	103	104	104
MFI Loans	Mean	17000	19032.86	1.59	35.46	0.07	0.25	0.51	0.07	2006.64	0.14	86262.86	0.36
	S.D.	(12824.26)	(18397.3)	(0.30)	(17.00)	(0.15)	(0.3)	(0.41)	(0.27)	(6.32)	(0.36)	(94161.14)	(0.54)
	Observation	14	14	14	13	13	13	14	14	14	14	14	14
Family, Relatives, or Friends	Mean	42701.96	59091.18	1.19	42.88	0.06	0.37	0.58	0.12	2005.21	0.09	177301.4	0.27
	S.D.	(66696.07)	(111756.7)	(0.40)	(35.78)	(0.15)	(0.33)	(0.38)	(0.33)	(6.59)	(0.29)	(294111.4)	(0.35)
	Observation	34	34	7	8	26	28	28	34	34	34	34	34
No Loans	Mean					0.06	0.5	0.63	0.27	2005.94	0.06	1397831	
	S.D.					(0.15)	(0.34)	(0.34)	(0.44)	(6.57)	(0.24)	(10600000)	
	Observation					329	390	453	630	604	630	459	

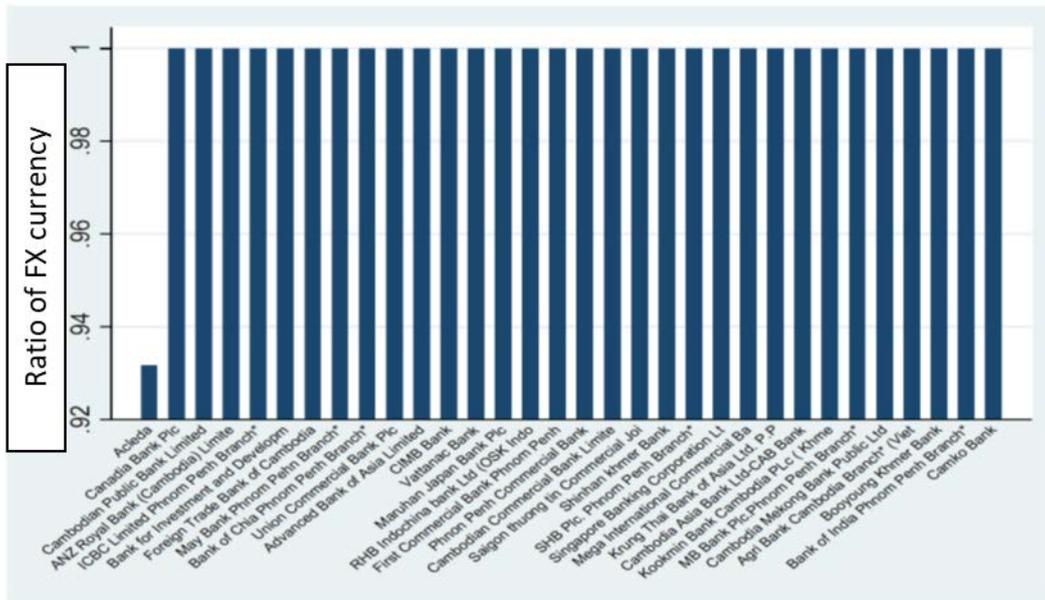
*Note:* mean values, standard deviations, and the number of observations are presented in each cell. Standard deviations are presented in parentheses. “Bank loan (Dummy)” represents whether a firm has any loan from a commercial bank. “Amount of loans when taken out (per loan)” represents the amount of a loan per loan when a firm borrows. “Interest rate of loan per month” represents the interest rate on an outstanding loan. “Duration of loan (months)” represents how long the maturity of an outstanding loan is. “Amount of outstanding loans” represents the amount of an outstanding loan. “ROA” represents profit over total assets. “Ratio of Sales in FX” represents the ratio of FX currency sales to total sales. “Ratio of Expenditure in FX” represents the ratio of FX expenditure to total expenditure. “Having insurance” is a dummy variable which takes one if a firm has business insurance. “Year of establishment” represents the age of a firm since it started operations. “Export (Dummy)” is a dummy variable which takes one if a firm is engaged in any exporting activities. “Amount of loans as a ratio of total assets” represents the amount of total loans held by a firm as a ratio of total assets.

**Table 6: Results of Estimation of Determinants of Cambodian Firms' Capital Structures**

	Model1		Model2		Model3		Model4	
	Main	Selection	Main	Selection	Main	Selection	Main	Selection
ROA	0.101 (0.17)	0.096 (0.15)	-0.032 (-0.05)	0.030 (0.04)	-3.339* (-1.90)	-3.347* (-1.91)	-3.405* (-1.93)	-3.281* (-1.68)
Ratio of FX Sales	-0.379 (-0.87)	1.305*** (2.78)	-0.366 (-0.84)	1.294*** (2.65)	-0.772* (-1.65)	1.098** (2.16)	-0.761 (-1.64)	1.095** (2.15)
ROA # Ratio of FX Sales					4.999** (2.13)	5.552* (1.96)	4.948** (2.12)	5.285 (1.62)
Volatility of Sales	-0.216 (-0.53)	0.609 (1.54)	-0.253 (-0.61)	0.599 (1.50)	-0.346 (-0.86)	0.452 (1.12)	-0.369 (-0.91)	0.446 (1.08)
Having insurance	0.739* (1.89)	-0.663 (-1.45)	0.610 (1.45)	-0.672 (-1.41)	0.815** (2.11)	-0.679 (-1.54)	0.729* (1.65)	-0.706 (-1.46)
Ratio of Fixed Assets	1.433** (2.33)	1.719*** (2.80)	1.470** (2.39)	1.743*** (2.71)	1.252** (2.06)	1.709*** (2.73)	1.285** (2.10)	1.728*** (2.74)
Age	0.011 (0.55)	-0.017 (-0.81)	0.009 (0.47)	-0.018 (-0.82)	0.012 (0.64)	-0.018 (-0.87)	0.011 (0.59)	-0.019 (-0.88)
Exporter Dummy			0.324 (0.83)	0.105 (0.22)			0.232 (0.57)	0.164 (0.32)
Log. Total Assets		0.353** (2.56)		0.362** (2.33)		0.349** (2.33)		0.354** (2.22)
Constant	-3.551*** (-4.58)	-5.676*** (-3.75)	-3.546*** (-4.44)	-5.782*** (-3.47)	-3.094*** (-4.00)	-5.285*** (-3.28)	-3.099*** (-3.95)	-5.355*** (-3.07)
athrho	1.678*** (2.58)		1.606** (2.02)		1.839** (2.37)		1.781** (2.04)	
lnsigma	0.169 (1.45)		0.156 (1.18)		0.153 (1.30)		0.145 (1.12)	
rho	0.933* (2.06)		0.923* (2.05)		0.951** (2.11)		0.945** (2.10)	
Wald chi-squared (rho)	2.98		2.88		3.98		3.63	
lambda	1.10		1.08		1.11		1.09	
Wald chi-squared	16.13		16.81		21.32		21.82	
Observations	114		114		114		114	
Censored	38		38		38		38	

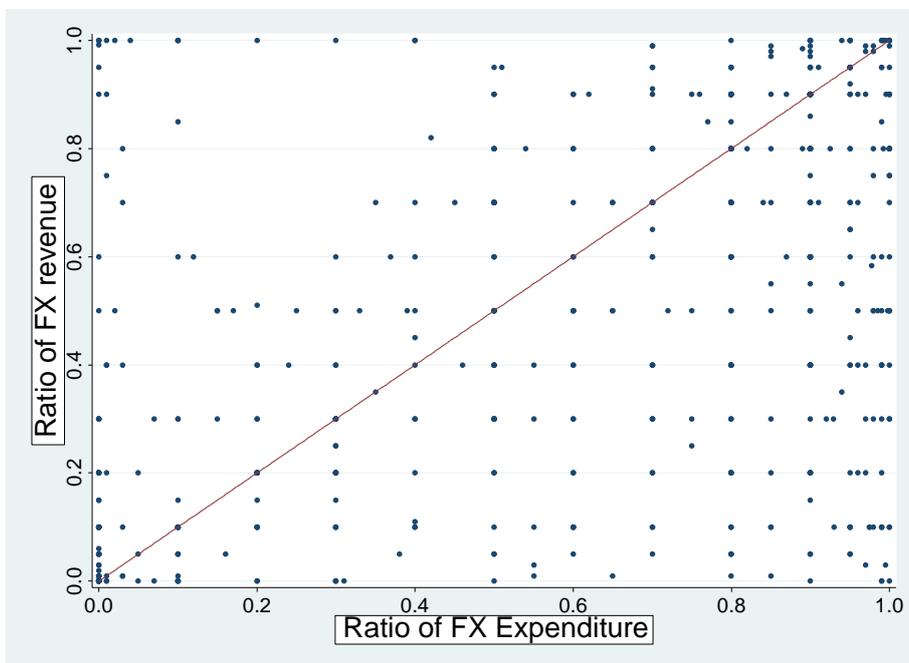
*Note:* \*, \*\*, and \*\*\* represent significance levels at 10%, 5%, and 1%, respectively. The values in parentheses represent the t-statistics. We estimated the models using the Heckman's sample selection model with maximum likelihood estimation.

**Figure 1: The Ratios of FX Currency in Corporate Loans (as of June 2013)**



*Note:* Data is provided by National Bank of Cambodia. This figure represents the ratio of FX corporate loans to total corporate loans. Commercial banks in this figure are listed from the largest bank on the left-hand side to smaller ones on the right-hand side. It appears that only one bank provides corporate loans in local currency.

**Figure 2: The Ratios of FX Revenue and FX Expenditure**



*Note:* The figure shows the ratio of FX currency in revenues and expenditures, respectively. The x-axis represents the ratio of FX currency in expenditure, and the y-axis represents the ratio of FX currency in revenues.

**Table A1: Correlation Matrix of Variables Used in Estimation**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) ROA	1							
(2) Ratio of FX Sales	0.09	1.00						
(3) Volatility of Sales	0.06	0.04	1.00					
(4) exporter	0.20	0.15	0.15	1.00				
(5) Having Insurance	-0.06	0.31	0.09	0.37	1.00			
(6) Ratio of Fixed Assets	-0.03	-0.24	-0.22	-0.28	-0.33	1.00		
(7) Log. Total Assets	0.19	0.44	0.19	0.38	0.47	-0.22	1.00	
(8) Age	0.13	0.23	0.10	0.24	0.28	-0.17	0.40	1.00

**Table A2: Results of Robust Estimation (Clustering Method)**

	Main	Selection
ROA	-2.917*** (-3.86)	-2.283 (-0.89)
Ratio of FX Sales	-0.803*** (-3.68)	0.785 (1.21)
ROA # Ratio of FX Sales	4.330*** (4.16)	3.193 (0.68)
Volatility of Sales	-0.656** (-2.15)	0.501** (2.39)
Having insurance	0.666** (2.35)	-0.596 (-0.99)
Ratio of Fixed Assets	1.001* (1.68)	1.355* (1.84)
Age	-0.014 (-0.07)	-0.091* (-1.86)
Exporter Dummy	0.289 (1.20)	-0.107 (-0.31)
Log. Total Assets		0.435*** (3.10)
Constant	-1.884*** (-2.62)	-5.578*** (-2.69)
athrho	0.693* (1.93)	
lnsigma	-0.026 (-0.17)	
rho	0.600*	
Wald chi-squared (rho)	3.71	
lambda	.584	
Observations	114	
Censored	38	

*Note:* \*, \*\*, and \*\*\* represent significance levels at 10%, 5%, and 1%, respectively. Values in parentheses represent t-statistics. We estimated models using Heckman's sample selection model with maximum likelihood estimation. Standard errors are calculated based on clustering method among industrial categories.

## **Appendix: Bank loans vs. loans from other sources**

To confirm robustness in the estimation results of equation 2 (selection equations in Table 6), we estimated equation 2 using the Probit model. Since a larger sample is available when we simply regress equation 2, then we can compare the main results with robust results. The results are presented in Table A3, and the estimated average marginal effects are shown. In column 1 and 2 of Table A3, we confirm the same results as seen in Table 6. The marginal effect of the ratio of FX in sales is significant in column 1 and 2, suggesting that if firms have larger shares of FX currency in sales, they are more likely to gain access to bank loans. Likewise, the marginal effect of the ratio of fixed assets is significantly positive. This suggests that if firms have more collateralizable assets, they are likely to gain access to bank loans. Given that the information asymmetry could be high in Cambodia, our results seem natural and suggest that, if firms have no collateral, they are likely to be excluded from the bank loan market.<sup>1</sup>

Table A3: Results of Probit Estimation of Access to Bank Loans

In column 3 and 4 of Table A1, we also present the results of Probit estimation of the determinants of whether firms choose bank loans or no loans. We find no significance in the effect of the ratio of FX sales and the ratio of fixed assets, which are different from the results in Table 6. This result could be due to the bias resulting from the inclusion of firms that have no demand for loans. Cole and Sokolyk (2016) argue that firms with no loans could be categorized into two types: firms that are in need of loans but could not gain access to borrowings, and firms that have no demand for borrowings. The authors empirically demonstrate that the fundamentals of these two types of firms are statistically different. As discussed by Cole and Sokolyk, our

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<sup>1</sup> The results indicate both possible cases where firms are discouraged from applying for bank loans and where they are actually rejected by banks.

results from column 3 and 4 might be a consequence of this potential bias from the firms with no demand for loans.

Next, we analyzed the determinants of firms' choice of funding sources using the multi-logit estimation. We categorized firms into three types; (1) firms having bank loans, (2) firms having loans from MFIs or kinship networks, and (3) firms with no loans; we then set the firms with having bank loans as the baseline in this multi-logit model. The results are presented in Table A4. Mostly, we confirmed similar results as seen in Table A3. We found that the size of firms increases the probability of having bank loans, while the volatility of sales also increases the probability of having bank loans. Furthermore, the increase in the ratio of FX revenues leads to decrease in probability of having loans from MFI or kinship networks. It is possibly because firms with FX revenues did not incur currency mismatch risks, and could easily gain access to bank loans.

Table A4: Results of Multi-Logit estimation of Access to Bank Loans

**Table A3: Results of Probit Estimation of Access to Bank Loans**

	Firms with Bank Loans vs Firms with MFIs/Family/Relative Loans		Firms Bank Loans vs Firms with No Loans	
	(1)	(2)	(3)	(4)
	ROA	0.090 (1.11)	0.094 (1.17)	-0.011 (-0.15)
Ratio of FX Sales	0.179* (1.65)	0.181* (1.67)	0.068 (1.21)	0.060 (1.07)
Volatility of Sales	0.517 (1.39)	0.518 (1.38)	0.464** (2.49)	0.459** (2.47)
Having Insurance	-0.039 (-0.35)	-0.038 (-0.35)	-0.076 (-1.47)	-0.075 (-1.46)
Ratio of Fixed Assets	0.299* (1.93)	0.292* (1.88)	0.071 (1.05)	0.080 (1.16)
Age	-0.003 (-0.51)	-0.003 (-0.48)	-0.0017 (-0.72)	-0.002 (-0.83)
Log. Total Assets	0.096*** (3.57)	0.099*** (3.58)	0.040*** (3.33)	0.037*** (2.99)
Exporter		-0.0551 (-0.52)		0.0575 (1.02)
		(-3.78)	(-6.36)	(-5.92)
Observations	152	152	434	434
Pseud-R-squared	0.1791	0.1805	0.0959	0.0986

*Note:* \*, \*\*, and \*\*\* represent the significance levels at 10%, 5%, and 1%, respectively. The values in parentheses represent the t-statistics.

**Table A4: Results of Multi-Logit Estimation of Access to Bank Loans**

	(1)			(2)		
	MFIs/Relative			MFIs/Relative		
	No loans	Loans	Bank loan	No loans	Loans	Bank loan
ROA	-0.07 (0.10)	-0.05 (0.07)	0.12 (0.08)	-0.06 (0.10)	-0.06 (0.08)	0.12 (0.09)
Ratio of FX Sales	0.03 (0.08)	-0.07 * (0.04)	0.04 (0.07)	0.04 (0.08)	-0.08 * (0.04)	0.03 (0.07)
Volatility of Sales	-0.61 ** (0.24)	-0.03 (0.13)	0.64 *** (0.22)	-0.60 ** (0.24)	-0.04 (0.13)	0.64 *** (0.22)
Having Insurance	0.02 (0.07)	0.00 (0.04)	-0.02 (0.06)	0.01 (0.07)	0.00 (0.04)	-0.02 (0.06)
Ratio of Fixed Assets	0.01 (0.09)	-0.08 (0.05)	0.07 (0.09)	0.00 (0.09)	-0.07 (0.05)	0.07 (0.09)
Age	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Log. Total Assets	-0.05 ** (0.02)	-0.01 (0.01)	0.06 *** (0.02)	-0.04 *** (0.02)	-0.02 * (0.01)	0.06 *** (0.02)
Exporter				-0.10 (0.08)	0.05 (0.04)	0.06 (0.07)

*Note:* \*, \*\*, and \*\*\* represent the significance levels at 10%, 5%, and 1%, respectively. The values in parentheses represent the standard errors.

## Abstract (in Japanese)

### 要約

本稿では、カンボジアという極度にドル化した経済での企業の資本構成の決定要因を実証的に分析した。具体的には、先進国企業の資本構成の決定要因としてよく使われるトレードオフ理論、エージェンシーコスト理論、ペッキングオーダー理論といった標準的な理論でカンボジア企業の資本構成の説明ができるかどうかの実証分析とともに、ドル化経済特有の通貨ミスマッチリスクの影響が見られるかどうかの実証分析を行った。実証分析では、カンボジア中央銀行 (National Bank of Cambodia) と JICA 研究所が共同研究として 2014 年に調査した 856 社の企業のデータのうちの負債を所有している企業 223 社を対象に実証分析を行った。特に、実証分析では銀行負債比率を被説明変数とした上で、開発途上国でしばしば問題となる外部負債へのアクセスの制約によるセレクションバイアスに対応するため、サンプルセレクションモデルを用いた推定を行った。

サーベイの結果を見ると、カンボジア企業の主要な借入先は商業銀行であり、かつ商業銀行からの借入はすべてが US ドルとなっていることから、カンボジア企業の資金調達には US ドルによる借入に限定されていることが明らかになった。さらに回帰分析の結果、資本構成の決定に関して、固定資産比率が高くなるほど銀行負債比率が高くなること、また、事業リスクに対する保険を所有している場合、銀行負債比率が高くなることが示された。そして、自国通貨建ての借入が利用できないほど金融取引が高度にドル化した経済に特有の要因として、通貨ミスマッチリスクが銀行負債の総資産比率に影響を与えているという結果も見られた。特に、収益率が高い企業ほど、収入のうちの外貨比率の上昇に対し銀行負債比率を低くする傾向が有意にみられた。これは、内部資金が潤沢な企業ほど通貨ミスマッチリスクに敏感に反応し通貨ミスマッチリスクを抑える行動をとっていること示唆する結果といえる。

これらの実証結果から、ほかの開発途上国で見られるようにカンボジアの企業の資金調達では担保となりうる資産があるかどうか、また、倒産リスクの程度が重要な要因であることが考えられる。そして、カンボジアのような金融取引が高度にドル化した経済では自国通貨建ての借入が利用できないため、自国通貨建ての収入を持つ企業の為替リスクのヘッジ手段が限定的になっていることが企業の資金調達において制約として働いていることが考えられる。そのため、例えば自国通貨建てのローン市場の拡充といった自国通貨の促進政策はカンボジア企業の資金調達におけるリスクを緩和し、企業の資金調達の促進につながることを期待できるだろう。

キーワード: カンボジア、ドル化、資本構成、サンプルセレクションモデル



JICA Research Institute

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JICA-RI Working Paper No. 143

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