The Determinants of Correspondent Banking Relationships: A Case of Vietnam

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Abstract

This paper investigates the driving forces of decision making on correspondent banking relationships (CBRs), focusing on two decisions: whether to establish a correspondent bank (CB) in a country, which we refer to as *country selection,* and then how many CBs are established in each country, which we label as *number decision*. We use cross-sectional data of commercial banks in Vietnam. The main findings are as follows: first, bilateral trade has a positive effect while distance has a negative impact on both decisions; second, a high gross domestic product (GDP) per capita of the trading partners increases the possibility of a country being selected while the presence of a financial center only affects the number of CBs; third, the effects of components of trade flow, bank concentration and anti-money laundering (AML) are mixed. When taking into account the censored property of CB data, the effects of total trade, distance, financial center, and AML on number decision are robust whereas those of trade components and GDP are not. These findings suggest that the bilateral connection between countries is the main determinant of CBRs.

Key words: Correspondent banking, International trade, Probit, Selection criteria

JEL codes: G11, G20, G21

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1. Introduction

Correspondent banking is a term that has become familiar to most banks, along with the development of international trade. Through correspondent banking relationships (CBRs), banks can access financial services in different regions and provide cross-border payment services to their customers, supporting international trade and financial integration. In spite of its evolution in the second half of the last century, the recent decline of CBRs has highlighted the need for a thorough study of their driving forces.

This paper examines the determinants of CBRs from a different aspect. The existing studies divide the process of establishing CBRs into two stages: a bank first decides whether to establish a CB network and then it chooses correspondents for operation. As most of the banks in the world do build CB networks and consensus over choosing a correspondent has not yet been reached (Naughton and Chan, 1998), the current approach is somewhat irrelevant. We apply an international market selection of exporting firms (Green and Allaway, 1985; Douglas and Craig, 1992; Papadopoulos et. al., 2002) to the CB decision-making process as country selection is the first and the most crucial stage of export strategy – it contributes to export success and it is true for every bank. In this way, we consider a process in which a bank initially identifies countries and after that decides how many CBs are needed in the identified countries. We refer to the first step as *country selection* and the second as *number decision*.

We use cross-sectional data of commercial banks in Vietnam. Although the banks are selected based on the availability of their CB information, they are a good representation of the commercial banks in Vietnam: their assets account for nearly a half of total assets of Vietnamese banking system and they represent the majority share of international settlements. We apply a probit method for the country selection and the Ordinary Least Square (OLS) method for the number decision. In addition, the tobit method is used for the robustness check when taking into account the right censoring data of CBs.

Our main findings consist of four main points. First, bilateral trade and country distance between Vietnam and its trading partners play important roles in country selection and number decision. Second, high GDP enhances the selection likelihood of a country and Vietnamese banks tend to have more CBRs in a country with financial hubs. Third, the impacts of exports, imports, bank concentration, and AML vary across banks. Fourth, when the censoring data of CBs is controlled, the effects of total trade, distance, financial center, and AML are consistent with those of OLS estimation while those of export, import, and GDP are not.

The remainder of the paper is organized as follows. Section 2 is the literature review. Section 3 specifies the model and describes the data. Section 4 interprets the estimation result. Section 5 concludes.

2. Literature review

Our paper is based on three strands of literature. First, we rely on the literature on theoretical frameworks to interpret CBRs. Early works mostly emphasize studying the CBs' provision of services to respondents that are mainly small banks in the U.S. Among them, Lawrence and Lougee (1970) conducted an empirical research on CBRs in Denver and its neighboring areas in the US. They point out that the main factor explaining CBRs is bank size. While smaller banks rely on CBs for the provision of basic services, larger banks employ correspondents to add variety to their services.

Another framework for CBRs is the requirements of liquidity, pointed out by Dewald and Dreese (1970). They suggest that deposits held by CBRs serve two purposes: (i) to set up a relationship with respondent banks and (ii) to diversify their sources of liquidity reserves. The level of deposit balances held with CBs depends on how much cash the respondent banks wish to reserve and on the legal requirements.

The third framework on CBR existence relates to CBs' minimization of financial contracting costs to their customers. In case it is impossible for a bank to serve its customers' financial service needs at a faraway location, the customer him/herself then has to deal with a number of jobs such as collecting information, carrying out the transaction, and arranging for payment. Consequently, the customer has to bear higher costs. Yet, the bank can help to reduce these costs by appointing an agent bank in this location to provide financial services to the customer on its behalf. Thus, the rationale of this framework lies with customer service. According to Naughton and Chan (1998), this approach seems to provide a more comprehensive explanation for bank size effect on CBR in the way that larger banks set up multiple relationships with CBs at a location to satisfy a wider variety of demand from its customers.

The fourth framework proposed by Naughton and Chan (1998) relates CBR with international expansion strategy. Expansion into an overseas market may be accomplished through different steps with various combinations of equity, capital, and business commitment. Among them, the first step into a foreign market is through CBs and the last one is with a branch or subsidiary. Once a bank has set up branches in overseas markets, it becomes a multinational bank. The two authors utilize the eclectic theory proposed by Dunning (1979) to explain international CBs. They conclude that CBRs are a risk-averse strategy that demands minimal devotion to resources, while the respondent banks are able to obtain some knowledge of the market before any formal engagement.

Second, we build on the literature on the determinants of CBRs. Chan (2014) provides a comprehensive literature review on factors determining CBRs. Based on previous studies (Dewald and Dreese, 1970; Lawrence and Lougee, 1970; Meinster and Mohindru, 1975; Dunning, 1979; Palmer, 1990), Chan summaries eighteen factors for banks to consider before deciding to establish international CBs. After making the decision to set up a CBR, it is essential for banks to select the right counter-partner. From research by Krishanan (1990) and Choo (1989), Chan then proposes nineteen key criteria for respondent banks to consider before choosing a potential correspondent. In his empirical study on 43 sample banks in

Australia, he finds that bank size is the most important factor in CBR establishment and geographic location is less important.

Third, we count on the literature of International Market Selection (IMS). Before deciding on an entry mode, it is essential for any firm to choose target foreign markets where it wishes to sell its products. However, there is a large pool of candidates that are significantly different from each other in various aspects, for example, size of market, language, economic development, and political stability. Thus, IMS advocates assessing the appeal of different markets within a pool of consideration before selecting the most attractive one(s) for further analysis and expansion (Reid, 1981).

Scholars have proposed different IMS models, for example Root (1994), Koch (2001), Kumar et al. (1994), and Cavusgil et al. (2004). Among them, the shift-share model has been highly appreciated due to its ability to predict the attractiveness of foreign markets at industry level, employing two variables, namely size of imports and growth rate of imports. Yet, the model is criticized for its sole reliance on import measures. Moreover, a number of empirical studies have revealed the unreliability of the model's prediction power (for example, Brown 1969; James and Hughes, 1973; Hellman, 1976). Attempting to mitigate the weakness of the shift-share model, Papadopoulos et al. (2001) propose a two-dimensional model representing the trade-off between "demand potential" and "trade barriers" in consideration of a company's strategy. On the one side, the demand aspect takes into account factors such as the potential market size, characterized by GDP, export and import data; trade relations between exporting and importing countries; similarity between domestic and foreign markets; industry-specific foreign market openness; and competition from domestic producers. On the other side, the obstacle aspect names factors such as tax and non-tax barriers; distance to the targeted exporting market; and volatility in exchange rate.

3. Model specification and data discussion

We develop the CB decision-making process model based on Lawrence and Lougee (1970), Green and Allaway (1985), and Naughton and Chan (1998). The process includes two steps. In the first step, the bank will determine in which countries it will establish CBs. In the second step, the bank will decide how many CBs are needed in each selected country.

The baseline models for each step are, respectively, specified as follows:

$$LnSelection_i = \beta_0 + \beta_1 LnTrade_i + \beta_2 LnGDP_i + \beta_3 LnD_i + \beta_4 FinCenter_i + \beta_5 Concentration_i + \beta_6 AML_i + \varepsilon_i \quad (1)$$

$$LnNumber_i = \beta_0 + \beta_1 LnTrade_i + \beta_2 LnGDP_i + \beta_3 LnD_i + \beta_4 FinCenter_i + \beta_5 Concentration_i + \beta_6 AML_i + \varepsilon_i \quad (2)$$

where $Selection_i$ is a dummy variable that receives a value of 1 if a bank puts CBs in country i and 0 otherwise. $Number_i$ is the number of CBs that a bank puts in country i. The lists of CBs are withdrawn from eight Vietnamese commercial banks: VCB, Vietinbank, MBBank, LienvietPostBank, MSB, NamABank, DongABank, and HDBank. These banks account for around half of the total bank assets and for the majority of international payment transactions in Vietnam.[6] $LnTrade_i$ is the natural logarithm of the bilateral trade between Vietnam and country i. This variable is customer driven, as in Lawrence and Lougee (1970) and Meinster and Severn (1982). $LnTrade_i$ is expected to have positive impacts on country selection and number decision as CBs are used to dealing with international trade payments. $LnGDP_i$ is GDP per capita of country i and it represents the market size.

$Concentration_i$ is the bank concentration index of country i and it measures the share of the three largest commercial banks to the total commercial bank assets. This data is collected from the Global Financial Development Database – World Bank Group. According to Financial Board Stability (2018), an increase in bank concentration negatively affects competition and raises cost, and that decreases the number of correspondents. AML_i is the Basel Anti-Money Laundering index, which measures the risk of money laundering and terrorist financing (ML/TF). A high index implies a high risk of the country suffering from ML/TF. As banks want to reduce the customer due diligence cost associated with CBs, AML_i is likely to have negative effects on both decisions. To capture the fact that banks decide on a CB relationship for several years, the macroeconomic determinants of CB decisions should reflect the mean. Hence, we take the average value of $LnTrade_i$, $LnGDP_i$, $Concentration_i$, and AML_i for the past five years.

The next two variables reflect the geographic variables. LnD_i is the natural logarithm of the weighted distance between Vietnam and country i, taken from CEPII. A larger distance between the countries implies a higher cost of communication and therefore decreases the probability of choosing that country for a CB as well as the number of CBs in that country. $FinCenter_i$ is a dummy variable that takes a value of 1 if country i has a financial center and 0 otherwise. This variable is based on the Global Financial Centres Index. Banks tend to have

[6] See Appendix for more details of these banks

correspondent services with banks that are located in a financial center of the relevant main trading area.

The descriptive statistics of the variables are shown in Table 1. Model (1) is estimated by using a probit method while model (2) uses an OLS method.

4. Empirical results

4.1. Country selection results

Panel A of Table 2 reports the marginal effects on the mean of the estimation results of model (1). We regress each bank in turn. While bilateral trade between Vietnam and a trading partner and the GDP of that country tend to increase the probability of that country being selected for a CB relationship, distance has the opposite effect. These results confirm our expectation; note that the positive effect of trade corresponds with Lawrence and Lougee (1970) and Meinster and Severn (1982). More specifically, bilateral trade is expected to positively affect the decision of a bank to establish a CBR in a particular country. If there is trade between two nations, a bank is more likely to be able to serve a customer doing business with a counter-partner from that country. The result shows that *LnTrade* has positive coefficients that are statistically significant across all banks sampled at 1% level. Departing from Lawrence and Lougee (1970), however, we use GDP per capita as a proxy for market size rather than population because GDP per capita better captures economic development. Except for LienvietPostBank, *GDP* has positive and statistically significant coefficients for all the banks examined. As mentioned earlier, we predicted that this variable would have a positive sign as countries with higher GDP per capita tend to be favorite destinations for Vietnamese people to travel, study or work in, which raises the demand for banking transactions.

In addition, we use the weighted distance between countries rather than that between banks in our framework. The negative effect can be explained by the fact that the longer this distance is, the more costly it is for banks to overcome information asymmetry. Respondents from different regions tend to face difficulties with the speed and the ease with which they can access information related to the correspondents and their operations, for example, adverse operation incidents connected to the CB or any changes in their compliance with AML/CTF management.

Financial center has no effect on the selection of a country. This may be due to the emergence of multinational banking groups, which have ruled out the importance of correspondent banking channels to such money markets (Mollan, 2012). The effects of bank concentration and AML are mixed. The negative expectation of bank concentration implies that the higher the bank concentration in a country is, the less likely it is that banks will set up CBRs with such a country. It is apparent that high concentration in the banking industry leads to market power lying with a small number of banks (Osterberg and Thomson, 1999). As a result, these banks may charge higher fees for the correspondent service they provide, which reduces the profitability and competitiveness of the respondents. However, except for DongABank and HDBank, the coefficients of *Concentration* in the remaining regressions are insignificant. This suggests that our finding is not strong enough to conclude a negative effect

imposed by bank concentration on country selection of banks. This may be due to policies introduced by the government in the country of the CB that prevents the monopolistic power of such banks. Similarly, *AML* adversely affects the selection country in only Vietinbank, DongABank, and HDBank. One of the possible reasons for this is that Vietnam is one of the top ten countries in the AML index so countries with less AML risk may have more bargaining power when selecting CBs.

We further consider the effects of the components of trade flow on country selection. While the results of other variables are quite robust, the impacts of exports and imports vary across the banks and even have no role in the case of Vietinbank and HDBank. This result suggests that banks may consider two-way rather than one-way trade for CB country selection.

4.2. Number decision results

Panel A of Table 3 portrays the estimation results of number decision on CBs. Bilateral trade and distance continue to play a vital role in determining how many CBs are needed in each country, whereas the effect of bank concentration is mixed. Our negative effect of distance is contrary to the results of Lawrence and Lougee (1970). The reason for this is that they examine CBRs among banks in the domestic market, i.e. the US, where the banks are subject to the same economic and legal conditions. In our research, however, we explore CBRs among banks from different countries under different circumstances, accompanied with the corresponding risks, which flips the signs of the coefficient.

Unlike the case of country selection, financial center positively affects number decision, except for Vietinbank. Once a country is selected, the respondent banks may take advantage of the financial hubs for their international banking operations. In addition, the insignificant effect of AML implies that banks only take into account the AML issue at the country level. Similarly, *GDP* now has no impact on number decision.

We also examine the effects of the bilateral trade's components on number decision. It turns out that only import flow decides the number of CBs in selected countries. Two factors can be used to explain this result. First, Vietnam has had a trade deficit for most of the last two decades, so import flow is one of the key determinants of the number decision process. Second, the Foreign Direct Investment (FDI) sector accounts for the majority of Vietnam's export volume. As FDI firms prefer to use the branches and subsidiaries of banks from the same origin country (Giannetti & Ongena, 2012), Vietnamese banks mainly serve importing firms. The remaining variables are consistent with the case of total trade.

It is worth noting that the results in this part may be not robust because we are not yet taking into consideration the fact that the number of CBs is right-censored at zero. Greene (2003) documents that the OLS estimation's coefficients are biased toward zero when a large portion of the dependent variable takes 0. Therefore, we follow Amemiya (1984) by applying the tobit model to solve the problem of data censoring. Panel A of Table 4 shows the estimation result. It can be seen that the effects of total trade, distance, financial center, and AML are robust with the OLS method. The result of bank concentration is still mixed but the negative effects become clearer. GDP per capita, however, positively affects the number

decision, as in the case of country selection. This suggests that Vietnamese banks tend to establish CBRs with banks in the more developed countries. Panel B of Table 4 also revisits the point that Vietnam-owned banks put a higher weight on the two-way trade among countries, not only for country selection but also for number decision.

5. Conclusion

This paper studies the driving forces of CBRs for commercial banks in Vietnam in two steps. In the first step, a country is likely to be selected when it has a large total trade and market size, and is located a small distance from Vietnam. In the second step, a bank will set more CBRs in a country that has greater trade volume, less distance, financial centers, and a lower risk of AML. These findings imply that the bilateral relationship between countries is the key determinant of CBRs.

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Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
VCB	111	11.17	21.04	0	108
Vietinbank	111	1.39	2.84	0	17
MBBank	111	5.35	11.49	0	63
LienvietPostBank	111	3.98	8.93	0	65
MSB	111	3.14	6.89	0	40
NamABank	111	2.40	5.27	0	38
DongABank	111	7.36	14.58	0	82
HDBank	111	0.15	0.61	0	5
LnTrade	111	5.15	2.85	0	11.1
LnExport	111	4.75	2.68	-0.10	10.42
LnImport	111	3.91	2.81	-0.11	10.81
LnGDP	111	8.92	1.34	6.16	11.53
LnD	111	8.93	0.78	6.28	9.87
FinCenter	111	0.13	0.33	0	1
Concentration	111	64.04	18.37	25.52	100
AML	111	5.43	1.22	2.57	8.30

Table 2: Determinants of decision whether to have CB in a country (Probit)

Panel A

VARIABLES	(1) VCB	(2) Vietinbank	(3) MBBank	(4) LienvietPostBank	(5) MSB	(6) NamABank	(7) DongABank	(8) HDBank
LnTrade	0.283***	0.196***	0.321***	0.470***	0.312***	0.242***	0.278***	0.750***
	(0.0674)	(0.0756)	(0.0869)	(0.120)	(0.101)	(0.0747)	(0.0914)	(0.177)
LnGDP	0.448**	0.324*	0.486**	0.269	0.456***	0.707***	0.793***	1.889***
	(0.209)	(0.186)	(0.200)	(0.197)	(0.171)	(0.195)	(0.235)	(0.623)
LnD	-0.603***	-0.609***	-0.602**	-1.160***	-1.171***	-0.206	-0.754***	-1.536**
	(0.229)	(0.214)	(0.235)	(0.292)	(0.294)	(0.175)	(0.202)	(0.778)
FinCenter	-0.794	0.341	0.234	0.201	-0.119	-0.356	-0.836	0.0479
	(0.673)	(0.480)	(0.591)	(0.594)	(0.483)	(0.503)	(0.581)	(0.674)
Concentration	0.00752	0.0128	0.00659	-0.00929	-0.00184	-0.0139	-0.0206*	-0.0532***
	(0.00821)	(0.00859)	(0.00968)	(0.0100)	(0.00806)	(0.00881)	(0.0110)	(0.0194)
AML	-0.101	-0.337*	0.0179	0.145	-0.00768	0.265	-0.515***	-1.169**
	(0.181)	(0.182)	(0.176)	(0.223)	(0.189)	(0.168)	(0.199)	(0.524)
Constant	0.942	1.717	-1.252	4.951	4.789	-6.298**	2.705	-3.999
	(3.131)	(3.049)	(2.910)	(3.762)	(3.045)	(2.758)	(2.697)	(8.342)
Observations	111	111	111	111	111	111	111	111
Pseudo R2	0.417	0.384	0.471	0.538	0.501	0.398	0.613	0.721

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Panel B

VARIABLES	(1) VCB	(2) Vietinbank	(3) MBBank	(4) LienvietPostBank	(5) MSB	(6) NamABank	(7) DongABank	(8) HDBank
LnExport	0.150	0.0482	0.199*	0.340**	0.181	0.283**	0.266*	0.343
	(0.110)	(0.122)	(0.111)	(0.148)	(0.136)	(0.125)	(0.138)	(0.247)
LnImport	0.178*	0.171	0.161*	0.206*	0.188*	-0.00193	0.0310	0.461
	(0.104)	(0.113)	(0.0937)	(0.105)	(0.110)	(0.105)	(0.120)	(0.298)
LnGDP	0.466**	0.304*	0.473**	0.247	0.439***	0.721***	0.822***	2.116***
	(0.210)	(0.182)	(0.198)	(0.203)	(0.169)	(0.196)	(0.241)	(0.616)
LnD	-0.532**	-0.534**	-0.544**	-1.142***	-1.140***	-0.191	-0.717***	-1.489*
	(0.229)	(0.211)	(0.238)	(0.303)	(0.305)	(0.177)	(0.210)	(0.762)
FinCenter	-0.896	0.310	0.212	0.134	-0.200	-0.393	-0.851	-0.165
	(0.690)	(0.487)	(0.594)	(0.596)	(0.473)	(0.505)	(0.596)	(0.759)
Concentration	0.00761	0.0134	0.00730	-0.00849	-0.00128	-0.0130	-0.0197*	-0.0587***
	(0.00827)	(0.00849)	(0.00967)	(0.0102)	(0.00807)	(0.00890)	(0.0108)	(0.0217)
AML	-0.0682	-0.320*	0.0420	0.174	0.0151	0.283*	-0.470**	-1.134**
	(0.180)	(0.176)	(0.174)	(0.228)	(0.187)	(0.169)	(0.194)	(0.514)
Constant	0.0768	1.223	-1.712	4.828	4.550	-6.795**	1.860	-6.202
	(3.171)	(2.990)	(2.894)	(3.897)	(3.162)	(2.793)	(2.746)	(9.590)
Observations	111	111	111	111	111	111	111	111
Pseudo R2	0.414	0.391	0.480	0.562	0.516	0.414	0.611	0.723

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3. Determinants of number of CBs in a country (OLS)

Panel A

VARIABLES	(1) VCB	(2) Vietinbank	(3) MBBank	(4) LienvietPostBank	(5) MSB	(6) NamABank	(7) DongABank	(8) HDBank
LnTrade	2.063***	0.285***	0.971**	1.126***	0.679**	0.473**	1.272**	0.0335*
	(0.746)	(0.0934)	(0.460)	(0.416)	(0.264)	(0.191)	(0.548)	(0.0176)
LnGDP	2.069	0.382*	1.750	-0.700	0.634	0.429	2.246	0.0233
	(1.947)	(0.218)	(1.146)	(0.993)	(0.660)	(0.494)	(1.386)	(0.0456)
LnD	-5.952***	-0.138	-2.743**	-2.981***	-2.341***	-1.083**	-2.720*	0.0126
	(1.990)	(0.240)	(1.267)	(0.929)	(0.799)	(0.471)	(1.512)	(0.0576)
FinCenter	28.99***	1.735	13.53***	8.040**	7.606**	6.721**	19.30***	0.817**
	(8.932)	(1.381)	(5.014)	(3.944)	(3.068)	(2.586)	(6.040)	(0.370)
Concentration	-0.133	0.00337	-0.0495	-0.0920**	-0.0347	-0.0429**	-0.117*	-0.000544
	(0.0907)	(0.00961)	(0.0565)	(0.0414)	(0.0324)	(0.0212)	(0.0680)	(0.00226)
AML	0.654	-0.0979	0.818	-0.344	0.349	0.328	0.846	0.0113
	(1.366)	(0.185)	(0.810)	(0.615)	(0.446)	(0.323)	(0.974)	(0.0342)
Constant	36.53	-2.160	6.243	37.78***	14.27	5.914	5.499	-0.469
	(25.93)	(3.660)	(17.07)	(14.29)	(9.917)	(7.166)	(19.90)	(0.784)
Observations	111	111	111	111	111	111	111	111
R-squared	0.621	0.313	0.500	0.478	0.519	0.504	0.585	0.310

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Panel B

VARIABLES	(1) VCB	(2) Vietinbank	(3) MBBank	(4) LienvietPostBank	(5) MSB	(6) NamABank	(7) DongABank	(8) HDBank
LnExport	0.762	0.135	0.159	0.188	0.0318	0.0887	0.366	0.0254
	(0.814)	(0.106)	(0.474)	(0.384)	(0.273)	(0.218)	(0.612)	(0.0211)
LnImport	1.773**	0.225*	1.068**	1.155**	0.801**	0.491*	1.247**	0.0179
	(0.813)	(0.121)	(0.435)	(0.522)	(0.316)	(0.290)	(0.544)	(0.0214)
LnGDP	1.887	0.345	1.657	-0.744	0.597	0.398	2.104	0.0173
	(1.918)	(0.212)	(1.117)	(0.980)	(0.634)	(0.482)	(1.363)	(0.0461)
LnD	-5.110**	-0.0218	-2.249*	-2.484***	-1.993**	-0.863*	-2.120	0.0239
	(2.058)	(0.253)	(1.314)	(0.924)	(0.810)	(0.472)	(1.571)	(0.0583)
FinCenter	27.87***	1.572	12.85**	7.419**	7.155**	6.435**	18.48***	0.799**
	(8.757)	(1.373)	(4.956)	(3.737)	(2.979)	(2.487)	(5.915)	(0.365)
Concentration	-0.129	0.00432	-0.0480	-0.0920**	-0.0347	-0.0426**	-0.114*	-0.000359
	(0.0904)	(0.00940)	(0.0558)	(0.0417)	(0.0318)	(0.0210)	(0.0679)	(0.00224)
AML	0.842	-0.0758	0.932	-0.211	0.439	0.382	0.975	0.0127
	(1.322)	(0.185)	(0.793)	(0.593)	(0.436)	(0.325)	(0.954)	(0.0340)
Constant	29.57	-3.085	2.109	33.48**	11.27	4.050	0.566	-0.552
	(24.92)	(3.770)	(16.99)	(13.37)	(9.583)	(6.848)	(19.63)	(0.781)
Observations	111	111	111	111	111	111	111	111
R-squared	0.633	0.329	0.515	0.498	0.537	0.516	0.599	0.316

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4. Determinants of number of CBs in a country (Tobit)

Panel A

VARIABLES	(1) VCB	(2) Vietinbank	(3) MBBank	(4) LienvietPostBank	(5) MSB	(6) NamABank	(7) DongABank	(8) HDBank
LnTrade	3.597***	1.049***	2.815***	3.088***	1.627***	1.163***	2.769***	0.929**
	(0.739)	(0.325)	(0.663)	(0.588)	(0.371)	(0.283)	(0.611)	(0.377)
LnGDP	3.914**	1.513*	5.466***	1.122	2.930***	2.314***	6.613***	1.089
	(1.910)	(0.787)	(1.745)	(1.490)	(1.053)	(0.795)	(1.719)	(0.846)
LnD	-8.080***	-1.326	-5.573***	-6.164***	-5.274***	-1.605*	-6.104***	-0.507
	(2.167)	(0.931)	(1.831)	(1.607)	(1.141)	(0.812)	(1.862)	(0.691)
FinCenter	24.62***	0.717	9.507**	6.572*	5.317**	4.888**	11.61***	0.964
	(5.183)	(1.702)	(4.046)	(3.444)	(2.424)	(1.897)	(4.105)	(0.965)
Concentration	-0.162*	0.00874	-0.0879	-0.217***	-0.0979**	-0.0975***	-0.320***	-0.0285
	(0.0924)	(0.0384)	(0.0805)	(0.0708)	(0.0484)	(0.0366)	(0.0861)	(0.0374)
AML	-0.518	-1.160	0.607	-0.305	0.184	0.861	-2.381	-0.844
	(1.930)	(0.776)	(1.754)	(1.560)	(1.064)	(0.813)	(1.718)	(0.805)
Constant	34.13	-4.983	-16.47	38.11	14.15	-12.84	11.29	-9.978
	(32.62)	(12.63)	(28.61)	(24.80)	(17.19)	(12.99)	(26.53)	(9.971)
σ	15.10***	4.570***	11.35***	9.482***	6.673***	5.270***	11.27***	1.599***
	(1.223)	(0.585)	-1.12	(1.022)	(0.676)	(0.521)	(0.997)	(0.372)
Observations	111	111	111	111	111	111	111	111

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Panel B

VARIABLES	(1) VCB	(2) Vietinbank	(3) MBBank	(4) LienvietPostBank	(5) MSB	(6) NamABank	(7) DongABank	(8) HDBank
LnExport	1.791	0.537	1.431	1.180	0.478	0.784	1.804	0.601
	(1.260)	(0.534)	(1.172)	(1.047)	(0.687)	(0.519)	(1.099)	(0.544)
LnImport	2.201*	0.634	1.660	2.136**	1.334**	0.498	1.233	0.353
	(1.187)	(0.505)	(1.085)	(0.972)	(0.662)	(0.485)	(1.010)	(0.448)
LnGDP	3.729*	1.393*	5.241***	0.967	2.759***	2.238***	6.424***	1.071
	(1.892)	(0.781)	(1.722)	(1.464)	(1.030)	(0.791)	(1.699)	(0.937)
LnD	-7.199***	-1.022	-4.913***	-5.461***	-4.702***	-1.393	-5.597***	-0.508
	(2.193)	(0.948)	(1.857)	(1.599)	(1.141)	(0.839)	(1.890)	(0.703)
FinCenter	23.81***	0.546	9.045**	5.996*	4.906**	4.762**	11.30***	0.897
	(5.145)	(1.682)	(3.995)	(3.389)	(2.383)	(1.887)	(4.062)	(0.984)
Concentration	-0.155*	0.0137	-0.0788	-0.209***	-0.0949**	-0.0932**	-0.308***	-0.0267
	(0.0915)	(0.0385)	(0.0796)	(0.0697)	(0.0476)	(0.0364)	(0.0851)	(0.0389)
AML	-0.249	-1.081	0.797	-0.155	0.326	0.946	-2.127	-0.814
	(1.902)	(0.765)	(1.724)	(1.533)	(1.040)	(0.807)	(1.689)	(0.826)
Constant	27.77	-6.876	-20.47	34.15	10.71	-14.39	7.502	-9.436
	(32.33)	(12.56)	(28.29)	(24.35)	(16.83)	(12.96)	(26.26)	(11.00)
σ	14.88***	4.502***	11.18***	9.290***	6.518***	5.231***	11.12***	1.579***
	(1.205)	(0.575)	(1.101)	(0.999)	(0.659)	(0.517)	(0.984)	(0.367)
Observations	111	111	111	111	111	111	111	111

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Appendix

1. Joint Stock Commercial Bank for Foreign trade of Vietnam, also known as Vietcombank (VCB), was established on 1st April, 1963. Up to earlier 2019, its charter capital has reached USD 1.6 billion. VCB is one of the biggest commercial banks in Vietnam, with more than 15,000 employees, and a total of 500 branches/transaction offices/representative office/affiliates both in Vietnam and abroad. This bank is currently maintaining a network of over 1,300 correspondent banks in 96 countries and territories around the world. VCB is among the leaders in trade financing and international payments with 16.3% market share in 2018.

2. Vietnam Joint Stock Commercial Bank for Industry and Trade, also known as Vietinbank, was founded on 26th March, 1988. It now has charter capital of about USD 1.6 billion. Vietinbank employs approximately 24,000 staffs. This bank has a wide network of 155 local branches with 958 transaction offices across Vietnam with 2 foreign branches in Germany, 1 Representative Office in Myanmar, and 1 subsidiary bank in Laos PDR. Moreover, Vietinbank has established correspondent relationships with around 159 banks from 40 countries and territories worldwide. This bank has earned its reputation in trade financing and international settlements after receiving 16 awards from many famous magazines and banks up to year 2018.

3. Military Commercial Joint Stock Bank, also known as Military bank (MB), was formed on 4th November, 1994. The charter capital of MB stands at USD 950 million. This bank currently hires 8,100 employees working at its head office in Hanoi as well as 296 other branches in different provinces in Vietnam. MB also has its presence overseas through 02 foreign branches in Lao and Cambodia; and 1 Representative Office in Russia. Furthermore, there has been 615 banks from over 60 countries and territories in the world engaged in correspondent relationships with MB.

4. Lietviet Post Joint Stock Commercial Bank, also known as Lienviet post bank (LPB), was set up on 28th March, 2008. Its charter capital is about USD 322 million. Currently, LPB has more than 70 branches and 159 transaction offices across Vietnam. In addition, LPB has established relationships with 460 correspondent banks from more than 50 countries and territories in the globe.

5. Vietnam Maritime Commercial Joint Stock Bank, also known as Maritime bank (MSB), was established on 12th July, 1991. After merging with the Mekong Development Bank in 2015, it raised its charter capital to about USD 503 million. MSB currently has

about 1,900 employees serving customers at more than 300 branches and transaction offices in Vietnam. Furthermore, MSB has established relationships with 356 correspondent banks from 53 countries and territories worldwide.

6. Nam A Commercial Joint Stock Bank, also known as Nam A bank (NAB), was formed on 21st October, 1992. Its charter capital has risen by 600 times since its establishment to approximately USD 144 million. From 50 employees at the beginning, NAB employs over 1,350 staffs in 2019. It has developed a network of around 60 transaction offices nationwide. Moreover, over 280 banks from 70 countries and territories have become correspondents with NAB up to now.

7. Dong A Commercial Joint Stock Bank, also known as Dong A bank (DAB), was established on 1st July, 1992. The bank currently maintains its charter capital at around USD 215 million. There are over 4,100 employees working at more than 220 branches and transaction offices of DAB in Vietnam. Besides, relationships with 858 correspondent banks from 86 countries and territories have been set up with DAB.

8. Ho Chi Minh City Development Joint Stock Commercial Bank, also known as HDBank (HDB), was founded on 27th September, 1990. It now has charter capital of about USD 441 million. This bank is currently hiring around 14,000 employees and has developed a network of more than 280 branches and transaction offices across Vietnam. What is more, there has been nearly 20 corresponding relationships formed between HDB and its banking partners from over 10 countries and territories.