An empirical study of international correspondent banking in Australia

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NOTE

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CHAPTER EIGHT:
MODELS OF INTERNATIONAL CORRESPONDENT BANKING: DETERMINANT FACTORS OF CORBANKING RELATIONSHIPS AND SELECTION CRITERIA OF CORBANKS

8.0 INTRODUCTION

Along with the background and the first and second components of the three component's core research, that is the case study of CBA's international correspondent banking system and the statistical analysis of the survey of all banks in Australia, provide the basis of the modeling in this chapter. Models will be generated by the OLS multiple linear regression methods and confirmed and explored by the factor analysis according to ten bank groups drawn from the population of all banks in Australia. In the regression models, non-resident assets and liabilities (D1) are the dependent variable (DV) for determining models of determinant factors, and the number of international correspondents (D2) as the dependent variable for determining models of selection criteria. The sequence of this chapter is as follows: providing brief description of the hypotheses and models for the eighteen unfiltered determinant factors and also the nineteen unfiltered selection criteria in section 8.1; methods for modelling are considered in section 8.2 based on the descriptive and simple inferential statistics in Chapter 6. The conditions set up in this chapter for the inclusion of factors are that the survey score such as means of importance are: equal to or less than 3.5 and significant levels are less than 0.05 for Tables 3.1.1 and 3.2.1. This enables the researcher to prioritize and screen off less significant/important independent variables prior to the hypothesis testing via OLS regression, and exploring associated independent variables and hence confirming regression results via factor analysis. OLS multiple regression results and factor analysis
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results will be discussed in section 8.3. The conclusion of the findings is summarised in section 8.4.

8.1 HYPOTHESES AND MODELS

Drawing from several sources including findings of the analytical framework suggested by theories such as eclectic theories of foreign direct investment and international banking, previous empirical results, conference papers and discussion papers of international correspondent banking as summarized in the Chapter 4 and exploratory research in the form of focus groups and in-depth interviews with people closely involved in international corbanking - all this leads to the following two hypotheses previously outlined in Chapter 5. The two hypothesis result in two models: Model 1 relates to determinant factors of international correspondent banking relationships; and Model 2 relates to selection criteria of correspondents.

8.1.1 Hypothesis 1: Determinant Factors of Corbanking Relationships

Detail of hypothesis 1, summary of dependent and independent variables are discussed in 5.6.1 and 8.1.3. The term international corbanking relationship is used in this research to signify a simple cross border bank to bank relationship. It does not have the meaning of relationship banking which is a broader marketing strategy. While there may be aspects of relationship banking in some aspects of corbanking activity, it is not the intention of this thesis to deal with relationship banking in any depth. The word relationship is therefore almost redundant as corbanking implies the existence of a business relationship. Hypothesis 1 therefore seeks to identify the factors that determine corbanking relationships.

For regression modelling of hypothesis 1 (The eighteen determinant factors each have a significant and positive effect on the decision to choose a strategy involving international
correspondent banking relationships), the dependent variable (D1) is the absolute cumulative non-resident assets and liabilities since it is the direct transaction records of correspondent banking activities. The independent variables, eighteen determinant factors (Lawrence & Lougee 1970, Dewald & Dreese 1970, Meinster and Mohindru 1975, Dunning 1979, Palmer 1990), of international correspondent banking relationships may have synergistic effects which were discussed in the paragraph 5.6.1. The factors are: bank size, customer driven, competitiveness, cost savings, foreign market entry, preventing fraud and money laundering, access to overseas local markets, increasing bank assets, improving efficiency, completing internationalisation network, internalization strategy, liquidity, not physically present in overseas location, minimizing capital investment, necessity and needs, providing one stop banking, profitability and reciprocity.

8.1.2 Hypothesis 2: Selection Criteria of Corbanking

Detail of hypothesis 2, summary of dependent and independent variables are discussed in 5.6.2 and 8.1.3. Following the decision by banks to engage in cross-border transactions by using the correspondent banking system, the next stage is to identify appropriate correspondents. Although there are many banks all over the world, not all are trustworthy and suitable. This leaves open the question of how to choose a correspondent bank. It is important to choose a correspondent on the basis of the bank's profile and overall business niche and policy. The bank will therefore need to assess the ability of the potential correspondent bank in servicing its needs. There is no standard formula or criterion in choosing a correspondent. It all depends on the reputation of the correspondent in the marketplace and the comfort level of the bank in dealing with the correspondent bank. With increasing competition in the marketplace, it is getting more difficult to choose the right correspondent bank. There is no definite answer as to the appropriate numbers and size of the correspondents. However, it would be useful to have
more than one correspondent in each country but this must be carefully and continually evaluated. Hence, to make the right decision, the bank will have to pool information gathered from its own assessments as well as advice from other banks to gauge the overall credit standing of a particular correspondent bank.

For regression modelling of the hypothesis 2 (*The nineteen selection criteria each have a significant effect in the partnership searching decision to choose an international correspondent*), the dependent variable (D2) is the number of international correspondents which is the results of selection of correspondents. The independent variables, nineteen criteria (Krishnan 1990, Choo 1989) have been identified as the key considerations or constructs to form paradigms in the choice of a correspondent bank which were discussed in the paragraph 5.6.2: broad domestic and global branch network, effective account or relationship officers, financial strength in terms of financial resources, quality and stability, formal banking presence, effective and efficient products and services delivery, historical relationships, innovative product design, linkage to SWIFT and netting, location, market reputation, operational capabilities, consistent business policy, pricing, range of services, reciprocity, risk rating, compatibility of services to respondents, continuous reliability of supply and technology level.

### 8.1.3 The Hypothesized Models

The models are comprised of identified factors and criteria that influence decisions made by banks to use international correspondent banking relations, and to select international correspondents.

The main body of each hypothesis is assumed to be a general linear model for a multiple regression analysis for k variables taking the following form:

\[ E(Y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k, \]
From this basis, the following models are developed using data for the whole population of 43 licensed Australian banks.

Model 1: Regression Models of Determinant Factors of International Correspondent Banking Relationships,

\[ D_1 = \beta_0 + \beta_1 I_1 + \beta_2 I_2 + \ldots + \beta_k I_k \]

Where:

i. \( \beta_0 \) is constant and \( \beta_1, \beta_2, \ldots \beta_k \) are regression coefficients;

ii. \( I_1, I_2, \ldots I_k \) are particular values of the explanatory variables that are measured (assumed) without error;

iii. For each set of \( I_i \) values, there is a subpopulation of \( D_1 \) values that are normally distributed with equal variances and independent of the set of \( D_1 \) values for any other values \( I_i \);

iv. \( D_1 \) is Non-resident assets and liabilities provided by RBA. The closest indicator of cross border corbanking activities, the best substitution of Nostro/Vostro account activities, and thus is an appropriate dependent variable of corbanking relationships. Banks do not provide the RBA details of their Nostro (due from other banks) /Vostro (due to other banks) account balances with other banks. However, they do provide information on the level of their non-resident assets and liabilities, which include their Vostro/Nostro account balances. The non-resident assets and liabilities is individual banks' non-resident assets and liabilities aggregated of AUD and foreign currency balances for the period November 1995 to October 1996. The data are the aggregation of monthly averages of weekly data. All amounts are expressed in millions of Australian dollars, with the foreign currency balances converted by the banks at exchange rates applying as at the reporting dates. Non-residents are defined to be companies or individuals not ordinarily resident in Australia, including overseas banks and financial
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institutions. The data are not ordinarily published other than in aggregated (i.e. all bank total) form. Furthermore, the variable may also be used to confirm the models for selection criteria of correspondents, however, it cannot be completely used to substitute the number of international correspondents, since this variable covers all transactions mainly between banks in Australia and overseas financial institutions. To test this a sample of results for banks generated in the form of the Model 1 will be confirmed by using dependent variable $D_2$ (the number of international correspondents) instead of $D_1$.

Model 2: Regression Models of Selection Criteria of International Correspondents,

$$D_2 = \alpha_0 + \alpha_1 J_1 + \alpha_2 J_2 + \ldots + \alpha_k J_k,$$

Where:

i. $\alpha_0$ is the constant and $\alpha_1, \alpha_2, \ldots, \alpha_k$ are regression coefficients;

ii. $J_1, J_2, \ldots, J_k$ are particular values of the explanatory variables that are measured (assumed) without error;

iii. For each set of $J_i$ values, there is a subpopulation of $D_2$ values that are normally distributed with equal variances and independent of the set of $D_2$ values for any other values $J_i$;

iv. $D_2$ is the Number of International Correspondents. This is the most appropriate dependent variable in determining the activities of banks to select their correspondents. The larger the number of international correspondents means the larger the number of banks that use the selection criteria of correspondents, in other words, greater activity in selecting correspondents. International correspondents are those overseas financial institutions which have at least exchange accounts - Nostro and Vostro accounts, or foreign exchange covers and a formal correspondent banking agreement with banks in Australia. This variable is expressed by nineteen independent variables for forming
models of selection criteria of correspondents. Furthermore, this variable can also be used to confirm the models for determinant factors of international correspondent relationships. However, this variable only indicates a part of corbanking activities, which defined under correspondents. To examine this a sample of results for banks generated in the form of the Model 2 which will be confirmed by using dependent variable $D_1$ (non-resident assets and liabilities) instead of $D_2$.

### 8.2 METHODS FOR CORBANKING MODELLING

Completing questionnaires and single or group interviews with correspondent bankers were methods used to collect data. Data are obtained from the empirical survey of 43 banks in Australia by using the questionnaire Question 3.1 for determinant factors of correspondent banking relationships and Question 3.2 for selection criteria of correspondent banks, and analytical results in particular for factors and criteria which are statistically significant within Chapter 7. Selection conditions of independent variables for multiple regression are (discussed below) used to reduce the number of independent variables in Appendix 4, Table 3.1.1 and 3.2.1 prior to regression modelling.

#### 8.2.1 OLS Multiple Regression and Hypothesis Testing

Multiple regression is used to find the relation between independent and dependent variables in order to form models of correspondent banking models of various categories of banks. The eighteen determinant factors and nineteen selection criteria are subjected to the following selection conditions using a two steps technique:

1. **Selection Conditions: Means of states of importance: a maximum, 3.5 and significant levels < 0.05.** The descriptive statistic of 3.5 is used to reflect the extent of importance assigned to the factor by the questionnaire respondents. The scale ranged from 1, most important to 5, least important. Scores higher
than 3.5 reflect low levels of importance and are therefore ignored. In addition, the results of the t test must indicate a level of significance below 0.05 before a factor is included in the regression thereby providing reasonable robustness to the data.

ii. **OLS Multiple Regression (Stepwise).** The second, both sets of data: D1 as the dependent variables against those more important and significant determinant factors as independent variables and D2 as the dependent variables against those more important and significant determinant selection criteria as independent variables were modelled by Stepwise Regression by using SPSS package for modelling.

In OLS multiple regression, the hypotheses are tested as follows: To test the hypotheses that all coefficients are zero.

**Test on Hypothesis 1**

for determinant factors

- $H_0: \beta_i = 0 \ (i = 1, 2, \ldots k)$
- $H_A: \text{Not All } \beta_i = 0 \ (i = 1, 2, \ldots k)$
  That is, not all coefficients $\beta_i$ are simultaneously zero

**Test on Hypothesis 2**

for selection criteria

- $H_0: \alpha_i = 0 \ (i = 1, 2, \ldots n)$
- $H_A: \text{Not All } \alpha_i = 0 \ (i = 1, 2, \ldots n)$
  That is, not all coefficients $\alpha_i$ are simultaneously zero

The test of significance of single regression coefficients and the joint or overall significance of the estimated regression are different tests in the regression model. The t-test is possible to find that one or more individual coefficients are statistically significant, while the F-test is used to test the overall model (that is joint hypothesis) is statistically significant and therefore it accept or rejects $H_0$. 
The strengths and validities of those models are considered by determining regression coefficients, the coefficient of determination, adjusted R square, F-statistics and its significance, and Durbin-Watson test for autocorrelation of residuals. Multicollinearity is a major issue in using multiple regression for interrelations among the independent variables. Its existence makes the estimates of the regression coefficients unreliable. Multicollinearities make difficulties for regression to find significant relationships, nevertheless, those correlated independent variables may be clustered in a number of factors in the factor analysis which is a remedy to uncover their contribution to total variation determining correspondent banking system and or selecting corbanks. Other issues to be aware of when using multiple regression include heteroscedasticity because of the presence of unequal variances of the error term, omitted variables and measurement (Yau, 1991). These will also be checked for in the analysis stage by considering the distribution of responses as well as considering outliers.

8.2.2 Factor Analysis for Confirmation and Exploration

In this study, the factor analysis was treated as a check and secondary method for the results and interpretation in paragraph 8.3.1 of this chapter and chapter seven. The purposes of this factor analysis are:

1. To confirm the models formed by OLS regression;
2. To identify and explore other less influencing variables which are correlated to determinant factors or selection criteria within the same factor of the cluster of variables since, in practice, decisions for establishing corbanking relationships and selecting corbanks are based on one or more determinants or criteria concluded in (1) are too simplified; and
3. To justify and confirm the descriptive results of the empirical survey in chapter six.
The determinant factors and selection criteria can be further confirmed by the factor analysis of their significance by recognizing them within those factors. Although factor analysis is used primarily to reduce the number of variables and to determine the structure of a set of variables, however, the formal application is not applicable in this research. Furthermore, those variables that constitute a factor are correlated among one another, therefore, the determinant factors and selection criteria identified by OLS regression which are variables within factors and then, other variables within the same factors should be taken into consideration for making international corbanking decisions. The remaining variables within other factors are also useful as supplementary determinant factors and selection criteria.

Again, factor analysis is used to capture the underlying dimensionality of a set of measures - that is, to shed light on how variables cluster together to form unidimensional constructs that are of theoretical interest. In this analysis, the exploratory factor analysis rather than confirmatory one is used. The relationships between various variables are examined without determining the extent to which the results fit a particular model. Therefore, in this case, Hypothesis testing plays only a small role in factor analysis. The approach involves the following:

(a) Correlation Matrix. The initial step is to compute a correlation matrix for variables, if there are no significant correlations between these items, this means that variables are unrelated and that it is not expected to form one or more factors. In other words, it would not be worthwhile to go on to conduct a factor analysis.

(b) Sample Size. The reliability of the factors emerging from a factor analysis depends on the size of the sample. There is no consensus on what that size should be. There is agreement, however, that there should be more subjects than variables (Bryman and Cramer, 1997).
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(c) The Principal-Axis Factoring Method (PAF) of extraction. PAF method is applied in this research. Estimates of communality by this method are on the diagonal of the observed correlation matrix. The estimates are derived through an iterative procedure. The goal of a PAF extraction is to extract the largest possible amount of variance from the data set with each succeeding factor. Advantages are that it is widely used and that it conforms to the factor analytical model in which common variance is analyzed with unique and error variance removed. The disadvantage is that its communalities must be estimated and the solution is determined by those estimates.

(d) Rotation of Factors. Oblique rotation is used for Determinant Factors of Correspondent Banking and Orthogonal rotation is used for Selecting Criteria of Corbanks in order to use the same method for testing of the ten bank groups for groups of criteria and factors. Oblique rotation produced by the oblimin method in SPSS, which gives three matrices: a pattern matrix, a structure matrix and factor correlation matrix where the structure matrix is generally used to interpret the factors. The results of the pattern and structure matrices are similar to the orthogonal rotation except that the loadings between the items and factors are higher. Orthogonal rotation produced by the varimax method in SPSS gives a rotated factor matrix for analysis.

(e) Number of Factors to Be Retained. Three filtering conditions are used for deciding which factors to exclude from factor matrices:

1. **Eigenvalues: less than or equal to 1.** The first is known as the Kaiser's criterion that is to select those factors which have an eigenvalue of greater than one. SPSS does this by default unless it receives instruction to do otherwise. That is a factor with an eigenvalue less than or equal to 1 is generally considered unimportant. The Kaiser criterion has been
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recommended for situations where the number of variables is less than 30 and the average communality is greater than 0.70 or close to 0.70.

ii. **Proportion of variance: less than or equal to 5%**. The second, a factor is probably not important if it accounts for less than or less than 5% of the total variance in a data matrix.

iii. **Screen test**. The third is known as the graphical screen test (Cattell, 1966). In this method, a graph is drawn of the descending variance accounted for by the factors initially extracted. The plot typically shows a break between the steep slope of the initial factors and the gentle one of the later factors. The factors to be retained are those which lie before the point at which the eigenvalues level off.

(f) Number of variables to be retained. In general, the meaning of a factor in a factor matrix is determined by the items or variables, which load most highly on it. Which items should be ignored when interpreting a factor is arguable? Two screening conditions are used for selecting variables for a factor:

i. **Loadings: less than or equal to 0.4**. The first, variables with a loading less than 0.4 (including negative loadings) within a factor are omitted from consideration.

ii. **Loadings: more than 0.4**. The second is all loading is excess of 0.4 are recognized as being loaded on a factor. The advantage of this rule is that it recognized the interaction of variables across factors.

(g) Choosing associated variables by the two step method. The first step is to choose the factor or factors by the criteria listed in the paragraph (e) performed by SPSS, the results are shown in Appendix 5 table 8.3.1 to 8.3.10 and Appendix 6 table 8.4.1 to 8.4.10. The second step is to choose variable or variables from chosen factor or factors.
explanatory variables for modelling by stepwise regression. For models against D1-the absolute cumulative non-resident assets and liabilities, bank grouping models were formed for nine bank groups: all, Australian, foreign, majors, non-majors, American, British, European and Asian banks. No statistically significant model was formed for Japanese banks.

In the all bank model, bank size (t value=11.21)*** is the most important and single factor with respect to non-resident assets and liabilities.

In Australian banks, the bank size (t value=6.45)*** and location not physically present (t value=2.55)* were important significant factors. The bank size factor was by far the most important evidenced by size is a pervasive phenomenon in Australian banking as the recent merger and acquisition activities such as Metway, QIDC and Suncorp merger, St George and Advance Banks, and majors looking for targets. However, majors still stressed the location not physically presence factor (t value=5.81)* as the most significant factor. The significant location not physically present factor (t value=2.65)* of the non-major model was the most important factor to establish corbanking relationships overseas.

In the foreign banks model, the result was similar to all banks in which the bank size factor (t value = 6.68)*** was the most important factor particular bank size in general for all foreign banks in Australia. For the American bank model, the bank size (t value = 5.37**) was the most significant factor despite American banks tending to be market orientated and hence improving profitability. The bank size

Footnote: 1 *** represents statistical significance at the 0.001 level, ** represents statistical significance at 0.01 level and * represents statistical significance at 0.05 level.
factor (t value = 3.85)* was the most important factor for British banks which had the characteristics to focus on relationships management. No significant determinant factor was identified for Japanese banks by this regression modeling. European (bank size (t = 4.17)*) and Asian banks (bank size (t = 4.02)*) both had the same view about the bank size factor reasons for choosing international correspondent banking relationships.

For modelling against D2 as the dependent variable. The bank size (II) as the most significant factor of All banks in Australia and Australian bank models was further confirmed by regression models against the number of international correspondent banks of the two bank groups (D2): For all banks in Australia-D2 = 0.021411 +306.2030, (bank size, t = 3.33)**, and for Australian banks-D2 = 0.027311 - 102.4476, (bank size, t = 3.40)**.

Reliability was strongly acceptable with 0.870 Cronbach’s alpha for the data. All models had a single explanatory variable except the Australian bank group with two explanatory variables which had no multicollinearity problem indicated by high tolerance (>0.99). Generally the D-W (Durbin-Watson test statistics) of the ten bank groups indicated no serious problem of autocorrelation.

In conclusion, evidence of all bank groups supports the relationships between non-resident assets and liabilities and determinant factors on decisions to establish international correspondent banking relationships. All nine models were statistically significant and hence they rejected the H0. The most significant regression models according to F statistics were for All banks in Australia, Australian and foreign banks which had the same most important bank size factor. All groups had adjusted R square more than 63% except the non-major model at 37.62% although this is still accepted in social science research. In other words, the proportion of the dependent variable
explained by one or two explanatory variable(s) was reasonable good. All bank groups except majors, non-majors and Japanese banks consistently had the bank size as their significant factor. The Australian bank group considered the bank size and location not physically present as significant factors but majors and non-majors merely took the latter factor as their only significant factor. In general: the bank size factor was the most general factor. It was then followed by the location not physically present.
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#### Table 8.1 OLS Regression Results of Bank Grouping Models of Determinant Factors of International Correspondent Banking Relationships

<table>
<thead>
<tr>
<th>The Most Significant Models</th>
<th>Keys and Tolerance</th>
<th>Adjusted R Square</th>
<th>F Statistics</th>
<th>D-W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-resident Assets &amp; Liabilities (D1) Expressed by:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Banks in Australia:</td>
<td>D1 = 1.807311 + 4310.2722 l1=Banksize(t=11.21)***</td>
<td>0.7481</td>
<td>125.75***</td>
<td>2.52</td>
</tr>
<tr>
<td>Australian Banks:</td>
<td>D1 = 1.789611 + 3350.5603 l13 - 4213.5035 l1=Banksize(t=6.45, Tol=0.9998)*** and l13=Location not physically present (t=2.55, Tol=0.9998)*</td>
<td>0.7686</td>
<td>24.25***</td>
<td>2.15</td>
</tr>
<tr>
<td>Foreign Banks:</td>
<td>D1 = 2.567811 + 2175.1530 l1=Banksize(t=6.68)***</td>
<td>0.6316</td>
<td>44.57***</td>
<td>2.38</td>
</tr>
<tr>
<td>Majors:</td>
<td>D1 = 111132.62713 + 10460.9317 l13=Location not physically present (t=5.81)*</td>
<td>0.9162</td>
<td>33.78*</td>
<td>2.52</td>
</tr>
<tr>
<td>Non-majors/Regionals:</td>
<td>D1 = 37971.095213 - 33420.6381 l13=Location not physically present (t=2.65)*</td>
<td>0.3762</td>
<td>7.03*</td>
<td>1.70</td>
</tr>
<tr>
<td>American Banks:</td>
<td>D1 = 0.003011 + 0.7158 l1=Banksize(t=5.37)**</td>
<td>0.8229</td>
<td>28.88**</td>
<td>0.74</td>
</tr>
<tr>
<td>British Banks:</td>
<td>D1 = 2.582711 + 1629.4109 l1=Banksize(t=3.85)*</td>
<td>0.6971</td>
<td>14.81*</td>
<td>2.60</td>
</tr>
<tr>
<td>Japanese Banks:</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>European Banks:</td>
<td>D1=15.331511 - 5892.7236 l1=Banksize(t=4.17)*</td>
<td>0.8041</td>
<td>17.42*</td>
<td>2.32</td>
</tr>
<tr>
<td>Asian Banks:</td>
<td>D1=3.115411 - 1539.4701 l1=Banksize(t=4.02)*</td>
<td>0.7909</td>
<td>16.13*</td>
<td>1.58</td>
</tr>
</tbody>
</table>

**Notes:**
1. The regression was by the stepwise.
2. D-W is the Durbin-Watson Test for Autocorrelation.
3. 0.05<*, 0.01<**, and 0.001<***.

#### 8.3.1.2 Findings of Hypothesis 2

Models of selection criteria of correspondents are shown in Table 8.2. As discussed above, having imposed conditions: the test value was importance scale 3.5 and the statistical significant level was ≤0.05 in order to choose acceptable factors out of the nineteen factors from one sample t test results in Appendix 4 Australian Corbanking...
Empirical Survey, the chosen factors then became explanatory variables for modelling by stepwise regression. For models against the number of international correspondent banks $D_2$, models of four bank groups were formed: all, Australian, foreign and European banks. The explaining strength of all bank model (Adjusted R Square = 0.1046) and foreign bank model (Adjusted R Square = 0.1477) for their dependent variables were weak although formal banking presence and location criteria were statistically significant for the models. In the Australian bank model, reliability of supply ($t$ value = 9.68)***, and operational capabilities ($t$ value = 3.00)** were significant especially reliability of supply. The operational capability factor apparently constituted the reliability of supply of correspondents. All foreign banks considered the location ($t$-value = 2.38)* of their correspondents to be the most significant criterion. No model was formed for majors, non-majors, American, British, Japanese and Asian banks. The formal banking presence ($t$-value = 11.76)** was the significant criterion of the European bank model. Most European banks such as Deutsche, BNP and Credit Suisse had branches in major financial centres and cities in the world. The reason for them to have correspondents with formal banking presence was to have good access to overseas local markets.

For a model against the dependent variable $D_1$, the reliability of supply was confirmed as the most significant criterion for Australian banks by the Australian bank model-$D_1 = 69643.9442J_{18} - 46316.6272$, where $J_{18}$ is reliability of supply ($t$-value = 3.40)**.

Reliability was strongly acceptable by 0.8697 Cronbach's alpha of the data. Three bank groups: All, foreign and European had a single explanatory variable. Australian bank model had two explanatory variables which had limited multicollinearity problem as indicated by the tolerance (>0.64). Six bank groups: majors, non-majors, American, British, Japanese and Asian banks had no explanatory variable against $D_2$, the number of international correspondents because of no model against $D_2$ was formed for the six
banks. There was no autocorrelation in all models since Durbin-Watson test statistics of four banks groups were greater than upper limit (d_u).

In conclusions, evidence of four bank groups supports relationships between the number of international correspondents on decision to select international correspondents. Four models were statistically significant and hence H_0 is rejected for them. However, no model is formed for six bank groups and therefore H_0 is not rejected. The most significant regression model according to F statistics was for All banks in Australia. Australian and European banks had adjusted R square more than 80%. All (adjusted R square = 10.46%) and foreign bank (adjusted R square = 14.77%) model were weak in explaining the dependent variable D_2. In other words, the proportion of the dependent variable explained by one or two explanatory variable(s) was reasonably good in Australian and European banks except All and foreign banks. The formal banking presence criterion was significant for All and European banks. Selection criteria: operation capabilities & reliability of supply and location were the significant criteria for Australian and foreign banks respectively. In the Australian bank group’s model, negative coefficient of operation capabilities implied the less operation capabilities, the less number of corbanks. It was due to the bank should have difficulty to manage its corbanks if it was less capable in terms of operations.

In general, the formal banking presence was the most common criterion, followed by the operation capabilities and reliability of supply, with location showing of weaker significance.
Table 8.2 OLS Regression Results of Bank Grouping Models of Selection Criteria of International Correspondents

<table>
<thead>
<tr>
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<th>Adjusted R Square</th>
<th>F Statistics</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Total number of Corbanks</strong> (D2) expressed by</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All Banks in Australia:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(D_2 = 377.1493J_4 - 143.4871)</td>
<td>(J_4=\text{Formal banking presence (t=2.43)*})</td>
<td>0.1046</td>
<td>5.91*</td>
<td>1.12</td>
</tr>
<tr>
<td><strong>Australian Banks:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(D_2 = -1297.7511J_{11} + 2096.7465J_{18} - 495.0599)</td>
<td>(J_{11}=\text{Operation capabilities (t=3.00, Tol=0.6377)}^{<em><strong>}) and (J_{18}=\text{Reliability of supply(}\text{t=9.68, Tol=0.6377)}^{</strong></em>})</td>
<td>0.8025</td>
<td>29.44***</td>
<td>2.36</td>
</tr>
<tr>
<td><strong>Foreign Banks:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(D_2 = 383.4864J_8 - 231.2478)</td>
<td>(J_8=\text{Location(t=2.38)*})</td>
<td>0.1477</td>
<td>5.68*</td>
<td>1.53</td>
</tr>
<tr>
<td><strong>Majors, Non-majors, American, British and Japanese banks</strong></td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td><strong>No significant model formed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>European Banks:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(D_2 = 434.50J_4 - 407.00)</td>
<td>(J_4=\text{Formal banking presence(t=11.76)}^{**})</td>
<td>0.9717</td>
<td>138.27**</td>
<td>3.32</td>
</tr>
<tr>
<td><strong>Asian Banks:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
</tbody>
</table>

Notes: 1. The regression was by stepwise, 2. D-W is the Durbin-Watson Test for Autocorrelation, 3. 0.05<*, 0.01<** and 0.001<***.

8.3.2 Factor Analysis Results

Important independent variables: determinant factors and selection criteria for the ten bank groups were distinguished by one sample t-test in chapter seven on the empirical survey. In exploration and then confirmation of determinant factors and selection criteria, the Principal-Axis Factoring method with oblimin procedure for obliquely rotated factors was applied for determining the former, and the same method with Varimax procedure for orthogonally rotated factors was applied for determining the latter. For selecting acceptable factors, three criteria (eigenvalues > or =1, proportion of variance >5% and scree test) were used to accept factors as discussed in paragraph 8.2.2 (e). For selecting
associate variables, a criterion (loadings > 0.4) was used to accept variables as discussed in paragraph 8.2.2 (f).

The results are discussed in the following according to their respective bank groups.

8.3.2.1 Exploration and Confirmation of Determinant Factors

Variables extracted by OLS regression models in paragraph 8.3.1.1 and Table 8.1 of this chapter and Variables identified as significant variables in chapter seven in terms of determinant factors, were factorised and thus, further explored and confirmed and analyzed via their structure or factor matrices. The analysis results are concluded in paragraph 8.3.2.1 (a) and (b), discussion on confirmation and exploration in paragraph 8.3.2.1(c) as follows:

8.3.2.1 (a) Extraction for More than One Factor

In the seven banks groups, six, five, four, five, four, four and three variables in Table 8.3.1-8.3.7 in Appendix 5 correspond to All, Australian, foreign, majors, non-majors, American and British banks. These were factorised by the Principal-Axis Factoring method with oblimin procedure and a minimum eigenvalue of 1.0 as the criterion for factors. Structure matrices were therefore generated and analyzed as follows: Three factors from each bank group: All, Australian, foreign, and majors banks were extracted and correspondingly accounted for 64.3%, 78.3%, 69.4% and 100% of their total variance at fairly high explanatory level. The cumulative percentage of the factors of the major banks had the highest explanatory power. Moreover, each total explanatory percentage consisted of the following: for all banks group 30.5%, 17.7% and 16.1% of total variance explained; for the Australian bank group, 30.2%, 28.8% and 19.3%; for the foreign bank group, 29.5%, 22.5% and 17.5%; for the major group, 51.8%, 26.0% and 22.2%; each with respect to factor 1, 2 and 3 of their groups. The factor 1 of the major bank group (51.8% of the total variance explained) provided the strongest explanatory power. Two
factors from each bank group: Non-majors, American, and British Banks were extracted and correspondingly accounted for 86.2%, 76.3% and 85.6% of their total variance at high explanatory level. The cumulative percentage of the factors of the non-majors had the highest explanatory power. Each total explanatory percentage consisted of, for non-majors, 47.9% and 38.3%; for American banks, 49.3% and 27.0%; for British banks, 59.7% and 25.9%; each with respect to factor 1 and 2 of their groups. The factor 1 of the British bank group (59.7% of total variance explained) provided the highest explanatory power comparing with two factors bank groups. However, no factor with significant variable(s) in the regression model of Japanese banks was clustered.

8.3.2.1 (b) Non-clustered Bank Groups.

In Japanese, European and Asian banks groups, variables in Table 8.3.8-10 in Appendix 5 could not be clustered to more than one factor. That is a solution cannot be achieved by rotation method. Nevertheless, one-factor matrices were generated for analysis by the principal-axis factoring method with a minimum eigenvalue of 1.0 as the criterion for factors. One factor from each bank group: Japanese, European and Asian banks were concluded and correspondingly accounted for 72.8%, 96.4% and 67.5%. The cumulative percentage of the factor of European banks had the highest explanatory power.

8.3.2.1 (c) Exploration of Common Determinant Factors

For searching for variable(s) correlating to the most significant variable(s) in the Table 8.1, the results will be presented in Figure 8.1. All and Australian bank groups have only one important variable in a factor and no other correlated variable. Foreign, American, Japanese and Asia bank groups have no clustered factor. The most important variable-location not physically presence of majors and non-majors is clustered and correlated with another variable-bank size in the same factor in which location not physically presence and bank size (loadings: 0.9714 and 0.9015) in factor 1, location not physically
presence and bank size (loadings: 0.9.78 and 0.8573) in factor 2, with respect to percentage of variance: 51.8% and 38.3%. The most important variable of the British bank group is clustered with another variable—customer driven (loadings: 0.9589 and 0.2690). The most important variable of the European bank group is clustered and correlated with other two variables: improved efficiency, necessity/needs and bank size (loadings: 0.9914, 0.9914 and 0.9628) in factor 1 with respect to 96.4% percentage of variance.
Figure 8.1: Cross Bank Group Relationships of Determinant Factors


8.3.2.1 (d) Confirmation.

Overall, the factor structure that emerged is reasonably clear and interpretable. The analysis is summarised according to the purposes:

(1) For confirmation of regression models in terms of the most significant variable(s) in Table 8.1, the following can be observed: All banks-the bank size (factor loading = 0.5854, Communality = 0.4159) loads in factor 2; Australian banks-location not physically present (0.9635, 0.9327) in factor 3; Foreign banks-the bank size is not included in any factor; Majors-location not physically present (0.9714, 1.0000) in factor 1; Non-Majors-location not physically present (0.9078, 0.8379) in factor 2, American banks-the bank size is not included in any factor, British banks-bank size(0.9589, 0.9290).
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in factor 1; Japanese banks—no regression model is confirmed, European banks—the bank size (0.9914, 0.9828) in factor 1; and, Asian banks—bank size is not included in any factor. Referring to Figure 8.1 and comparing all variables among bank groups, the bank size is still the most important determinant and the less important determinant is location not physically presence although Foreign, American, Japanese and Asian bank groups had failed to satisfy selection conditions. Surprisingly, location not physically presence of regression modeling results in majors and non-majors bank groups is associated with the bank size determinant factor. Furthermore, in the Australian bank model, the bank size is still the most important variable.

(2) For confirmation of significant variables from Table 3.1.1 in Appendix 4 in terms of factor loadings and percentages of variance explained, all significant variables in Table 3.1.1 and the bank size in ten bank groups had factor loadings more than 0.4. Furthermore, an acceptable proportion, at least, proves factors, which are helpful in explaining the total variation of all variables. In All, Australian, Foreign, and Major bank groups, the significant variables and bank size could be restructured and clustered into three factors which cumulatively accounted for 64.3%, 78.3%, 69.4% and 100% of total variance with respect to their bank group using six, five, four, and five variables respectively. In Non-Majors, American and British bank groups, two factors were structured that cumulatively accounted for 86.2%, 76.3% and 85.6% with respect to their bank group of total variables in four, four and three variables. Furthermore, in Japanese, European and Asian bank groups, three significant variables extracted by one-sample t-test in Table 3.1.1 and bank size could not be further clustered. That is, one factor accounted for 72.8%, 96.4% and 67.5% of total variance in regard to their bank groups. Since all significant variables and the bank size of all bank groups had factor loadings more than 0.4, and a high percentages of the total variance was explained, justifies the use
of factor analysis. This leads to confirmation of all significant variables in Table 3.1.1, Appendix 4 and the results in Table 8.3.
## Chapter Eight

### 8.3.2.1 (e) Summary of Exploration and Confirmation of Regression Models

Table 8.3: Exploration and Confirmation of OLS Regression Results by Factor Analysis for Determinant Factors of International Correspondent Banking Relationships

<table>
<thead>
<tr>
<th>Bank Groups</th>
<th>OLS Regression Results: Significant Variables in a Linear model (in Table 8.1)</th>
<th>Factor Analysis Results: Factor(s) Formed at Eigenvalue ≥1 &amp; Loading&gt;0.4 (in Figure 8.1)</th>
<th>Exploration &amp; Confirmation of Regression Results by Factor Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank Groups</td>
<td>(A)</td>
<td>(B)</td>
<td>(C)</td>
</tr>
<tr>
<td>All banks</td>
<td>Bank Size ((t=11.21)<em><strong>: F=125.75</strong></em> &amp; AdjR^2=0.75.)</td>
<td>Bank Size (loading=0.59 &amp; % of total variance: 17.7).</td>
<td>A factor is formed by a single variable—Bank Size which is thus confirmed.</td>
</tr>
<tr>
<td>Australian banks</td>
<td>Bank Size ((t=6.45)<strong><em>and Location Not Physically Present ((t=2.55, Tol=1.0)</em>: F=24.25</strong>* &amp; AdjR^2=0.77.)</td>
<td>Location Not Physically Present ((0.96, 19.3%)).</td>
<td>A factor is formed by a single variable—Location Not Physically Present which is thus confirmed.</td>
</tr>
<tr>
<td>Foreign banks</td>
<td>Bank Size ((t=6.68)<em><strong>: F=44.57</strong></em> &amp; AdjR^2=0.63.)</td>
<td>No factor is formed by a single variable or correlated with variables.</td>
<td>No explored variable clustered into a factor.</td>
</tr>
<tr>
<td>Majors</td>
<td>Location Not Physically Present ((t=5.81)<em>: F=33.78</em> &amp; AdjR^2=0.92.)</td>
<td>Location Not Physically Present ((0.97) &amp; Bank Size ((0.90, 51.8%).)</td>
<td>A factor is formed by a single variable—Location Not Physically Present which is thus confirmed. Bank Size &amp; Location Not Physically Present are not clustered and no factor is formed to include bank size.</td>
</tr>
<tr>
<td>Non-majors / Regional banks</td>
<td>Location Not Physically Present ((t=2.65)<em>: F=7.03</em> &amp; AdjR^2=0.38.)</td>
<td>Location Not Physically Present ((0.91) &amp; Bank Size ((0.86, 38.3).)</td>
<td>A factor is formed by a single variable—Location Not Physically Present which is thus confirmed. Bank Size &amp; location not physically present are clustered into a factor. The Bank Size is an explored variable.</td>
</tr>
<tr>
<td>American banks</td>
<td>Bank Size ((t=5.37)<strong>: F=28.88</strong> &amp; AdjR^2=0.83.)</td>
<td>No factor is formed by a single variable or correlated with variables.</td>
<td>No explored variable clustered into a factor.</td>
</tr>
<tr>
<td>British banks</td>
<td>Bank Size ((t=3.85)<em>: F=14.81</em> &amp; AdjR^2=0.70.)</td>
<td>Bank Size ((0.96) &amp; Customer Driven ((0.27, 59.7).)</td>
<td>A factor is formed by a single variable—Bank Size which is thus confirmed. Bank size &amp; Customer Driven are clustered into a factor. Customer Driven is an explored variable.</td>
</tr>
<tr>
<td>Japanese banks</td>
<td>Nil</td>
<td>No factor is formed by a single variable or correlated with variables.</td>
<td>No significant determinant factor.</td>
</tr>
<tr>
<td>European banks</td>
<td>Bank Size ((t=4.17)<em>: F=17.42</em> &amp; AdjR^2=0.80.)</td>
<td>Bank Size ((0.99), Necessity/ Needs ((0.96) &amp; Improved efficiency((0.99, 96.4%).)</td>
<td>A factor is formed by a single variable—Bank Size which is thus confirmed. Bank Size, Necessity/ Needs &amp; Improved Efficiency are clustered into a factor. Necessity/Needs &amp; Improved Efficiency are explored variables.</td>
</tr>
<tr>
<td>Asian banks</td>
<td>Bank Size ((t=4.02)<em>: F=16.13</em> &amp; AdjR^2=0.79.)</td>
<td>No factor is formed by a single variable or correlated with variables.</td>
<td>No explored variable clustered into a factor.</td>
</tr>
</tbody>
</table>
The results: Bank Size is the most important variable and then followed by Location not Physically present by OLS multiple regression which are concluded and generalized in nine bank groups except Japanese bank groups in Table 8.1. The results were further explored and hence confirmed by factor analysis. In attempt to identify factors containing significant variables in regression by viewing the Figure 8.1 and Table 8.3, this method is somewhat arbitrary but it does present a more visual way of identifying factors in the various banking groups. The findings in Table 8.3 for the determinant factors are perhaps the most promising as the most significant or important determinant factor is “Bank Size” and it is then followed by “Location Not Physically Present”. The clustering effect of the factor analysis reveals that banks generally identify their corbanking needs by taking into account more than one variable or a factor, for example, in British bank groups, those banks may look at a factor consisting of two variables: Bank Size and Customer Driven in order to make decisions. However, Bank Size remained as a single determinant factor for the All bank group. In Australian bank groups, the regression two determinant factor findings was reduced to one determinant factor in the factor analysis. Bank Size is further confirmed in All, British and European bank groups and explored in Majors and Non-Majors. Furthermore, it is difficult to see the relationships between two variables in a factor of Majors or Non-Majors bank groups, or among three variables in a factor of European bank groups and give names to those factors. No additional determinant factor was explored and found in Foreign, American and Asian bank groups although this finding did not necessarily imply that the regression results of the three bank groups are not confirmed.
8.3.2.2 Exploration and Confirmation of Selection Criteria

Variables extracted by OLS regression models in paragraph 8.3.1.2 and Table 8.2 of this chapter and variables identified as significant variables in chapter seven in terms of selection criteria which were factorised, further explored and confirmed and analyzed via their rotated or factor matrices. The analysis results are concluded in paragraph 8.3.2.2 (a) and (b), discussion on confirmation and exploration in paragraph 8.3.2.2 (c) as follows:

8.3.2.2 (a) Extraction for More than One Factor.

In the nine banks groups, sixteen, fifteen, fifteen, eight, thirteen, ten, seven, six and three variables in Table 8.4.1-5 and 8.4.7-10 in Appendix 6 correspond to All, Australian, Foreign, Majors, Non-Majors, British, Japanese, European and Asian banks respectively. These were factorised by the Principal-Axis method using the Varimax procedure and a minimum eigenvalue of 1.0 as the criterion for factors. Rotated factor matrices were therefore generated and analyzed as follows: Five factors from the Foreign bank group were extracted and accounted for 76.7% of its total variance at fairly high explanatory level. Four factors from the All and Australian bank groups were extracted and accounted for 69.2% and 80.8% at fairly high explanatory level. Factor 1 of the Australian bank group (48.0% of the total variance explained) provided the strongest explanatory power. Three factors from each bank group: Majors, Non-Majors, British and Japanese Banks were extracted and accounted for 100%, 85.8%, 95.6% and 100% respectively of their total variance at high explanatory level. The cumulative percentage of the factors of the Japanese banks had the highest explanation power. Factor 1 of the Non-Majors bank group (63.0% of total variance explained) provided the highest explanatory power compared with any of the three factors bank groups. Two factors from each bank group: European and Asian bank groups, were extracted and correspondingly accounted for 77.5% and 100% of their total variance. The cumulative percentage of the
factors of the Asian banks had the highest explanatory power. However, no factor with significant variable(s) in regression models was clustered for six banks: Majors, Non-Majors, American, British and Asian.

**8.3.2.2 (b) Non-clustered Bank Groups**

In the American bank group, variables in Table 8.4.6 in Appendix 6 could not be clustered to more than one factor, that is solution could not be rotated by the rotation method. Nevertheless, one-factor matrices were generated for analysis by the principal component method with a minimum eigenvalue of 1.0 as the criterion for factors. One factor from the American bank group was concluded and accounted for 80.1% explanatory power. However, no factor with significant variable(s) in the regression model was clustered for American banks.

**8.3.2.2 (c) Exploration of Common Selection Criteria**

For searching for variable(s) correlating to the most significant variable(s) in the Table 8.2, the results were presented in Figure 8.2. All banks have three clustered and correlated variables with a factor including the most important variable-formal banking presence. Australian bank groups have nine clustered and correlated variables with a factor including the most important variables-operational capabilities and reliability of supply. Foreign bank groups have four correlated variables with a factor including the most important variable-location. European bank groups have four correlated variables with a factor including the most important variable-formal banking presence. In majors, non-majors, American, British, Japanese and Asian bank groups, no correlated variable had been found since no regression model was formed for those bank groups. Therefore, those correlated variables with factors to the most significant variables in OLS regression models are influencing variables for those models although they are not as important as variables in the regression models.
8.3.2.2 (d) Confirmation

Overall, the factor structure that emerged is reasonably clear and interpretable. The analysis is summarised according to the purposes:

(1) For confirmation of models in terms of the most significant variable(s) in Table 8.2, in the following can be observed for four bank models: All banks—the formal banking presence (factor loading = 0.6562, Communality = 0.6880) is Factor 3; Australian banks—operational capabilities (0.8622, 0.8404) and reliability of supply (0.7495, 0.7638) both form Factor 1; Foreign banks—location (0.6899, 0.7214) is Factor 2; European banks—formal banking presence (0.9497, 0.9418) is Factor 1, are an acceptable variable in terms of their factor loadings (more than 0.4) and communalities which therefore confirm the result in the Table 8.2. That is, referring to Figure 8.2 and...
comparing all variables among bank groups, formal banking presence is still the most important criterion followed by operational capabilities. However, no factor could be selected for six bank groups: Majors, Non-Majors, American, British, Japanese and Asian since they had no regression models.

(2) For confirmation of significant variables from Table 3.2.1 in Appendix 4 in terms of factor loadings and percentages of variance explained, all significant variables in Table 3.2.1 in ten bank groups had factor loadings more than 0.4. Furthermore, an acceptable proportion, at least, proves factors, which are helpful in explaining the total variation of all variables. In the Foreign bank group, the significant variables could be restructured and clustered into five factors, which cumulatively accounted for 76.7% of total variance. In All, Australian bank, and Japanese (against D1) bank groups, three factors were structured that cumulatively accounted for 69.2%, 80.8% and 100% of total variance. In European and Asian bank groups, two factors were structured that cumulatively accounted for 77.5% and 100% with respect to their bank groups of total variables in six and three variables. Furthermore, in the American bank group, six significant variables extracted by one-sample t-test in Table 3.2.1 could not be further clustered, that is one factor accounted for 80.1% of total variables. Since all significant variables of all bank groups had factor loadings more than 0.4, and the high percentages of the total variance explained justifies the use of factor analysis, thus, the significant variables in Table 3.2.1 for selection criteria by one-sample t-test are confirmed and the results are concluded in Table 8.4. Factors formed for six bank groups are however useless since no regression model was even formed for them.
### Table 8.4: Exploration and Confirmation of OLS Regression Results by Factor Analysis for Selection Criteria of International Correspondents

<table>
<thead>
<tr>
<th>Bank Groups</th>
<th>OLS Regression Results (Table 8.2): Significant Variables in a Linear model</th>
<th>Factor Analysis Results (Figure 8.2): Factor(s) Formed at Eigenvalue ≥1 &amp; Loading&gt;0.4</th>
<th>Exploration &amp; Confirmation of Regression Results by Factor Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>All banks</td>
<td><em>Formal Banking Presence</em> (t=2.43)<em>: F=5.91</em> &amp; AdjRSq=0.11.</td>
<td>Formal Banking Presence (loading=0.66), Range of Services Provided &amp; Compatibility of Service (% of total variances: 8.5).</td>
<td>Formal Banking Presence is clustered into a factor and thus the variable is confirmed.</td>
</tr>
<tr>
<td>Australian banks</td>
<td><em>Operation Capabilities</em> (t=3.00)*** &amp; Reliability of Supply (t=9.68, Tol=0.6377)<em><strong>: F=29.44</strong></em> &amp; AdjRSq=0.80.</td>
<td>Operational Capabilities (0.86), Reliability of Supply (0.75), J2,J19,J17,J8,J4,J5 &amp; J14 (48).</td>
<td>Operational Capabilities and Reliability Of Supply are clustered into a factor and thus the variables are confirmed.</td>
</tr>
<tr>
<td>Foreign banks</td>
<td><em>Location</em> (t=2.38)<em>: F=5.86</em> &amp; AdjRSq=0.15.</td>
<td>Location (0.69), Operational Capabilities, Banking Presence, and Linkage to SWIFT &amp; Netting System (10.5)</td>
<td>Location is clustered into a factor and thus the variable is confirmed.</td>
</tr>
<tr>
<td>Majors, Non-majors/Regiona l, American, British &amp; Japanese banks</td>
<td>Nil</td>
<td>No factor is formed by a single variable or correlated with variables.</td>
<td>No significant selection criterion.</td>
</tr>
<tr>
<td>European banks</td>
<td><em>Formal Banking Presence</em> (t=11.76)<em><strong>: F=138.27</strong></em> &amp; AdjRSq=0.97.</td>
<td>Formal banking presence (0.95), J8, J5 &amp; J14 (57.5).</td>
<td>Formal Banking Presence is clustered into a factor and thus the variable is confirmed.</td>
</tr>
<tr>
<td>Asian banks</td>
<td>Nil</td>
<td>No factor is formed by a single variable or correlated with variables.</td>
<td>No significant selection criterion.</td>
</tr>
</tbody>
</table>
The weaker statistical results: Formal Banking Presence is the most important variable and then followed by Operation Capabilities & Reliability of Supply, and Reliability of Supply, by OLS multiple regression which are concluded and generalized in four bank groups in Table 8.2. The results were further explored and hence confirmed by factor analysis. In an attempt to identify factors containing significant variables: selection criteria in regression by viewing Figure 8.2 and Table 8.4 with the method similar to determinant factors, The findings in Table 8.4 for selection criteria are somewhat weaker or less statistical significance because of the regression results are concluded and generalized within only four bank groups: All, Australian, foreign and European.

Nevertheless, the results were required to be further explored and hence confirmed by factor analysis. The most significant or important selection criterion is Formal Banking Presence (J4) which is followed by the weaker Operation Capabilities (J11) & Reliability of Supply (J18), and Location (J9), and much inconsistency is evident in the variables included in the factors of factor matrices for different banking groups. Priority of factors constructed by variables according to percentages of total variance is sorted as a formal banking presence and three other variables (57.5% of total variance) in European banks, operation capabilities and reliability of supply and seven other variables (48% of total variance) in Australian banks, Location and three other variable (10.5%) in foreign banks, formal banking presence and two other variables and other two variables (8.5%) in all banks in which the factor in European banks is the strongest and followed by the factor in Australian banks. The clustering effect of the factor analysis reveals that banks identify their corbanks by taking into account of more than one variable. For example, in the All bank group, those banks may look at three variables: formal banking presence, range of services provided and compatibility of services in order to make decisions. Australian
banks consider in more variables since they establish corbanking access at head office level. However, Foreign bank groups such as the European bank groups take fewer variables into consideration since they mostly set up their corbanking access at overseas branch level. No significant or important selection criterion is concluded for selecting corbanks in Majors, Non-Majors/regional, American, British, Japanese and Asian bank groups.

8.3.3 Reliability and Validity of Measures

Regarding reliability, the overall Cronbach’s Alpha for determinant factors in Table 3.1.1, Appendix 4 is 0.8700, and for selection criteria in Table 3.2.1, Appendix 4 is 0.8697 which indicate reliability (consistency) is strong for the results of regression and factor analysis. Regarding validity, according to the literature review, the industrial survey, and the CBA case study, measures – nineteen factors and eighteen criteria – apparently reflect the contents of the concepts of corbanking in questions – establishing corbank relationships and selection corbanks. Hence, fact validity was built by these measures. Hypothesis 1 and 2 as measures were also deduced from theories and industrial information which were relevant to the concepts of corbanking. These two hypotheses were tested by regression in paragraph 8.3.1.1 and 8.3.1.2 and then confirmed by the factor analysis. Measures in the face validity virtually harmonize with measures in the construct validity. This leads to convergent validity which supports the real meaning of the constructs and the models are thus good representations. In conclusion, evidence supports that the two models by regression and findings of the factor analysis are valid and highly reliable.
8.4 SUMMARY OF FINDINGS

The theme for this chapter is to test the two hypotheses and thus to form two models: one comprising of identified determinant factors of using international correspondent relationships, another comprising of selection criteria of international correspondents, both via OLS multiple regressions in stepwise mode. The eighteen determinant factors as independent variables are filtered by one-sample t-test in Table 3.1.1, Appendix 4 and then further screen off by priorities according to selection conditions. The results of regression models of determinant factors were: bank size was the most important determinant factor of All and Australian, foreign, American, British, European and Asian banks; location not physically present was the most important determinant factor of Australian, majors and non-major banks; All and Australian bank group models of determinant factors to use international correspondent banking were again confirmed by OLS multiple regressions against the number of international correspondents as their dependent variable. All models had adjusted R Squared ranging from 63.16% to 91.62%, except the non-major model at 37.62%. Furthermore, All, Australian and Foreign were the most significant models in determinant factors according to F statistics. Durbin-Watson tests for all models indicated no autocorrelation. In the case of multiple independent variables (only for Australian bank group), Multicollinearity was negligible. Likewise, the nineteen selection criteria were filtered prior to performing the regression analysis. Formal banking presence was the most important criterion of All and European banks; operational capabilities and reliability of supply were the most important for Australian banks; location was the most important criterion for foreign banks; The Australian bank group model of selection criteria of international correspondents was
again confirmed by OLS multiple regressions against the non-resident assets and liabilities as its dependent variable. The Four models had adjusted R squared ranging from 10.46% to 97.17%. European and Australian were more significant than All and foreign banks. The most significant model was the Australian bank group model of selection criteria in terms of the size of population adjusted R square and F statistics. Durbin-Watson tests proved no autocorrelation in existence of four bank groups. In the case of multiple independent variables (only for Australian bank group), Multicollinearity was negligible for the Australian bank group of selection criteria.

The factor analysis with the Principal-Axis and rotation mode was used to serve three purposes: exploration of related and important factors or criteria correlating for the most important or important factors, and then confirmation of regression models; and justification and confirmation of the filtered determinant factors and selection criteria. The findings of the factor analysis were that the most significant and important determinant factors and selection criteria in the regression models of bank groups were confirmed. In respect to determinant factors, All and Australian bank groups clustered one variable to form their factors. The factors for other bank groups consisted of more than one variable: Majors and Non-Majors-location not physically present and bank size; British banks-bank size and customer driven; and European banks-bank size, necessity/needs and improved efficiency. In confirming regression models, All, Australian, Majors, Non-Majors, British, and European banks were confirmed due to factors being clustered for those banks. No factor was formed for Foreign, American, Japanese and Asian banks, however their regression models are still remained valid except Japanese banks for which no regression was formed. Similarly, for selection criteria, Figure 8.2 and Table 8.4 summarized variable correlated with their factors and confirmed the results of regression models in Table 8.2.
In four bank groups, factors were identified. All banks-three variables including the most important variable-formal banking presence; Australian banks-eight variables including two important variables-operation capability and reliability of supply; foreign banks-four including the most important variable-location and an influencing variable-formal banking presence; and European banks-four variables including the most important variable-formal banking presence. In confirming regression models, All, Australian, foreign and European banks were confirmed due to a factor including the most important variables being clustered for each bank group. No factor was formed for Majors, Non-Majors, American, British, Japanese and Asian bank groups and those banks also had no regression models, therefore, this implied no preferential selection criteria. Regarding the weakness of the factor analysis, it is a somewhat controversial procedure, in large part because it involves a higher degree of subjectivity in the form of judgment than is typical in statistical analysis.

8.4.1 Simplified Finding

Simplified findings were: the most important factor for banks getting into corbanking was "bank size", and a less important factor was location not physically present factor. The most important criterion for banks to choose correspondents was "formal banking presence" which is related to holding a banking license. Less important criteria were operational capabilities, reliability of supply, and location. This generalisation is according to the strength of statistical significance and counts on factors or criteria appearing in the models. In an attempt to identify common determinant factors and selection criteria, "bank size" and the less significant Location not physically present factor are frequently together as determinant factors in different banking groups. Nevertheless, for selection criteria, no strong consistency of criteria is shown in different banking groups although a weak generalization was "formal banking presence".
Reliability and validity of the two models are supported by tests of cronbach's alpha and factor analysis. The findings further emphasize the survey results in chapter seven and compare general findings and the CBA case in chapter six.

8.5 CONCLUSION

Corbanking services have become core business for some banks but not others. However, corbanking is still an important arm for providing international banking services and developing an internationalization strategy. Therefore, it is very useful to find the reasons for banks to enter into corbanking relationships as well as to select their correspondents. This chapter concludes a very clear signal for banks to enter corbanking mode is due to the Bank Size factor. The most important but less clear result for banks to select their international correspondents is Formal Banking Presence. In banking practice, banks may not enter corbanking arrangements on the basis of one factor and select correspondents by one criterion. Further exploration indicates that bank size and location not physically present are typically together for banks to use corbanking, nevertheless, inconsistent results found for selection criteria for correspondents. These conclusive results can be a good starting point for further investigation in international banking.