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Poulsen, Annette Brinch

THE IMPACT OF JAPANESE AND U. S. FINANCIAL CONDITIONS ON THE ACTIVITY OF JAPANESE BANKS IN THE U. S.

The Ohio State University

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THE IMPACT OF JAPANESE AND U.S. FINANCIAL CONDITIONS
ON THE ACTIVITY OF JAPANESE BANKS IN THE U.S.

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

Annette Frinch Foulson, E.A., M.A.

* * * * *

The Ohio State University
1963

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ACKNOWLEDGMENTS

It is a pleasure to acknowledge the assistance of many people in the completion of this dissertation.

As adviser, Dr. Edward J. Bay was always willing to discuss the work and provide encouragement. His comments and help were extremely important in the completion of this research.

Dr. Edward J. Bay spent considerable time in discussing the work, reading drafts and making important suggestions. Dr. J. Huston McCulloch provided further insights into the issues presented here.

Numerous people provided additional assistance in completing this dissertation. Dr. Mark C. Berger, Dr. Daniel E. Chall, Mr. Dean E. Cresshore, Ms. Nancy A. Jianakoplos, Dr. Jeffry M. Netter and Dr. Richard J. Willke were especially helpful.

I owe a special thank you to my parents, Mr. and Mrs. Werner B. Poulsen, for continual support throughout my graduate work.

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International Economics

Money and Banking

Econometrics

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Chapter 1

INTRODUCTION

Japanese banking activity in the U.S. dramatically increased in the last decade. In November 1972, Japanese banks had 28 offices in the U.S. with total assets of $11 billion. By June 1982, the number of offices had increased to 71 with total assets of $100.5 billion. Of all foreign-owned banks in the U.S., Japanese-owned banks hold over one-third of total assets, more than the banks of any other single country. This dissertation offers an explanation for the entry of Japanese banks and expansion of Japanese banking activities in the U.S. based on the characteristics of Japanese and U.S. financial markets and on existing theories of foreign direct investment.

Why this activity has occurred is a question which has not been adequately answered. Theories of foreign direct investment are based on the premise of the direct investor's possession of some unique, "intangible" asset which cannot be readily transferred to a domestic firm. In the banking industry, this asset is thought to consist of an already established working relationship with the client and the
special knowledge of the social and economic environment common to both the bank and its client.

Though the importance of the relationship between banks and their customers cannot be ignored and is investigated in this dissertation, the Japanese financial structure may also encourage overseas activities. In Japan, banks have a very important role in the financing of the corporate sector. The ability of Japanese banks to finance adequately the corporate sector is hampered by interest rates in the loan and deposit markets which are controlled by regulations and institutional agreements. In addition, the Bank of Japan exerts influence over all aspects of Japanese banking. It is possible that the Japanese banks have entered the U.S. market with the purpose of acquiring funds when credit conditions in Japan are tight. The importance of the Japanese banking environment to U.S. activities of Japanese banks is the central focus of this dissertation.

In Chapter II, a general overview of foreign bank presence in the United States is provided. This chapter includes a review of U.S. regulations affecting foreign banks in the U.S. and the competitive issues resulting from these regulations. Literature on foreign direct investment, including applications to multinational banking, is summarized in Chapter III. Chapter IV presents a theoretical model explaining the behavior of Japanese banks.
in the U.S. Chapter V reviews regulations affecting Japanese banks in Japan and presents results from the application of estimation techniques for markets in disequilibrium to Japanese loan markets. Chapter VI includes results from the empirical estimation of the model presented in Chapter IV. Chapter VII reviews the dissertation work and suggests directions for future research.
Chapter II

FOREIGN-OWNED BANKS IN THE U.S.: AN OVERVIEW

This chapter is an overview of foreign-owned banks in the U.S. Special attention is given to the important role of Japanese banks in U.S. banking markets. This overview provides the necessary background for analyzing the growth and activities of foreign-owned banks during the past decade.

Details on foreign-owned banks are provided in five sections. The first section describes the remarkable growth of foreign-owned banks in the U.S. in both size and number. The second section reviews the countries which are active in U.S. banking. Japanese banks are especially prominent in U.S. banking markets. The third section reports the geographical distribution of foreign-owned banks and notes that these banks are drawn to major trade and money-market

---

1 Foreign-owned banks, as used in this dissertation, refers to U.S. banking institutions, including agencies, branches, subsidiary banks and investment companies which are owned by foreign banks. U.S. banking institutions which are owned by foreign individuals or non-banks are not included. Assets of these latter institutions equalled $12.5 billion in March 1980, as compared to assets of $171.5 billion in U.S. banks owned by foreign banks.
centers. The fourth section discusses the possible forms of organization for foreign-owned banks and factors influencing bank organization. The fifth section reviews the U.S. regulatory environment within which foreign banks operate. A summary concludes the chapter.

2.1 GROWTH

Foreign-owned banks have expanded rapidly in the U.S. in the past decade. Total assets of foreign-owned banks in June 1973 were $33 billion. By June 1962, these assets equaled $267 billion, a more than eight-fold increase in nine years. During this same period, the number of institutions climbed from 111 to 466. (Table 1 presents asset data for this period.)

Relative to U.S. banks, the standing of foreign-owned banks improved dramatically. As shown in Table 1, foreign-owned bank assets represented only four percent of all U.S. banking assets in 1973. By 1962, this share increased to 15 percent. Because foreign-owned banks emphasize business and trade financing, these banks are often compared to large U.S. banks which maintain a similar wholesale outlook. The share of foreign-owned bank assets to those of large U.S. banks increased from seven percent to 34 percent in the past decade.
### TABLE 1

Assets of Foreign-Owned Banks in the U.S., Compared to U.S. Banks

<table>
<thead>
<tr>
<th>YEAR (a)</th>
<th>TOTAL ASSETS</th>
<th>PERCENT CHANGE</th>
<th>RATIO-LARGE BANKS (b)</th>
<th>RATIO-ALL BANKS (c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>$32,771</td>
<td></td>
<td>.07</td>
<td>.04</td>
</tr>
<tr>
<td>1974</td>
<td>$47,101</td>
<td>43.7</td>
<td>.10</td>
<td>.05</td>
</tr>
<tr>
<td>1975</td>
<td>$56,189</td>
<td>19.3</td>
<td>.11</td>
<td>.06</td>
</tr>
<tr>
<td>1976</td>
<td>$65,561</td>
<td>16.7</td>
<td>.12</td>
<td>.07</td>
</tr>
<tr>
<td>1977</td>
<td>$76,202</td>
<td>16.2</td>
<td>.14</td>
<td>.07</td>
</tr>
<tr>
<td>1978</td>
<td>$100,625</td>
<td>32.0</td>
<td>.16</td>
<td>.08</td>
</tr>
<tr>
<td>1979</td>
<td>$144,692</td>
<td>43.8</td>
<td>.23</td>
<td>.10</td>
</tr>
<tr>
<td>1980</td>
<td>$171,553</td>
<td>18.6</td>
<td>.25</td>
<td>.12</td>
</tr>
<tr>
<td>1981</td>
<td>$261,400</td>
<td>53.6</td>
<td>.34</td>
<td>.17</td>
</tr>
<tr>
<td>1982</td>
<td>$284,800</td>
<td>9.0</td>
<td>.34</td>
<td>.15</td>
</tr>
</tbody>
</table>

**Source:** Federal Reserve Board, Washington, D.C. and American Banker, February 17, 1983.

(a) Totals are for end of June except 1980 totals are for end of May.

(b) Ratio of foreign-owned bank assets to assets of all commercial banks with assets more than $750 million.

(c) Ratio of foreign-owned bank assets to assets of all U.S. banks, including domestically-chartered banks, branches and agencies of foreign banks, Edge Act and Agreement corporations and New York State investment companies.
These figures emphasize the importance of foreign-owned banks in the U.S. In addition, in June 1982, foreign-owned banks issued 22 percent of all commercial and industrial loans and held 11 percent of all deposits. Foreign-owned banks are firmly established in the U.S.

2.2 COUNTRY OF ORIGIN

Japanese banks dominate the foreign-banking presence in the U.S. In June 1982, Japanese banks had 71 offices in the U.S. with over $100 billion in assets. Japanese assets accounted for 35 percent of all foreign-owned bank assets. Japanese banks issued over 33 percent of all commercial and industrial loans of foreign-owned banks. The lead position of Japanese banks has been maintained since early in the 1970s, as indicated in Table 2.

In general, Japanese, European and Canadian banks have the most significant U.S. bank holdings. In 1982, all but 17 percent of foreign-owned bank assets were from these areas. Several studies (for example, Fieleke, 1977 and Terrell, 1978) suggest that there is a link between a country's U.S. banking presence and other trade and business relationships between the two countries. Since Japan, Canada and the countries of Europe interact with the U.S. in many areas, including trade and direct investment, the country distribution of foreign-owned banks is not surprising.
TABLE 2

Assets of Foreign-Owned Banks in the U.S., By Country

(millions of U.S. dollars)

<table>
<thead>
<tr>
<th>YEAR (a)</th>
<th>JAPAN</th>
<th>CANADA</th>
<th>EUROPE</th>
<th>REST OF WORLD</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>15,930</td>
<td>5,884</td>
<td>9,272</td>
<td>1,684</td>
<td>32,771</td>
</tr>
<tr>
<td>1974</td>
<td>20,766</td>
<td>7,463</td>
<td>16,481</td>
<td>2,392</td>
<td>47,101</td>
</tr>
<tr>
<td>1975</td>
<td>23,314</td>
<td>6,655</td>
<td>23,066</td>
<td>3,154</td>
<td>56,165</td>
</tr>
<tr>
<td>1976</td>
<td>24,868</td>
<td>6,817</td>
<td>24,822</td>
<td>4,034</td>
<td>60,542</td>
</tr>
<tr>
<td>1977</td>
<td>26,267</td>
<td>8,030</td>
<td>35,445</td>
<td>6,461</td>
<td>76,202</td>
</tr>
<tr>
<td>1978</td>
<td>34,421</td>
<td>11,430</td>
<td>44,697</td>
<td>10,077</td>
<td>100,625</td>
</tr>
<tr>
<td>1979</td>
<td>48,088</td>
<td>16,629</td>
<td>64,780</td>
<td>15,195</td>
<td>144,652</td>
</tr>
<tr>
<td>1980</td>
<td>65,255</td>
<td>17,359</td>
<td>70,544</td>
<td>18,395</td>
<td>171,553</td>
</tr>
<tr>
<td>1981</td>
<td>83,890</td>
<td>26,700</td>
<td>104,560</td>
<td>46,250</td>
<td>261,400</td>
</tr>
<tr>
<td>1982</td>
<td>100,500</td>
<td>24,100</td>
<td>107,700</td>
<td>52,500</td>
<td>284,800</td>
</tr>
</tbody>
</table>


(a) Totals are for end of June except 1980 totals are for end of May.
Table 3 presents further information on the ten countries with the largest banking interests in the U.S. as of June 1982. In general, foreign-owned banks hold a greater share of their assets as commercial and industrial loans than do U.S. banks (29 percent versus 21 percent) and their deposit-asset ratio is lower (.51 versus .71). These figures support the view that foreign-owned banks are more business oriented than most U.S. banks.

The banks of the United Kingdom and Hong Kong have commercial and industrial loan-asset and deposit-asset ratios closest to those of U.S. banks. This reflects the fact that 70 percent of United Kingdom assets and 95 percent of Hong Kong assets are held in former U.S.-owned banks acquired through takeovers. Countries such as Japan, Canada, France and Mexico with relatively low deposit-asset ratios are countries which have found the establishment of agencies a popular form of entry for various reasons. Agencies may only hold credit balances incidental to other bank business, resulting in low deposit-asset ratios.²

As indicated in Table 2, asset growth of banks from the rest of the world have kept pace with asset growth of banks from major countries. As of June 30, 1982, Hong Kong banks had assets of $20.1 billion, banks from South and Central America had assets of $11.2 billion and banks from Southeast

² Further description of differences between the various forms of bank organization are provided in Section 2.4.
## TABLE 3

### Assets of Foreign-Owned Banks of Ten Largest Countries

**June 30, 1962**  
(dollar figures in billions) (a)

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of Offices</th>
<th>Assets</th>
<th>Percent</th>
<th>C&amp;I Loans/Assets</th>
<th>Deposits/Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>71</td>
<td>$100.5</td>
<td>34.9</td>
<td>.28</td>
<td>.44</td>
</tr>
<tr>
<td>U. Kingdom</td>
<td>47</td>
<td>$57.4</td>
<td>19.9</td>
<td>.25</td>
<td>.67</td>
</tr>
<tr>
<td>Canada</td>
<td>47</td>
<td>$24.1</td>
<td>6.4</td>
<td>.38</td>
<td>.37</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>18</td>
<td>$20.1</td>
<td>7.0</td>
<td>.29</td>
<td>.79</td>
</tr>
<tr>
<td>France</td>
<td>29</td>
<td>$13.8</td>
<td>4.8</td>
<td>.35</td>
<td>.33</td>
</tr>
<tr>
<td>Italy</td>
<td>19</td>
<td>$12.0</td>
<td>4.1</td>
<td>.25</td>
<td>.60</td>
</tr>
<tr>
<td>Switzerland</td>
<td>12</td>
<td>$10.6</td>
<td>3.7</td>
<td>.31</td>
<td>.60</td>
</tr>
<tr>
<td>Germany</td>
<td>20</td>
<td>$7.3</td>
<td>2.5</td>
<td>.36</td>
<td>.44</td>
</tr>
<tr>
<td>Israel</td>
<td>21</td>
<td>$6.8</td>
<td>2.3</td>
<td>.28</td>
<td>.81</td>
</tr>
<tr>
<td>Mexico</td>
<td>12</td>
<td>$3.3</td>
<td>1.1</td>
<td>.45</td>
<td>.30</td>
</tr>
<tr>
<td><strong>Total (Top 10)</strong></td>
<td><strong>486</strong></td>
<td><strong>$287.8</strong></td>
<td><strong>88.9</strong></td>
<td><strong>.29</strong></td>
<td><strong>.53</strong></td>
</tr>
<tr>
<td><strong>All U.S. Banks (e)</strong></td>
<td><strong>15,235</strong></td>
<td><strong>$1,854.7</strong></td>
<td><strong>---</strong></td>
<td><strong>.21</strong></td>
<td><strong>.71</strong></td>
</tr>
</tbody>
</table>

*Source: American Banker, February 17, 1963.*

(a) Figures include assets of 19 Edge Act Banks.

(b) Country's assets as percent of all foreign-owned bank assets.

(c) Country's commercial and industrial loan-asset ratio.

(d) Country's deposit-asset ratio.

(e) All U.S. banks includes domestically-chartered banks, branches and agencies of foreign banks, Edge Act and Agreement corporations and R.I. investment companies.
Asia had assets of $3 billion.

2.3 GEOGRAPHIC DISTRIBUTION

Foreign-owned banks establish their offices in major trade and money-market cities. In June 1982, 204 of a total of 473 offices were located in New York City. Another 79 offices were in Los Angeles and 47 were in San Francisco. Chicago was fourth in number of offices with 46. Kim and Miller (1983, p. 36) find that most foreign-owned banks, particularly branches, devote more than 50 percent of their loans to trade financing. The city distribution of foreign-owned banks is logical in this light.

Table 4 reports assets of foreign-owned banks by state from 1973 through 1980. New York State offices account for about 70 percent of all foreign-owned bank assets throughout this period and most foreign banks in the U.S. maintain at least one New York office. In addition to the trade and money center benefits of New York, New York became the first state to allow foreign banks to establish branches in 1961.

Many foreign-owned banks have maintained close ties with U.S. ethnic groups. This is especially true in the Japanese case. California offices of Japanese banks have cultivated connections with the large Asian community in that state and all Japanese banks in the U.S. emphasize ties with Japanese firms (Kim and Miller, p. 38).
<table>
<thead>
<tr>
<th>YEAR (a)</th>
<th>NEW YORK</th>
<th>CALIFORNIA</th>
<th>ILLINOIS</th>
<th>OTHERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>23,228 (65)</td>
<td>8,712 (39)</td>
<td>69 (2)</td>
<td>761 (5)</td>
</tr>
<tr>
<td>1974</td>
<td>32,878 (74)</td>
<td>12,974 (44)</td>
<td>224 (8)</td>
<td>1,026 (7)</td>
</tr>
<tr>
<td>1975</td>
<td>39,343 (84)</td>
<td>14,426 (57)</td>
<td>670 (20)</td>
<td>1,550 (8)</td>
</tr>
<tr>
<td>1976</td>
<td>43,807 (95)</td>
<td>17,695 (61)</td>
<td>1,944 (24)</td>
<td>2,115 (9)</td>
</tr>
<tr>
<td>1977</td>
<td>55,048 (110)</td>
<td>17,516 (67)</td>
<td>2,619 (28)</td>
<td>1,015 (11)</td>
</tr>
<tr>
<td>1978</td>
<td>73,919 (134)</td>
<td>21,701 (83)</td>
<td>3,165 (31)</td>
<td>1,840 (24)</td>
</tr>
<tr>
<td>1979</td>
<td>108,084 (155)</td>
<td>28,632 (93)</td>
<td>4,732 (34)</td>
<td>3,245 (35)</td>
</tr>
<tr>
<td>1980</td>
<td>121,444 (163)</td>
<td>38,428 (97)</td>
<td>6,060 (34)</td>
<td>5,622 (45)</td>
</tr>
</tbody>
</table>

Source: Federal Reserve Board, Washington, D.C.

Note: Figures in parentheses refer to number of offices.

(a) Totals are for end of June except 1980 totals are for end of May.
2.4 **FORM OF ORGANIZATION**

Foreign banks may operate in the U.S. in five different forms — as representative offices, agencies, branches, subsidiaries or investment companies. Table 5 lists assets of foreign-owned banks by form of organization for 1973 through 1982.

Table 6 provides information on loan-asset and deposit-asset ratios of the various organizational forms. Subsidiaries most closely resemble U.S. banks, with a relatively low ratio of commercial and industrial loans to assets and a high deposit-asset ratio. The other forms of organization emphasize commercial and industrial loans more and hold fewer deposits.

Japanese banks have entered the U.S. in all forms. California offices of Japanese banks are primarily agencies (21 offices) with a few subsidiary banks (8). This emphasis on agencies is partially the result of California law which essentially prevented entry of branches until 1978. New York offices of Japanese banks are mainly branches. There are 20 Japanese branch banks in New York, four subsidiaries and four agencies.
TABLE 5
Assets of Foreign-Owned Banks in the U.S., By Form of Organization
(millions of U.S. dollars)

<table>
<thead>
<tr>
<th>YEAR (a)</th>
<th>AGENCY</th>
<th>BRANCH</th>
<th>COMMERCIAL BANK</th>
<th>INVESTMENT COMPANY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>15,132 (57)</td>
<td>6,640 (24)</td>
<td>5,252 (27)</td>
<td>1,747 (3)</td>
</tr>
<tr>
<td>1974</td>
<td>25,402 (66)</td>
<td>11,292 (36)</td>
<td>7,787 (28)</td>
<td>2,621 (3)</td>
</tr>
<tr>
<td>1975</td>
<td>26,325 (80)</td>
<td>15,094 (54)</td>
<td>11,714 (32)</td>
<td>3,056 (3)</td>
</tr>
<tr>
<td>1976</td>
<td>29,600 (87)</td>
<td>20,847 (63)</td>
<td>13,646 (34)</td>
<td>1,466 (5)</td>
</tr>
<tr>
<td>1977</td>
<td>25,427 (96)</td>
<td>32,014 (62)</td>
<td>16,268 (33)</td>
<td>2,474 (5)</td>
</tr>
<tr>
<td>1978</td>
<td>32,235 (129)</td>
<td>47,381 (101)</td>
<td>19,092 (37)</td>
<td>1,518 (5)</td>
</tr>
<tr>
<td>1979</td>
<td>44,787 (149)</td>
<td>72,724 (123)</td>
<td>24,339 (39)</td>
<td>2,642 (6)</td>
</tr>
<tr>
<td>1980</td>
<td>56,620 (166)</td>
<td>84,575 (128)</td>
<td>25,600 (37)</td>
<td>2,759 (6)</td>
</tr>
<tr>
<td>1981</td>
<td>63,500 (181)</td>
<td>107,300 (176)</td>
<td>90,600 (49)</td>
<td>N.A. (7)</td>
</tr>
<tr>
<td>1982</td>
<td>63,500 (195)</td>
<td>116,000 (208)</td>
<td>102,200 (55)</td>
<td>3,100 (8)</td>
</tr>
</tbody>
</table>


Notes: Figures in parentheses are number of offices. N.A. = Not available.

(a) Totals are for end of June except 1980 totals are for end of May.
### TABLE 6

**Assets, Loans and Deposits of Foreign-Owned Banks by Form**

**June 30, 1982**  
(dollar figures in trillions)

<table>
<thead>
<tr>
<th>FORM OF ORGANIZATION</th>
<th>NUMBER OF OFFICES</th>
<th>ASSETS</th>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agency</td>
<td>195</td>
<td>$63.5</td>
<td>22.3</td>
<td>.34</td>
<td>.17</td>
</tr>
<tr>
<td>Branch</td>
<td>208</td>
<td>$116.0</td>
<td>40.7</td>
<td>.29</td>
<td>.48</td>
</tr>
<tr>
<td>Subsidiary</td>
<td>55</td>
<td>$102.2</td>
<td>35.9</td>
<td>.26</td>
<td>.76</td>
</tr>
<tr>
<td>Investment Company</td>
<td>8</td>
<td>$3.1</td>
<td>1.0</td>
<td>.39</td>
<td>.22</td>
</tr>
<tr>
<td>Total</td>
<td>485</td>
<td>$284.8</td>
<td>100.0</td>
<td>.29</td>
<td>.52</td>
</tr>
</tbody>
</table>


(a) Form's assets as percent of all foreign-owned bank assets.

(b) Form's commercial and industrial loan-deposit ratio.

(c) Form's deposit-asset ratio. Deposits include credit balances.
2.4.1 Representative Offices

As of August 30, 1982, there were 289 representative offices of foreign banks open in the U.S., making this the most popular organizational form for foreign bank representation. However, representative offices are not authorized to offer any banking services. Instead, they represent the parent bank in the U.S., providing information about the parent and facilitating banking transactions undertaken with U.S. correspondent banks. Because these offices do not offer banking services, they are exempt from most regulation. Representative offices allow the parent to establish an inexpensive U.S. presence and often provides the initial U.S. foothold of foreign banks before they expand into other organizational forms (FITE Report, p. 3).

2.4.2 Agencies

Agencies participate in most banking activities. They issue commercial and industrial loans and finance international transactions. However, agencies may not accept deposits though credit balances incidental to their regular business may be held for short periods of time. Due to the restriction on deposit collection, agency business is financed primarily through funds from affiliated banks or interbank markets.
Agencies escape much of the regulation to which branches and subsidiaries are subject. State supervision of agencies tends to be less extensive than for branches (FINE Report, p. 2). Because agencies do not hold deposits, they are not subject to interest-rate regulations such as Regulation C or to fractional reserve requirements. Also, they are not subject to Federal Deposit Insurance Corporation (FDIC) review or payments. An important advantage to the agency form of organization is that agencies are not required to restrict their lending to any one customer to ten percent of their or their parent's assets, as are branch and subsidiary banks.

Agencies are involved primarily in financing international trade and in making loans to other banks (FINE Report, p. 2). Thirty-four percent of agency assets are in commercial and industrial loans (Table 6). Japanese agencies cite the accommodation of financing needs of large Japanese trading companies as their primary motivation (Kim and Miller, p. 38). Canadian agencies participate heavily in interbank-loan markets.

2.4.3 Branches

Branches allow foreign banks to offer a full range of banking services in the U.S. Branches, unlike agencies, may accept deposits. In the early 1970s, most assets of
foreign-owned banks in the U.S. were in agencies but since 1976, branches have become the most popular organizational form. On June 30, 1982, branches held 41 percent of foreign-owned bank assets in the U.S. while agencies accounted for only 22 percent.

Branches are subject to stricter regulations than agencies. Loans to any one customer are restricted to ten percent of the capital and surplus of the parent bank. Foreign branches are generally subject to the same reserve requirements and interest-rate ceilings as state-chartered domestic banks, even before the passage of the International Banking Act of 1978. Examination and supervision procedures for foreign branches are more extensive than those for agencies.

The International Banking Act of 1978 (IBA) allowed branches (as well as agencies) to obtain national charters. Before this, all branches were established with state charters and only where permitted by state law. New York allowed foreign-branch banking in 1961 and branches were required to hold assets equal to at least 108 percent of its liabilities obtained in the U.S. Illinois law, since 1973, allows foreign banks to establish one branch in Chicago's loop area. The office is required to have at least $1 million in assets. Branches were effectively kept out of California until 1976 due to state legislation requiring
branches to have FEIC insurance. Since the IBA, which allowed foreign branches to obtain FEIC insurance for the first time, nine foreign-bank branches have opened in California.

Foreign banks often prefer to establish branches rather than subsidiaries. Branch banks allow foreign banks to maintain greater control over the U.S. office. Subsidiary banks with national charters are required to form a board of directors consisting of a majority of U.S. citizens. (Before the IBA, all directors were required to be U.S. citizens.) Local directors who support the overall goals of the parent bank may be difficult to find. In addition, capitalization requirements are lower for a branch. For branches, limitations on loans to any one customer are based on the parent bank's capital; subsidiary limitations are based on the capital of the U.S. office only.

Like agencies, branches are heavily involved in trade and business financing. Commercial and industrial loans make up 29 percent of the assets of branches. Almost 50 percent of branch funds are raised through deposits.

2.4.4 Subsidiaries

Subsidiaries of foreign banks hold about 36 percent of foreign-owned bank assets in the U.S., with assets totaling $108 billion in June 1982. Subsidiaries essentially operate
as any other domestically-chartered bank, offering a full range of banking services. The degree of control of the foreign bank over the subsidiary varies with the foreign bank's share of ownership. As noted above, if the subsidiary has a national charter, a majority of the board of directors must be U.S. citizens.

The establishment of subsidiary offices through the acquisition of U.S. offices is a controversial issue. From 1970 through 1980, 36 U.S. banks were acquired by foreign-banking institutions. The four largest foreign subsidiary banks in asset size were all established through takeovers.3

Foreign banks have an advantage in acquiring U.S. banks because they are not subject to the same constraints as domestic banks. Domestic banks are restricted by state branching laws which may limit expansion throughout the state, federal branching laws which prevent out-of-state takeovers and antitrust regulation which may disallow mergers between two large U.S. banks for competitive reasons.

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3 These banks are, ranked in asset size, Marine Midland Bank in New York, Crocker National Bank in San Francisco, Union Bank in Los Angeles and National Bank of North America in New York. Marine Midland was taken over by a Hong Kong Bank, the other three are owned by British banks.
Activities of subsidiaries more closely resemble those of U.S. banks than those of foreign-owned branches and agencies. Commercial and industrial loans to finance trade and business are still substantial but retail loans and investments in securities are important holdings also. The deposit-asset ratio for subsidiary banks is .78, higher than that of all commercial banks (.71).

2.4.5 Investment Companies

There are eight investment companies owned by foreign banks in the U.S., with assets of $3.1 billion. They are all located in New York, the only state which allows investment companies to participate in both commercial and investment banking business. The banking functions of investment companies include the issuance of short-term and medium-term loans, the issuance of acceptances, foreign-exchange transactions and related activities. Though investment companies may not hold deposits, they may maintain credit balances incidental to their other activities. The IBA restricts newly-established investment companies to participate in either commercial or industrial banking.

Investment companies hold 39 percent of their assets in commercial and industrial loans. Investment companies obtain most of their funds from interbank borrowing and borrowing from directly-related institutions.
2.5 REGULATORY ENVIRONMENT

A subject of concern throughout the 1970's was the regulatory environment under which foreign-owned banks operated in the U.S. It was argued that foreign-owned banks were operating with a competitive advantage with respect to U.S. banks because of differential regulation. The discussion led to the passage of the International Banking Act in 1978, which was designed to decrease or eliminate competitive differences. However, some differences remain.

In this section, the regulations pertaining to foreign-owned banks before and after the IBA are presented. The impact of differential regulation on the competitive balance between U.S. and foreign-owned banks is also considered.

2.5.1 Regulation Before the IBA

Until 1978, foreign-owned banks were not subject to federal regulations unless they were established as subsidiary banks. The lack of federal regulation allowed foreign-owned banks to escape some of the rules to which U.S. banks were subject. The impact of different restrictions on entry and geographic expansion, restrictions on product expansion and supervision are considered here. The following discussion refers primarily to branches, agencies or other organizational forms of foreign-owned
banks besides subsidiaries. Subsidiaries are generally subject to the same regulations as U.S. banks.

Before the IEA, foreign-owned banks were not eligible for federal charters and were therefore established with state charters according to the specific laws of the state. In 1979, 15 states expressly authorized foreign-owned banks to establish either branches or agencies within their borders, of which three allowed branches only and four allowed agencies only. Seventeen states expressly prohibited either branches or agencies of foreign-owned banks. Eighteen states lacked specific regulation. (Kim and Filler, p. 83)

The three states with the largest foreign-bank presence are New York, Illinois, and California. In 1961, New York changed its law to allow foreign-bank branches. Though foreign agencies and representative offices had been allowed before 1961, branches allowed foreign banks to collect deposits. Illinois, in 1973, allowed foreign banks to operate a single branch in the Chicago Loop area. California, until 1978, essentially prohibited the entry of foreign bank branches because it required FDIC insurance for any foreign-owned bank accepting deposits. Foreign-owned banks could not obtain FDIC insurance until the IEA. However, agencies and subsidiaries were allowed in California and were used extensively by foreign banks, as seen in Table 4.
The lack of federal regulation in entry allowed foreign-owned banks to expand geographically in ways which U.S. banks could not. The McFadden Act and the Banking Act of 1933 had established state boundaries as the ultimate limits for geographic expansion through branching. (Carter and Golembke, 1981, p. 91.) However, branches of foreign banks were not subject to these restrictions. In 1975, 48 foreign banks, including 13 Japanese banks, had offices in more than one state. (FINE Report, p. 19.) In 1982, 19 Japanese banks had multistate offices.

The ability to branch interstate, many argued (for example, Terrell and Mey, p. 74, and the FINE Report, p. 19-20), gave foreign banks a competitive advantage. However, the extent of this advantage was questioned. Edwards and Zwic (1975) conclude that foreign banks' multistate operations were not a serious threat to U.S. banks. Large U.S. banks are able to establish multistate operations through loan production offices, offices of nonbank affiliates and Edge Act and Agreement corporations. Rhoades (1980, p. 3) argues that non-bank subsidiaries of U.S. bank-holding companies have spread throughout the U.S. in ways which "the expansion of foreign banks in the United States has not matched." As an example, Rhoades notes that Citicorp has about 400 offices in 38 states, including consumer finance offices, mortgage outlets, loan production
offices and Edge Act offices. Bank of America has 350 offices in 41 states. Manufacturers Hanover Trust Company has 190 offices in 10 states.

Despite the multistate activities of U.S. banks, they are still limited to accepting deposits in only one state. The Federal Reserve and the Treasury Department argued in hearings concerning the IEA that deposit-taking is the essence of banking and it was in that activity that domestic banks were at a disadvantage. (Segala, 1979, p. 17.)

Another advantage of foreign-owned banks in the U.S. is the ability to take over large U.S. banks. The McFadden and Bank Holding Company Acts prevent U.S. banks from taking over banks in another state, except in special circumstances. In addition, intrastate mergers may be prevented by state branching laws. Many states limit or prohibit branching, even through multibank holding companies. For larger banks, intrastate mergers are further restricted by antitrust laws. Walter (1980, p. 37) makes the point that

major opportunities in U.S. banking are effectively reserved for foreign banks only, since they are free to make acquisitions of banks in the United States that are foreclosed to domestic banking.

U.S. banks are subject to extensive restrictions concerning nonbanking business. The Glass-Steagall provisions of the 1933 Banking Act prevent U.S. banks from
underwriting new securities issues and from providing securities brokerage or trading services. The Bank Holding Company Act limits bank holding companies' nonbanking activities to those closely related to banking.

In 1960, there were 32 securities firms affiliated with foreign banks, including five Japanese firms. Weiss (p. 19) notes that "U.S. securities affiliates of foreign banks are not numerous, nor do they conduct a substantial proportion of overall domestic securities business." He adds (p. 54) "only 16 [foreign-owned] companies rank among the top 250 securities firms in total capital. The combined assets of these 16 foreign-owned securities companies represent only about half that of the largest domestically-owned securities firm, Merrill Lynch." Edwards and Zwick (p. 62) note that these securities offices were opened partially as a response to U.S. banks opening securities offices overseas. Weiss (p. 19) adds that U.S. banks have supported the continued existence of foreign banks' securities offices in the U.S. to avoid possible retaliation overseas.

Foreign-owned banks were treated differently than U.S. banks with respect to supervision, also. Foreign-owned banks were subject to state reserve requirements rather than federal reserve requirements. These state requirements are sometimes lower than federal reserve requirements and often allow the bank to hold interest-bearing U.S. securities as
part of total reserves. Of course, any U.S. bank could at the time also avoid federal reserve requirements by leaving the Federal Reserve System. However, most of the major banks with which foreign banks compete maintained their membership.

Another possible cost advantage for foreign-owned branches before the IBA was the absence of assessments for FDIC insurance of deposits. Most states require domestic banks to maintain deposit insurance; foreign-owned banks were not eligible for FDIC insurance. However, this may have put foreign-owned branches at a disadvantage because they could not offer FDIC insurance to their customers.

Differential regulation between foreign-owned and U.S. banks led to calls for federal regulation to level the playing field. Because foreign-owned banks could establish multistate offices, expand into non-banking fields, more readily take over large U.S. banks and escape federal reserve requirements and FDIC assessments, many argued that U.S. banks at a competitive disadvantage. In 1978, the International Banking Act was passed.

2.5.2 The International Banking Act of 1978

The IBA attempted to reduce, or eliminate the competitive advantages of foreign-owned banks in the U.S., though it was not completely successful in achieving its goal. The IBA
set down comprehensive rules for foreign-owned banks in the U.S. The legislation was intended to eliminate any competitive advantages or disadvantages of foreign-owned banks in the U.S. Kim and Miller divide the provisions of the law into eight major categories; their outline is followed here.

Federal Licensing and Chartering

The IBA requires all foreign-owned banks operating in the U.S. to register with the Federal Reserve Board. In addition, branches and agencies are given the option of obtaining a federal or a state charter. A federally-chartered branch or agency may only be established in a state where the bank does not already operate a state-licensed branch or agency and where allowed by state law. State-chartered branches or agencies may convert to federal charters.

The IBA subjects foreign branches and agencies to the branching restrictions and conditions of the McFadden Act. To facilitate the establishment of subsidiary banks with federal charters, the Comptroller of the Currency is allowed to waive the requirement that all directors of a subsidiary of a foreign bank be U.S. citizens. Instead, a minority of directors may be foreign.
Regulatory, Supervisory and Examining Authority

The IBA provides that federal branches and agencies are to be supervised by the Comptroller, federally-insured state branches by the FDIC and state-examining bodies and nonfederally-insured state branches and agencies by state-examining bodies. In addition, the Federal Reserve has residual authority to examine any foreign-owned branch or agency. The Federal Reserve can also establish reserve requirements for foreign-owned branches and agencies whose parent banks have worldwide assets of at least $1 billion. In return, the branches and agencies have access to Federal Reserve services, such as the discount window and check clearing.

Interstate Banking

The extent of the advantage to foreign-owned banks of operating in more than one state has not been determined. The IBA limits multistate activities to decrease any possible competitive advantage. However, existing offices of foreign banks operating on or before July 27, 1978 are not affected by this part of the legislation.

The IBA requires that any foreign bank with offices in more than one state must designate a home state. Deposits from outside that state are limited to those which would be allowed at an Edge Act corporation, that is, deposits either
from a foreign source or related to international trade. Also, subsidiary banks outside the home state may not be acquired.

Nonbanking Activities

Foreign-owned banks are made subject to the Bank Holding Company Act and its amendments by the FEA. However, grandfather provisions for nonbanking activities of foreign banks are included. Nonbanking activities undertaken by September 7, 1978 may be retained until December 31, 1985. After that date, the Federal Reserve may terminate grandfathering for any particular activity or bank if it decides it is necessary to prevent "decreased or unfair competition."

Deposit Insurance

All foreign branches with federal charters and those with state charters in states where FDIC insurance is mandatory must have FDIC insurance if deposits less than $100,000 are accepted. Branches only accepting deposits more than $100,000 are exempted due to the wholesale criterion of their business.

Edge Act Operations
The IBA changed the provisions of the Edge Act of 1919. Edge Act corporations are used for financing trade but before the IBA they were operating under regulations which put them at a disadvantage with respect to foreign banks. The IBA expanded the lending powers of Edge Act corporations and made reserve requirements more equitable. Foreign-owned banks are now allowed to establish Edge Act corporations also.

Reserve Requirements and Interest-Rate Limitations

The IBA gave the Federal Reserve permission to establish reserve requirements and interest-rate ceilings for foreign-owned banks. Foreign-owned banks are subject to the same restrictions as member banks.

Further Recommendations

The IBA mandated further review of the regulatory environment of all banks. In particular, study of the treatment of U.S. banks overseas and of the branching restrictions of the McFadden Act were ordered.
2.6 Summary

Foreign-owned banks play a major role in U.S. banking. They hold 15 percent of all U.S. banking assets and issue 22 percent of the commercial and industrial loans. Japanese banks have the largest U.S. banking presence, with many New York and California offices. Table 7 summarizes the position of Japanese-owned banks in the U.S.

Foreign banks may establish U.S. offices as agencies, branches, subsidiary banks or investment companies. The branch form of organization is presently the most popular in number and total assets.

The regulatory environment of foreign banks in the U.S. is an important consideration in the study of these banks. Before the IBA, several advantages of foreign-owned banks were thought to exist. Foreign-owned banks were able to branch across statelines, were able to takeover U.S. banks more readily than U.S. competitors, were able to expand into nonbanking activities such as securities underwriting and were not subject to federal reserve requirements or FDIC insurance assessments.

The IBA attempted to correct the situation. However, foreign-owned banks maintain some competitive advantages. Grandfather provisions allow foreign-owned banks to maintain existing offices in more than one state and also allow
### TABLE 7

**Japanese Banks in the U.S.**

*June 30, 1982*

(dollar figures in billions)

<table>
<thead>
<tr>
<th>State</th>
<th>Form of Organization</th>
<th>Number of Offices</th>
<th>Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>Agency</td>
<td>4</td>
<td>$13.2</td>
</tr>
<tr>
<td></td>
<td>Branch</td>
<td>20</td>
<td>$43.0</td>
</tr>
<tr>
<td></td>
<td>Subsidiary</td>
<td>4</td>
<td>$8.1</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
<td><strong>$64.3</strong></td>
</tr>
<tr>
<td>California</td>
<td>Agency</td>
<td>21</td>
<td>$21.0</td>
</tr>
<tr>
<td></td>
<td>Subsidiary</td>
<td>6</td>
<td>$5.4</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td><strong>$30.4</strong></td>
</tr>
<tr>
<td>Illinois</td>
<td>Branch</td>
<td>6</td>
<td>$3.0</td>
</tr>
<tr>
<td>Washington</td>
<td>Branch</td>
<td>5</td>
<td>$1.1</td>
</tr>
<tr>
<td>Oregon</td>
<td>Branch</td>
<td>1</td>
<td>$1.6</td>
</tr>
<tr>
<td>Hawaii</td>
<td>Agency</td>
<td>1</td>
<td>$0.02</td>
</tr>
<tr>
<td>Texas</td>
<td>Edge Act</td>
<td>1</td>
<td>$0.06</td>
</tr>
</tbody>
</table>

**Source:** American Banker, February 17, 1983.
existing nonbanking activities to continue. Foreign-owned banks maintain an advantage in the ability to takeover large U.S. banks due to the nature of anti-trust legislation. Also, if they do not accept deposits less than $100,000, foreign-owned banks are not required to have FDIC insurance.

In the Japanese case, the competitive advantages may not have played as an important a role as in others. Japanese banks, in 1975, had 13 banks with offices in more than one state. However, only three banks were able to accept deposits in more than one state. In 1982, eleven Japanese banks accepted deposits in more than one state. Japanese banks had interests in five U.S. securities firms, however they are relatively small compared to U.S. securities firms. Japanese banks have not been involved in the takeover of any large U.S. banks. Most U.S. banks which have been purchased by Japanese banks have been used to expand the branching network of existing subsidiary banks in California. (Longbrake, Quinn and Walter, 1980).

The competitive impact of U.S. regulations on foreign-owned bank entry has been discussed by many authors. The extent of the importance of differential regulation is difficult to determine. There is some evidence that foreign banks hurried to enter the U.S. before the BAA went into effect (Walters, p. 22). However, other writers, for example, Weiss (p. 43), suggest that the competitive balance
between U.S. and foreign banks is not "seriously cut of line."
Chapter III
LITERATURE ON FOREIGN DIRECT INVESTMENT

This chapter considers previous literature on foreign direct investment. Most of the empirical analysis in this area has emphasized foreign direct investment in manufacturing industries. It is only recently that this work has been expanded to include multinational banking.

The first section of this chapter reviews the role of risk diversification in international investment. The second section presents Hymer's (1960) view on the necessity of market inefficiencies for foreign direct investment to occur. The third section expands Hymer's work to include more recent theories of foreign direct investment drawn from industrial-organization literature. The impact of differential regulation is reviewed in the fourth section. In the fifth section, applications to multinational banking are considered. A summary concludes the chapter.
3.1 RISK DIVERSIFICATION AND FOREIGN DIRECT INVESTMENT

The characteristics of foreign direct investment which make it different from other forms of foreign investment is that the control over the enterprise in which capital is invested is maintained by the investor. The benefits of international diversification of investors' portfolios have been recognized as an extension of the benefits of diversification within a single country. (Grubel, 1966). In any world of uncertainty, the investor will not only maximize his expected return but he must also control the level of risk accompanying that return. In modelling this behavior, Markowitz (1952) and Tobin (1958) found that the key to risk minimization for any expected level of return was diversification of assets. Sharpe (1964) later showed that for a general-equilibrium solution in a world-wide economy with no barriers to capital flows, every investor's portfolio holds a share of every risky asset in direct proportion to the share of that asset in the total market portfolio of all risky assets.

Direct investment theories attempt to explain the phenomenon of investors maintaining control over the enterprise. Kobrin and Lessard (1976) and Lessard (1979) found that the diversification explanation was not sufficient by itself to explain foreign-direct-investment patterns. Kobrin and Lessard, while noting the gains from
international diversification, found that unless the investor has some competitive advantage that compensates for the higher costs of competing in a foreign country, he would be much more likely to participate in portfolio investment, where control over the investment is not maintained, than in direct investment. Lessard summed up this point by stating,

Even a casual examination of direct foreign investment patterns show that diversification is not the sole motivation for multinational corporation expansion. If it were, the world would be dominated by global holding companies and direct foreign investment would not be concentrated in research-and-advertising intensive industries. However, this does not rule out diversification as a joint determinant of direct foreign investment. (p. 15).

3.2 MARKET INEFFICIENCIES AND FOREIGN DIRECT INVESTMENT

Most of the literature on foreign direct investment concentrates on finding market inefficiencies which result in greater gains to the investor by maintaining control over the investment rather than investing without control. Hymer (1960) was the first to note the importance of the characteristics of the firms and industries participating in foreign direct investment. In studying historical patterns of U.S. foreign direct investment, Hymer found that the firms that participated in direct investment were firms where foreign interests were only a small part of their total activities. Also direct investment showed a marked industrial distribution; over time, direct investment tended
to occur in the same industries despite changing market conditions.

Hymer suggested that the diversification approach to investment could not explain these two characteristics. They both suggest that some firm- or industry-specific characteristic will encourage foreign investment. Hymer hypothesized that it is the well-established domestic firm or industry which has acquired some special skill or knowledge which will tend to invest abroad. The special capability gives that firm some comparative advantage over foreign firms and allows the firm to compete successfully in the foreign market.

Since Hymer, many researchers have attempted to identify what the special advantage of the investing firms might be. One approach suggested that every good goes through a "product-life cycle." (Vernon, 1966). In stage I of production, the new good is a luxury item whose production techniques are still being developed. The good will tend to be produced in the country where it will be sold, the technologically advanced country with a relatively high per capita income. However, as the good advances through later stages, the good begins to lose its luxury status and competitive forces from new firms entering the industry begin to make the costs of production more important. It is in these later stages, Vernon suggested, that foreign direct
investment is observed. Production is located in less-advanced countries where labor costs tend to be lower.

Several empirical tests of this life-cycle hypothesis offered corroborating evidence. (Gruber, Mehta and Verron, 1967 and Keesing, 1967). The tests were based on the premise that there should be a link between exports and research-and-development expenditures. In stage I of production, the observer would expect to see such a connection because newly-developed products are exported while those in later stages of production can be produced in foreign countries. Research in this area found high correlations between industries with high research-and-development expenditures or highly-skilled labor and industries with substantial exports. However, these results are not conclusive evidence of the existence of the product-life cycle since the correlations are consistent with other possible explanations of the relationship between research and exports.

3.3 Industrial Organization and Foreign Direct Investment

More recent work in the literature of foreign direct investment has incorporated theory developed in the industrial-organization literature. For any firm, a basic deterrent to foreign direct investment is that a foreign firm is unfamiliar with the language, laws, customs and
market of the country where it has invested and must acquire this information at some cost. Domestic firms with which it is competing have a competitive advantage due to their greater familiarity with the market. For a foreign firm to be a viable competitor, it must have some offsetting advantage.

Caves (1971, 1974b), drawing on industrial-organization work, identified a type of market structure which implied foreign direct investment. Caves suggested that the investing firm must have an "intangible" asset such as production technology, managerial skills, knowledge of the product or factor market, or product differentiation as in an established brand name. This asset must be available to the investing firm at a lower cost than to competitors and the cost of this asset must be relatively low in comparison to the return available from foreign production. Besides identifying these possible sources of competitive advantage, Caves pointed out that for foreign direct investment to be chosen over other possible methods of exploiting foreign markets, i.e., licensing or exports, the return on the special asset must to some extent depend on local production.

Caves argued that these characteristics point to product differentiation as the one necessary determinant for the occurrence of direct investment. Caves ruled out the
importance of other advantages by stating that intangible assets such as special production technology or managerial skill are more likely to be exploited via licensing and exports since they are not dependent on local production. Because Caves expected that only large firms would be willing to finance the high fixed costs of risky foreign direct investment, he hypothesized that foreign direct investment occurs predominantly in industries characterized by differentiated oligopoly.

Caves' analysis may be too specific. In stating that licensing or exports can fully exploit all the potential profits of any expertise except product differentiation, he assumed that any other firm-specific expertise can be sold for its full value in a license or that exports can efficiently serve the market. If there exists some market imperfection, if only lack of knowledge, the firm could not capture all of the rents inherent in its intangible asset. If the special asset is dependent on a continuous production of new knowledge as in a rapidly developing product, a license selling a stock of knowledge at one point in time would not be worth very much to the buyer and a continual, longer-term relationship such as foreign direct investment should be expected. (Bagazzi, 1973). Additionally, the firm may not wish to incur the costs of policing a licensing agreement. Finally, it is not necessarily true that the
full profits available from product differentiation may only be available through foreign direct investment. If the potential buyer of a license recognizes the true value of the differentiated product, he should be willing to pay the full rent and the firm should be willing to sell the license.

Several empirical studies were undertaken specifically to identify the characteristics of firms or industries which participate in foreign direct investment. Horst (1972) and Caves (1974a) both found through regression analysis that high research and development expenditures had a positive effect on an industry's participation in foreign direct investment and that firm size, an indicator of barriers to entry, also had a positive effect.

3.4 REGULATION AND FOREIGN DIRECT INVESTMENT

An important alternative approach to the above theories of foreign direct investment is based on the consideration of the impact of regulation and taxation on firm and industry behavior. If regulations restrict or prohibit portfolio investment, direct investment may be the most efficient way for the firm to gain benefits from international diversification. Some countries restrict the purchase of foreign securities by their citizens or they do not allow foreign securities to be listed on their stock
exchanges. Many countries have currency restrictions which limit the amount of currency which can be taken out of the country. Taxes may also discourage portfolio investment. (Eiteman and Stonehill, 1979).

3.5 APPLICATIONS TO FOREIGN DIRECT INVESTMENT IN BANKING

The intangible asset explanation of foreign direct investment discussed above suggests that the foreign firm must have some special asset which will allow it to compete in the domestic market. The banking market is typically characterized by homogeneous goods and strong competition with only small economies of scale benefitting the larger banks. (Benston, 1973). Later studies (Benston, Hanweck and Humphrey, 1982) suggest that the average operating costs for both branch and unit state banks are U-shaped and diseconomies of scale are observed at a relatively small level of output (from $10 million to $25 million in deposits). Knowledge of the capital market by the market participants is extensive. For a foreign bank to enter such a competitive market and be able to compete with the domestic banks, it must have some advantage to offset its "foreignness."

Caves (1977, p. 88) relates multinational banking to foreign direct investment in nonfinancial industries. The relevant intangible asset of a multinational bank, he suggests,
lies in its established goodwill relations with large commercial and industrial customers who are its borrowers and depositors in its home market. For its large steady customers, the bank's package of services amounts to a differentiated product.

This asset includes knowledge about the home country and about the borrowing firm and any goodwill already built up in an already existing relationship. It is likely that the borrowing firm will find it cheaper to deal with a bank who is already cognizant of its special needs.

This does not directly answer the question of why the bank will bother to open foreign offices instead of servicing its customers from the home country. There are advantages of being conveniently located. The borrowing firm may prefer to have its banking services available close to its place of investment. By not offering multinational services, the bank risks losing its clients. Stevens (1972) points out that the firm can minimize its risk from international holdings by borrowing in the same currency in which its foreign assets are denominated.

Fieleke (1977) looked for evidence of the importance of the customer relationship between U.S. banks operating abroad and U.S. foreign direct investors. U.S. bankers had told Fieleke in interviews that their predominant reason for going abroad was to serve their customers. Fieleke empirically tests this reasoning by regressing the level of foreign branch assets and earnings by country on the U.S.
direct investment pattern in the same country, that country's GNP and exports plus imports and the branch's rate of return on assets. The U.S. direct investment position was included to test the intangible asset hypothesis. GNP measures economic activity and the level of exports plus imports proxies freedom from government regulation and taxation. Fieleke also uses branch rate of return as an indicator of government regulation — the higher the rate of return, the greater the regulation on entry and bank activities since returns had not been bid down by competition. Fieleke finds that the U.S. direct investment position had a significantly positive effect on branch assets and earnings. He does not come to any conclusions about the other variables, stating that their observed insignificance was probably due to a multicollinearity problem.

Terrell (1979) performs similar tests for U.S. banks in Japan and Japanese banks in the U.S. in a bilateral study of international banking. Terrell looks at the impact of Japanese trade and several measures of market activity, such as changes in loans by local banks and loan-deposit ratios, on monthly changes in loans of Japanese offices in the U.S. and U.S. offices in Japan. The trade variable is used as a measure of the relationship between the banks and its customers from the same country. Terrell's results indicate
that this intangible asset was highly significant in having a positive effect on Japanese banks in the U.S. His results are not as conclusive for U.S. offices in Japan.

Khoury (1978) develops a theoretical model to explain multinationalism in the banking sector and applies it to foreign banks operating in the U.S., especially Japanese banks. The model is based on profit maximization and its solution leads to the specification of supply equations for loans in the U.S. by foreign banks. Demand equations are also specified.

The model is estimated for three types of loans -- commercial and industrial, trade and consumer. Of particular interest here are the results for commercial and industrial loans. Khoury finds that differences in interest rates and differences in labor costs between Japan and the U.S., the cost of Japanese funds and the level of Japanese loans are significant determinants of the supply of Japanese loans in the U.S. On the demand side, direct investment in the U.S. of Japanese firms is found to be a significant determinant of loans, supporting the importance of the relationship between the banks and its clients.

Though Khoury's model is well-developed, he ignores the special characteristics of Japanese banks which may make U.S. offices especially attractive. As discussed in Chapter V, the Japanese banking sector is heavily regulated. Any
attempt to explain Japanese bank behavior without explicit consideration of this issue cannot fully explain Japanese multinational banking.

Tschoegl's (1982) work discusses bank multinationalism in terms of "incremental expansion" and "knowledge development." He suggests that any disadvantage from being in a foreign country diminishes over time. As experience in international activities is gained, the bank increases its competitiveness in foreign countries.

In his analysis of foreign banks in California, he suggests that the organizational form a bank chooses indicates the banks' integration with the U.S. market. For example, a subsidiary bank indicates a higher degree of integration than an agency. The longer a foreign bank operates in the U.S., he finds, the more likely it is to move from being an agency to a subsidiary bank.

In addition to evidence from organizational form, Tschoegl performs regression analysis. He considers two dependent variables: the first is whether or not a foreign bank in California has a subsidiary office and the second is the number of branch offices per subsidiary. He looks for evidence of "knowledge development" to explain the extent of foreign bank presence. He proxies the experience variable with the number of countries where the bank has offices and with the length of time the bank has been in California.
finds a significant, positive relationship between the extent of foreign bank presence in the U.S. and overall international experience of that foreign bank.

3.6 SUMMARY

International portfolio investment has long been recognized as a means to increase profits for any given level of risk. Theories of foreign direct investment attempt to explain why the firm maintains control over its investment. The product-life cycle approach suggests that a good will be produced abroad when production techniques are well-developed and the firms need to produce in the cheapest environment, that is, in the less-advanced countries. Research based on theories of industrial organization indicate that the foreign firm must have some capability or "intangible" asset which gives it a competitive advantage over the domestic firm. It must be difficult to license this intangible asset to a domestic firm or to service the market through exports to encourage the direct investment by the foreign firm.

An important consideration in the analysis of foreign direct investment must be the impact of domestic and foreign regulation and taxation on the firms' activities. The Japanese banking sector is heavily regulated by the Japanese government, as reviewed in Chapter V. Such regulations may
Encourage Japanese banks to extend their operations overseas. In addition, U.S. regulations may provide a competitive advantage to Japanese banks over U.S. banks.
Chapter IV

MODELLING ACTIVITIES OF JAPANESE BANKS IN THE U.S.

In this chapter a model of U.S. activities of Japanese banks is developed. The model is based on neoclassical profit-maximizing behavior. This approach relegates the importance of diversification to a minor role in international bank behavior. Though this may not be appropriate in a complete model, this simplification is acceptable. Foreign-direct-investment literature emphasizes that diversification cannot be the determining factor for international operations because similar diversification benefits could be obtained through portfolio investment. Diversification may be a joint determinant of foreign direct investment but increased profit opportunities must be available for overseas expansion to occur.

Previous efforts to model international activities of banks have used loans issued by banks in a foreign country as the output variable of the foreign office. Fieleke

* Many models of domestic bank behavior make similar profit-maximizing assumptions. For example, Klein (1971) and Graddy and Kyle (1979) model bank behavior within the neoclassical framework.
(1978), Khoury (1978), and Terrell (1979), whose works were discussed in Chapter III, all consider the level of foreign loans as the indicator of foreign activities. This is an important component of foreign activities of banks but I expand previous models to include interbank fund movement from one country to another. In the Japanese case, funds returned to Japan from foreign offices may reflect attempts to ease credit conditions in Japan caused by government interference in the credit market.

This chapter presents the model which is used to explain activities of foreign banks in the U.S. The first section provides a general description of international bank production. The second section describes the demand functions for two bank products of particular interest — commercial and industrial loans issued in the United States and interbank funds returned to Japan. The third section presents a model of bank behavior with subsections on the profit function and on the solution of the model. A summary concludes the chapter.

4.1 BANK PRODUCTION

It is assumed that the bank is a multi-product firm operating to maximize profits and that the bank is large enough to operate in two countries. The assets of the bank include customer loans (offered in both countries),
interbank loans and securities. Bank liabilities include deposits and interbank borrowings. The bank is restricted in its activities by the balance-sheet requirement that assets must equal liabilities plus capital. Revenue is earned from interest on assets. Costs include interest paid on deposits and interbank borrowings, and processing and administrative costs of all bank activities. Additional costs may result from government regulations, including reserve and capital requirements.

International banks have the option of serving their customers in several ways:

1. The bank may produce loans domestically and book them domestically to residents of the home country (L(1)).
2. The bank may produce loans in the foreign country through their foreign offices and book them to residents of the foreign country (L(2)).
3. The bank may produce loans domestically and book them domestically to residents of the foreign country (L(3)). This type of loan requires the participation of a foreign-correspondent bank to channel funds from the lender to the borrower.

There is a two-way relationship between the bank's domestic and foreign activities. The growth of domestic banking business implies a stronger bank, one that is better able to expand into a foreign market. Also, as domestic
customers increase and expand internationally, it is probable that the demand for foreign banking services will also increase. On the other hand, if the bank has chosen to open a foreign office, this contributes to the strength of the parent bank. The parent bank does not have to fear losing customers to competitors with foreign offices and may gain new customers because of the increased service. In addition, ties between the bank and its existing clientele will be reinforced. The costs and benefits of opening a foreign office which issues L(2) must be compared to servicing foreign demand through L(3). The existence of foreign offices indicates that there must be gains in choosing L(2) over L(3) in some cases.

In addition to customer loans, international banks may raise funds in one country and send them to offices in other countries for use there. Funds raised domestically and used in the foreign country (E(1)) and funds raised in the foreign country for domestic use (E(2)) are included in this model to capture interaction between the two credit markets.

International banks may also purchase government securities domestically (G(1)) or in the foreign country (G(2)). It is assumed that domestic offices buy securities from its own government while offices in the foreign country buy securities from the foreign country.
4.2 **DEMAND FOR BANK PRODUCTS**

Of particular interest to this dissertation work are commercial and industrial loans issued in the U.S. and funds returned to Japan from U.S. offices. The determinants of these products of Japanese banks in the U.S. provide information on why Japanese banks have expanded into the U.S. Two hypotheses are developed in the demand functions suggested here. The first concerns the impact of Japanese regulations on U.S. activities of Japanese banks. The second draws from the literature of foreign direct investment and suggests that other Japanese firms in the U.S. provide Japanese banks with an offsetting competitive advantage.

Central to this dissertation work is the nature of Japanese banking. As discussed in Chapter V, Japanese authorities maintain control over many aspects of financial markets in Japan. Regulation in Japan may encourage Japanese banks to establish U.S. offices. U.S. offices give Japanese banks an alternative regulatory environment in which to operate. It is hypothesized that when regulatory constraints in Japan become particularly binding, U.S. activities of Japanese banks will increase. Similar activity has been observed in U.S. banks which use Caribbean branches to escape U.S. regulations concerning reserve requirements and interest-rate ceilings.
This model concentrates on the relationship between U.S. and Japan but a more complete version would include all Japanese bank activities outside of Japan. Complete data on the Japanese presence in other foreign countries are not available. Japanese banks have offices throughout Southeast Asia and a few in South America and Europe.

U.S. offices of Japanese banks may be used to ease tight Japanese credit conditions in several ways. Commercial and industrial loans from U.S. offices may be issued to Japanese clients who are unable to obtain loans in Japan. In addition, U.S. offices are able to return funds to Japan through interbank loans. It is hypothesized that both of these activities will increase in periods of tight credit conditions in Japan.

The second hypothesis developed here draws from the literature of foreign direct investment. Japanese banks in the U.S. entered a market where their foreignness put them at a disadvantage with respect to domestic competitors. Foreign direct-investment literature suggests the necessity of an offsetting advantage. Caves (1977) suggests that the offsetting advantage in international banking is the presence of the bank's customers in the foreign market. Japanese banks in the U.S. can provide bank services to Japanese firms operating in the U.S. Japanese banks would have an advantage in dealing with their customers because
they have an already established working relationship and knowledge of the social and economic environment common to both the bank and the clients.

Caves (1974b) notes that any intangible asset exploited through foreign direct investment is not expected to be readily exploited through licensing to a firm in the foreign country or through exports. Banking fits into this category. An asset based on a previous relationship is not readily transferable to another firm nor are banking products easily exported.

Literature on customer demand for bank products suggests other determinants of demand to be used here. Melitz and Pardue (1973) categorize the determinants of demand into three groups — income, productivity of the bank product and relative price of the product compared to substitutes. Increases in income, they hypothesize, will lead to an increase in loan demand as will increases in loan productivity. Melitz and Pardue use GNP as an indicator of income and fixed investment and inventories as measures of loan productivity. Because bank loans, whether customer or interbank, are simply one form of credit, the price of loans must be compared to other forms of credit. Melitz and Pardue suggest that as bank loans become more expensive relative to other sources of credit, demand for bank loans falls.
4.3 Supply of Bank Products

Supply functions for bank products are obtained from a simple profit-maximizing model. In the first subsection, the profit function is specified and the second subsection presents the model solution for profit-maximizing quantities of various bank products.

4.3.1 Profit Function

Bank revenue equals the rate of return on each bank asset multiplied by the respective asset quantity. This rate of return is assumed to include both explicit and implicit payments. It is assumed that within each category assets are homogeneous and earn the same return. In addition to the return on customer loans and government securities, bank offices may increase revenue through the ability to channel funds to offices in the other country. The return on these funds is assumed to be the interest rate on interbank funds in the lender's market. Equations (1) and (2) specify revenue functions for domestic and foreign offices respectively:

(1) \[ R(1) = r(1)L(1) + r(3)L(3) + i(1)E(1) + g(1)G(1) \]

and

(2) \[ R(2) = r(2)L(2) + i(1)E(2) + g(2)G(2) \].
$B(1)$ represents revenue of the domestic office and $B(2)$ is revenue of the foreign office; $r$ indicates the interest rate on customer loans, $i$ is the interest rate on interbank loans, and $g$ is the interest rate on government securities.

Processing and administrative costs of servicing loans and deposits plus interest paid on deposits and interbank borrowings are the major component of costs of the bank. The bank may also pay taxes on capital outflows from one country to another and pay correspondent fees to banks assisting in issuing $L(3)$.

Loan production costs in the domestic country are:

$$
C(1) = w(1)[L(1) + L(3)] + t(1)B(1) + c(1)G(1) + t(1)L(3) + [x(1) + n(1)]D(1) + [i(2) + x(2)]B(2)
$$

where:

- $w(1) = \text{domestic processing costs on customer loans}$,
- $b(1) = \text{domestic processing costs on interbank loans}$,
- $c(1) = \text{domestic processing costs on government securities}$,
- $t(1) = \text{payment to the correspondent bank for intercountry loans, expressed in percent}$,
- $x(1) = \text{domestic interest rate paid on demand deposits}$,
- $n(1) = \text{domestic processing costs on deposits}$,
- $D(1) = \text{domestic deposits}$.
\[ i(1) = \text{interest rate on interbank funds}, \quad \text{and} \]
\[ T(2) = \text{tax on capital outflow from foreign country}. \]

This cost function reflects processing costs, which include salaries, supplies and data processing, and interest costs of interbank borrowings and deposits. Processing costs are not necessarily the same for loans and deposits, nor for customer and interbank loans or government securities, and are therefore stated separately.

Costs for foreign offices are analogous to those of domestic offices with the exception of fees paid to correspondent banks. Equation (4) defines the foreign office cost function:

\[
(4) \quad C(2) = v(2)L(2) + b(2)E(2) + c(2)G(2)
\]
\[
+ [\mu(2) + \pi(2)]D(2)
\]
\[
+ [i(1) + T(1)]B(1). \]

Profits in each country equal revenues earned in that country minus costs incurred in that country. Therefore profits in the domestic and foreign countries are:

\[
(5) \quad P(1) = R(1) - C(1)
\]
and

\[
(6) \quad P(2) = R(2) - C(2). \]
The bank will attempt to maximize total profits or:

\[ P = [B(1) + B(2)] - [C(1) + C(2)]. \]

Throughout the solution of the model, it is assumed that profits of the foreign office are independent of profits of the domestic office and that the respective profit functions may be maximized separately. This simplification is based on the assumption that though the profits are certainly interdependent in the large, individual offices concentrate on own profit maximization and pursue activities which bring the largest net return. Khoury uses a similar assumption in his model. In the empirical work in Chapter 6, this assumption is relaxed to recognize interdependence between bank offices.

4.3.2 Model Solution

The decision variables for the banks are the quantities of each type of asset held. The model of bank behavior is therefore solved by finding the profit-maximizing quantity of each asset. This is done through differentiating the profit functions with respect to each asset, setting the first derivatives equal to zero and solving the resulting equations for the asset quantity. Second derivatives are checked to insure that they are less than zero, a sufficient condition for profits to be maximized.
Domestic and foreign offices are restricted in their activities by the following balance-sheet constraints:

\[
\begin{align*}
(8) & \quad L(1) + L(3) + B(1) + G(1) = [1 - h(1)]D(1) + K(1) + E(2) \\
\text{and} \\
(9) & \quad L(2) + B(2) + G(2) = [1 - h(2)]D(2) + K(2) + E(1),
\end{align*}
\]

where \( K(1) \) and \( K(2) \) refer to the capitalization of the domestic and foreign offices respectively and \( h(1) \) and \( h(2) \) refer to respective reserve requirements.

Let:

\[
\begin{align*}
(10) & \quad j(1) = [s(1) + n(1)] \\
\text{and} \\
(11) & \quad s(1) = [i(1) + I(2)].
\end{align*}
\]

Also,

\[
\begin{align*}
(12) & \quad j(2) = [s(2) + n(2)] \\
\text{and} \\
(13) & \quad s(2) = [i(2) + I(1)].
\end{align*}
\]
The profit functions can be found by substituting equations (10) through (13) into equations (8) and (9):

\[
(14)\quad P(1) = r(1)L(1) + r(3)L(3) + i(1)E(1) + g(1)G(1) \\
- w(1)[L(1) + L(3)] - b(1)E(1) - c(1)G(1) \\
- t(1)L(3) - j(1)E(1) - s(1)E(1)
\]

and

\[
(15)\quad P(2) = r(2)L(2) + i(2)E(2) + g(2)G(2) - w(2)L(2) \\
- b(2)E(2) - c(1)G(1) + j(2)E(2) \\
- s(2)E(1)
\]

As noted, the banks must choose between various assets. For Japanese offices, these include I(1), I(3), E(1) and G(1). For U.S. offices of Japanese banks, these include L(2), E(2) or G(2). Before the first derivatives of the profit functions are presented, several notes concerning relationships between variables are stated.

The balance-sheet constraints, equations (8) and (9), provide information about the relationship between the various assets. For example, if equation (8) is solved for L(3), the first derivative of L(3) with respect to L(1) (or any other asset choice) is negative one. This relationship along with the chain rule from calculus is used
in solving the profit functions for the profit-maximizing quantity of $L(1)$. Similar use of the balance-sheet constraints and the chain rule are used in solving for the first derivatives with respect to each asset.

The relationship between fund sources and assets may be found similarly. Again, use is made of the balance-sheet constraint. If equation (8) is solved for $D(1)$ and then the first derivative of $D(1)$ is taken with respect to $L(1)$ (or any other asset), the first derivative is found to be $[1/L-h(1)]$. The first derivative of $F(1)$ with respect to any asset equals one. This information is used with the chain rule in solving for the first derivatives of the profit functions.

Though a change in each asset type is expected to have an impact on that asset price, it is assumed that other asset prices will not be affected. While recognizing that this is not completely true in the real world, the assumption has precedence in the work of Melitz and Furdue. The assumption of independence of asset prices adds greatly to the simplicity of the model and facilitates the empirical estimation presented in Chapter VI.

It is also assumed that the cost of the various factors of production are independent of the quantity of assets. These factors are the processing costs, as measured through $v$, $b$ and $c$, and interest costs on deposits and interbank
funds. Essentially, this assumption states that Japanese banks in Japan or in the U.S. are price takers in the respective factor markets.

With these notes, the first derivatives of the profit functions for customer and interbank loans are obtained. They are:

(16) \[
\frac{\partial P(1)}{\partial L(1)} = r(1) \cdot L(1) - r(3) - i(1) - g(1) - u(1) - \frac{1}{1-m(1)} j(1) - s(1),
\]

(17) \[
\frac{\partial P(1)}{\partial L(3)} = r(3) \cdot L(3) - r(1) - i(1) - g(1) - u(1) - \frac{1}{1-m(1)} j(1) - s(1) - t(1),
\]

(18) \[
\frac{\partial P(1)}{\partial B(1)} = i(1) \cdot B(1) - r(1) - r(3) - g(1) - u(1) - \frac{1}{1-m(1)} j(1) - s(1),
\]

(19) \[
\frac{\partial P(2)}{\partial L(2)} = r(2) \cdot L(2) - i(2) - g(2) - u(2) - \frac{1}{1-m(2)} j(2) - s(2),
\]

and
\[
\frac{\partial P(2)}{\partial E(2)} = i(2) + E(2)\frac{\partial i(2)}{\partial E(2)} - r(2) - g(2) \\
- b(2) - \left\{1/[1-b(2)]\right\}j(2) - \varepsilon(2).
\]

Setting the first derivatives equal to zero and solving for the loan variables provide the following supply functions:

\[
(21) \quad L(1) = [-r(1) + r(3) + i(1) + g(1) \\
+ u(1) + j(1) + \varepsilon(1)] \\
* \{1/[\partial r(1)/\partial L(1)]\}.
\]

\[
(22) \quad L(3) = [-r(3) + r(1) + i(1) + g(1) \\
+ u(1) + t(1) + j(1) + \varepsilon(1)] \\
* \{1/[\partial r(3)/\partial L(3)]\}.
\]

\[
(23) \quad B(1) = [-i(1) + r(1) + r(3) + g(1) \\
+ b(1) + j(1) + \varepsilon(1)] \\
* \{1/[\partial i(1)/\partial B(1)]\}.
\]

\[
(24) \quad L(2) = [-r(2) + i(2) + g(2) \\
+ u(2) + j(2) + \varepsilon(2)] \\
* \{1/[\partial r(2)/\partial L(2)]\}.
\]
The second derivatives are:

(25) \[ B(2) = [-i(2) \cdot r(2) + g(2) \cdot b(2) + j(2) + e(2)] \cdot \{1/[\partial i(2)/\partial B(2)]\} \]

The second derivatives are:

(26) \[ \frac{\partial^2 p(1)}{\partial l(1)^2} = \frac{\partial^2 r(1)}{\partial l(1)^2} < 0, \]

(27) \[ \frac{\partial^2 p(1)}{\partial l(3)^2} = \frac{\partial^2 r(3)}{\partial l(3)^2} < 0, \]

(28) \[ \frac{\partial^2 p(1)}{\partial b(1)^2} = \frac{\partial^2 r(1)}{\partial b(1)^2} < 0, \]

(29) \[ \frac{\partial^2 p(2)}{\partial l(2)^2} = \frac{\partial^2 r(2)}{\partial l(2)^2} < 0, \]

and

(30) \[ \frac{\partial^2 p(2)}{\partial b(2)^2} = \frac{\partial^2 r(2)}{\partial b(2)^2} < 0. \]

These second derivatives are all less than zero as long as the revenue function meets the standard requirement that the demand for a good falls as the price increases. This guarantees that the supply equations capture profit-maximizing rather than profit-minimizing quantities of loans.
4.4 SUMMARY

This chapter provides a model for use in predicting activities of Japanese banks in the U.S. Of particular interest are commercial and industrial loans issued by Japanese banks in the U.S. and funds returned to Japan from U.S. offices. The model will be used to test two hypotheses about the activities of Japanese banks in the U.S.: first, that Japanese banks may use their U.S. offices as an additional source of funds when credit conditions in Japan are tight and second, that Japanese banks issue loans in the U.S. as a response to customers already participating in the U.S.
Chapter V

DISEQUILIBRIUM AND THE JAPANESE LOAN MARKET

This chapter reviews conditions existing in Japanese financial markets which may make foreign direct investment particularly attractive to Japanese banks. In Chapter IV, it is suggested that Japanese banks find the U.S. an attractive location for expansion because of constraints and regulations in Japan. These conditions are discussed more completely in this chapter. In addition, estimation techniques for markets in disequilibrium are applied to Japanese loan markets in an attempt to offer empirical evidence of disequilibrium caused by these constraints.

The first section of this chapter provides an overview of Japanese banks with emphasis on factors that may prevent explicit interest rates from clearing the loan market. The second section reviews econometric methods for estimating demand and supply functions for markets characterized by disequilibrium. Special note is made of studies of loan markets in disequilibrium. The third section presents the results of applying these estimation methods to the Japanese loan market. A summary concludes the chapter.
5.1 **DISEQUILIBRIUM AND JAPANESE BANKS**

Banks have played an integral part in the growth and development of the Japanese economy. An important factor behind the rapid growth of the Japanese economy since World War II is the high savings-to-income ratio of the Japanese. Japanese banks provide the principal channel through which savings reach the corporate sector. Three distinctive characteristics of Japanese banks can be identified. These include reliance of banks on loans from the central bank, dependence of the corporate sector on bank financing and inflexibility of most explicit interest rates. Many observers suggest that these characteristics have led to a banking sector which does not operate freely. The empirical portion of this chapter investigates this hypothesis. The impact on the banking market of each characteristic is considered in turn.

5.1.1 **Dependence on the Central Bank**

The Japanese banking system, as a whole, is in debt to the Bank of Japan. This is a function of the way in which the Bank of Japan provides credit to the Japanese economy. Rather than buying securities from bankers or dealers (as in U.S. open-market operations), the Bank of Japan extends direct loans to banks at the discount rate. The discount rate, established by the Bank of Japan, is usually below the
call-money rate (the rate for short-term lending between financial institutions). During the past decade, the discount rate averaged 1.3 percent below the call rate. Banks therefore prefer short-term loans from the central bank, if possible, over borrowing in the call market. Because of the attractiveness of its loans, the Bank of Japan may implement monetary policy through quantitative allocations of central-bank loans. Suzuki (1980, p. 169) notes that the Bank of Japan exerts its most important influence over Japanese credit availability through restrictions on the volume of central-bank loans rather than by changing loan conditions such as the discount rate or loan-repayment time schedules. Restrictions on loan volume are implemented through "window guidance," described in more detail below.

The reliance on the central bank has allowed the central bank to exert broad influence over Japanese banks. Prindl (1980, p. 19) notes that "window guidance" is the most distinctive feature of how the Bank of Japan directs the financial system. This guidance involves daily Bank of Japan scrutiny of banks' overall lending, rate setting, and individual loan decisions. The Bank of Japan may tell banks to support a specific industrial sector according to national economic policies. Prindl (p. 19) notes:

Areas of new technology will be encouraged: computers, electronics and telecommunications, for instance, as Japan moves further up the
Targeting specific industries for expansion helped the development of Japan's post-war economy. However, many Japanese writers and observers are now questioning the viability of a controlled credit market. Detailed guidance by the Bank of Japan is expensive and time-consuming. The return to the efficiency of a freer market seems to be a long-term goal of the Bank of Japan. Evidence of this lies in their recent actions, such as loosening controls over interest rates in bond markets and opening financial markets to foreigners, and in their recent words, such as Bank of Japan publications which emphasize the need for increased flexibility of interest rates. (For example, see Bank of Japan, 1977 and 1980.) Pigott (1983) states that the inflation, higher oil prices and slow real growth of the Japanese economy in the 1970s have forced these reforms on the Japanese financial system.

5.1.2 Corporate Dependence on Banks

The corporate sector depends heavily on bank financing. Suzuki, Pigott, and Eguchi and Hidekazu, among others, note this feature of the Japanese economy. Table 8 compares
Japanese financial characteristics to those of the U.S. As shown, the Japanese maintain a substantially higher fraction of GNP as gross savings. Also, Japanese corporations depend primarily on loans from banks and other private financial institutions for their funds. In 1980, bonds and equity accounted for only 14.2 percent of firms' funds in Japan as opposed to 53.3 percent in the U.S.

The growth-oriented policies of the Japanese government following World War II encouraged the dependence on bank financing. Low interest rates and central-bank guidance directed bank loans to industry. In addition, interest-rate controls in the bond market lower the desirability of bond financing. Private corporate-bond issues must be individually approved by the authorities, who have generally set issue rates below yields in the secondary market. (Pigott, p. 33). The result is that the bond markets are used primarily by the government and public corporations.

Restrictions on international financial flows also contributed to corporate dependency on bank financing. Until the late 1970s, virtually all financial flows into and out of the country were subject to ceilings, prior approvals or other limitations. (Pigott, p. 28). Since 1979, foreigners have been allowed to participate in the bond-repurchase market, linking Japanese money markets with those abroad. In 1980, a foreign-exchange law was passed which
**TABLE 6**

Financial Profile of Japan and the U.S.

<table>
<thead>
<tr>
<th></th>
<th>U.S. (percent)</th>
<th>Japan (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Savings as</td>
<td>15.7</td>
<td>15.3</td>
</tr>
<tr>
<td>Percent of GNP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share of Funds Raised</td>
<td></td>
<td></td>
</tr>
<tr>
<td>by Corporate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Via:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loans from Banks</td>
<td>21.1</td>
<td>25.1</td>
</tr>
<tr>
<td>Loans from</td>
<td></td>
<td></td>
</tr>
<tr>
<td>other Financial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutions</td>
<td>35.5</td>
<td>21.6</td>
</tr>
<tr>
<td>Bond Issue</td>
<td>20.3</td>
<td>33.0</td>
</tr>
<tr>
<td>Equity</td>
<td>20.3</td>
<td>20.3</td>
</tr>
</tbody>
</table>

reversed the old principle whereby transactions were prohibited unless specifically authorized by the authorities. Now... nearly all financial transactions are presumed permitted unless expressly prohibited or otherwise explicitly regulated. The importance of such a change is considerably more than technical, given the delay and cost Japanese institutions often encounter in obtaining official sanctions for their actions. (Figott, p. 40).

5.1.3 **Inflexibility of Interest Rates**

Following World War II, the Bank of Japan decided that if interest rates were allowed to adjust to equilibrium levels:

interest rates would rise sharply and thereby seriously harm the international competitiveness of industry. The control of the demand for funds was, therefore, exercised by quantitative regulations of lendings...and the level of interest rates was held somewhat below the equilibrium rate. (Bank of Japan, 1977, p. 18)

In 1956, the first step towards increased flexibility of loan rates was taken. In that year, a voluntary agreement between the banks and the Bank of Japan tied changes in the standard rate, analogous to the prime rate in the U.S., to changes in the official discount rate. In 1970, this general agreement was made more explicit and the standard rate was set at 0.25 percent above the official discount rate. Until 1977, bank lending rates were changed frequently but always in conjunction with changes in the official discount rate. Therefore, these changes reflected changes in the Bank of Japan monetary policy. In March 1977, the Bank of Japan took the first step towards
loosening the tie between the discount rate and loan rates by not requesting that the banks follow their lead when they cut the discount rate. However, since then, the standard rate has remained at 0.25 percent above the discount rate without exception.

Evidence suggesting the inflexibility of Japanese interest rates can be found through two comparisons, as suggested by Figott (p. 36). He notes first that, in a free market, nominal interest rates tend to be more variable than real rates because they tend to adjust to changes in expected inflation. However, if nominal rates are controlled, real rates are more variable in periods of changing inflation rates. Thus, the comparison of the variability of Japanese nominal rates to the variability of Japanese real rates provides some information on interest-rate flexibility. Second, comparing the variability of Japanese interest rates to similar U.S. rates may provide further evidence of inflexible Japanese rates. Except for deposit rates, U.S. rates are essentially market-determined.

The coefficient of variation (standard deviation divided by the mean) of Japanese and U.S. loan rates are provided in Table 5. As indicated, the Japanese nominal bank loan rate was much less variable than the real bank loan rate throughout most of the 1970s, indicating inflexible nominal
interest rates. Evidence of the impact of less restrictive regulation in the late 1970s is observed in the increased flexibility of the nominal bank loan rate relative to the real rate from 1976 to 1981. Similar data for the U.S. indicate that the nominal U.S. prime rate was more flexible than the U.S. real rate throughout most of the period.

Making cross-country comparisons are more difficult because interest rates are affected by many factors which may or may not be common to both countries. However, the variability of Japanese nominal loan rates was less than the variability of U.S. nominal rates throughout the 1970s, while Japanese real rates were more variable than U.S. real rates. If Japanese nominal rates are not market-determined and U.S. rates are, than this relationship might be expected, assuming similar inflation rates and other interest-rate determinants in the two countries.

Bankers work within this system of controlled interest rates. Corporations maintain compensatory balances with banks as a form of implicit payment. Through survey information, Suzuki (p. 50) finds that banks tend to allocate credit more willingly to those companies who keep large deposits with the bank and corporations often maintain at least 25 percent of their borrowings as compensatory balances. Frindl (p. 60) notes that in times of severe credit squeezes, compensatory balances of 50 percent of
### Table 9

Variability of Japanese and U.S. Loan Rates

(Coefficient of Variation)

<table>
<thead>
<tr>
<th></th>
<th>1968-72</th>
<th>1973-77</th>
<th>1978-81</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nominal Interest Rates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Loan Rate</td>
<td>.27</td>
<td>.90</td>
<td>1.06</td>
</tr>
<tr>
<td>U.S.:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prime Loan Rate</td>
<td>1.24</td>
<td>1.74</td>
<td>2.78</td>
</tr>
<tr>
<td><strong>Real Interest Rates</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Loan Rate</td>
<td>1.37</td>
<td>5.44</td>
<td>.98</td>
</tr>
<tr>
<td>U.S.:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prime Loan Rate</td>
<td>.97</td>
<td>1.09</td>
<td>3.69</td>
</tr>
</tbody>
</table>

**Notes:** All data are end-of-month. Real rates are the nominal rates minus average consumer price inflation over the previous year.

borrowings are not unheard of. Through these means, the effective loan rate is brought closer to equilibrium. There is uncertainty about effective lending rates, and, according to Suzuki, banks find themselves subject to pressure to permit corporations to withdraw compensatory balances, thus lowering the effective loan rate. (However, he offers no explanation why banks would allow loan agreements to be changed.) High levels of compensatory balances emphasize the importance of the establishment of close customer-bank relationships.

These three characteristics of Japanese banking suggest that Japanese banks play an important role in the Japanese economy and that the Bank of Japan attempts to control bank behavior. Because of corporate dependence on bank loans and Bank of Japan control over the banks, the Japanese government may encourage banks to direct funds to desired sectors of the economy to encourage growth. Corporations and banks maintain close relationships to insure sufficient credit during periods of low fund availability. (Frindl, p. 65.)

The remaining sections of this chapter investigate the possibility that these characteristics of the Japanese banking industry create disequilibrium in the market for loans. If disequilibrium does exist, Japanese banks may find it attractive to establish U.S. operations as a way to
reduce the burdens of Japanese bank regulation. The dependence of Japanese corporations on bank financing further emphasizes the need of Japanese banks to obtain adequate funds.

Results from disequilibrium estimation should be interpreted carefully. As described in the next sections, demand and supply functions for various markets are investigated in disequilibrium literature. Key to each study is the existence of a market constraint which prevents the price of the good investigated from clearing the market.

In each study, specifications of demand and supply functions are drawn from other works which assume equilibrium in the respective markets. The main difference in disequilibrium work is the introduction of a price variable which is not allowed to adjust to market-clearing levels immediately. The demand and supply functions estimated tend to be ad hoc in nature and are not drawn from carefully-formulated models. If omitted variables are correlated with included explanatory variables, results are biased and may be misinterpreted.

The existence of disequilibrium, in other than the very short run, is difficult to substantiate. The empirical disequilibrium work reviewed here ignores the possibility of other market-clearing mechanisms besides explicit prices. In banking, for example, though explicit prices such as
deposit rates are fixed, the total price paid for the use of funds often includes additional services and "free gifts." Though these implicit returns should be considered in estimating demand and supply functions, they are often ignored because they are difficult to measure. Disequilibrium estimation which only considers explicit prices ignores the effect of implicit prices in obtaining equilibrium.

Because implicit prices are not adequately investigated in disequilibrium estimation, studies which suggest disequilibrium may actually be indicating misspecification of the demand or supply functions. If explicit prices are not clearing the market, then implicit prices may be doing so. The existence of prolonged disequilibrium cannot be readily justified, especially in relatively-efficient markets such as the bank loan market.

Disequilibrium-estimation procedures are applied to Japanese loan markets to gain further insight into Japanese banking. Characteristics of Japanese banking such as dependence on central bank financing, corporate dependence on banks and inflexible interest rates have led to suggestions of disequilibrium in Japanese loan markets. However, the existence of substantial compensatory balances and close relationships between customers and banks suggest the importance of non-explicit price considerations. Any
evidence of disequilibrium obtained may actually be indicating the importance of factors other than the explicit price in clearing loan markets.

5.2 ESTIMATION PROCEDURES FOR DISEQUILIBRIUM MARKETS

Recently developed techniques for estimating demand and supply curves for markets in disequilibrium have been applied to loan markets in Canada and in the U.S. (Laffont and Garcia, 1977, and Sealey, 1979). Similarly, the application of disequilibrium-estimation techniques to the Japanese loan market should supply information about the extent of Japanese credit rationing and should help to explain the expansion of Japanese banks into the U.S. market. If the Japanese regulatory environment hampers the activities of the home offices of Japanese banks, overseas offices may be used to sidestep the domestic constraints. This section reviews estimation methods for markets in disequilibrium and their application to loan markets.

It must be noted that these estimation procedures make many assumptions about market behavior and the specification of demand and supply functions. The validity of all results depends on the appropriateness of the assumptions. Therefore, any conclusions about market characteristics must be interpreted with care.
5.2.1 Fair and Jaffee (1972)

In response to increased interest in estimating demand and supply equations in disequilibrium markets, Fair and Jaffee developed estimation procedures for such analysis. The central problem in estimating disequilibrium markets is that the observed quantity of the good may or may not satisfy both the demand and supply equations. In a market with excess demand, the observed quantity lies on the supply curve and in circumstances of excess supply, the quantity demanded is observed. Fair and Jaffee hypothesize several procedures for distinguishing which relationship is observed and then for proceeding with the estimation of the demand and supply equations.

In developing a maximum-likelihood estimator for the parameters of the demand and supply functions, Fair and Jaffee note that the problem is similar to Quandt's (1958) switching-regression approach. Rather than determining one switching point in a system of two possible regimes, Fair and Jaffee allow the possibility of a large number of switching points. The observed quantity may lie on the supply curve (the "supply regime") or on the demand curve (the "demand regime"), and may switch back and forth. The likelihood function of the entire sample is the product of the respective demand and supply likelihood functions.5 The

---

5 Fair and Jaffee assume that the error terms of the demand and supply functions are distributed normally and
log-likelihood function for the entire sample should be calculated for all possible sets of demand and supply regimes. The set which maximizes the function constitutes the most defensible sample separation. Estimates of parameters of the demand and supply equations are the least squares estimates over the respective sample periods. The validity of the estimates depends, of course, on the appropriateness of the specified demand and supply functions.

The computational difficulty of testing all possible demand and supply regimes leads Fair and Jaffee to introduce alternative methods of sample separation. These methods incorporate information from changes in the price of the good considered. Because prices adjust toward equilibrium levels, Fair and Jaffee hypothesize that increasing prices indicate an observed supply regime (excess demand) and decreasing prices indicate an observed demand regime (excess supply). Once the sample separation is determined, the demand and supply functions may be estimated through several independently and are independent of the explanatory variables. They note that this may be inappropriate since it is generally assumed that the error terms and the price variable in a market system are correlated. However, Fair and Jaffee defend the assumption as convenient in simplifying the maximum-likelihood estimation. Such a misspecification could lead to biased results.

* At each of T sample points, there are two alternatives for sample separation. Therefore, $2^T$ calculations are necessary to consider all possible separations.
different techniques. This method of obtaining the sample separation assumes that prices change only in reaction to excess demand or excess supply. Fair and Jaffee recognize that other factors affect prices but find that price changes perform satisfactorily as rough indicators of regimes.

In their directional method, Fair and Jaffee separate the sample according to the direction of the price change. Using ordinary least squares, the supply function is estimated over periods of rising prices and the demand function is estimated over periods of falling prices. Periods in which prices do not change (temporary equilibriums) are included in both functions. Estimates obtained from this method are inconsistent because the mean of the error terms do not equal zero.  

In Fair and Jaffee's quantitative method, further assumptions are made about the price-adjustment process. The model for the disequilibrium market is specified as:

\[
D(t) = a(0) I_D(t) + a(1) E(t) + ud(t),
\]

For example, the observed quantity of the good is considered to be on the demand curve whenever quantity demanded is less than or equal to quantity supplied. When the error term of the demand function is large and positive, it is less likely that the observed quantity will be determined to be on the demand curve than if the error term is small or negative. Thus, the mean of the error term of the demand function (and similarly, the supply function) will not equal zero. Any estimates will be inconsistent even if sample separation is correct.

The technique presented here includes Amemiya's (1974) modification to provide consistent estimates.
(2) \[ S(t) = b(0)IS(t) + b(1)E(t) + us(t), \]

(3) \[ C(t) = \min[E(t), S(t)] \] and

(4) \[ D(t) - S(t) = 1/g[\Delta P(t)], \quad \Delta = \text{first-difference operator}. \]

Equations (1) and (2) are the demand and supply functions respectively, where \( P \) is the price of the good and \( XD \) and \( IS \) are vectors of other explanatory variables. \( ud \) and \( us \) are stochastic error terms. Equation (3) indicates that the quantity observed is the minimum of demand or supply. Equation (4) is the price-adjustment mechanism, derived from:

(5) \[ P(t) - P(t-1) = g[D(t) - S(t)], \quad 0 < g < \infty. \]

Equation (5) states that the direction of the price change is a positive function of excess demand in the market. If \( g \) approaches infinity then there is immediate price adjustment to conditions of excess demand or supply. The lower the value of \( g \), the slower the adjustment.

Fair and Jaffe's procedure to estimate \( g \) and the parameters of the demand and supply functions relies on deriving the unobserved function at each time period from equation (5). The model is thus transformed to:

(6) \[ Q(t) = a(0)XD(t) + a(1)E(t) + ud(t) \] and
(7) \[ Q(t) = b(0)IS(t) + b(2)E(t) + \frac{1}{g} [\Delta P(t)] + uS(t) \]

when \( D(t) < S(t) \), and

(8) \[ Q(t) = a(0)ID(t) + a(1)E(t) - \frac{1}{g} [\Delta P(t)] + uD(t) \]

and

(9) \[ Q(t) = b(0)IS(t) + b(1)E(t) + uS(t) \]

when \( D(t) > S(t) \).

Equations (6) through (9) can be further reduced to:

(10) \[ Q(t) = a(0)ID(t) + a(1)E(t) - \frac{1}{g} [\Delta P(t)] + uD(t) \]

where \( \Delta P(t) = \begin{cases} \Delta E(t) & \text{if } \Delta E(t) > 0 \\ 0 & \text{otherwise} \end{cases} \)

and

(11) \[ Q(t) = b(0)IS(t) + b(1)E(t) - \frac{1}{g} [\Delta P(t)] + uD(t) \]

where \( \Delta P(t) = \begin{cases} -\Delta P(t) & \text{if } \Delta P(t) < 0 \\ 0 & \text{otherwise} \end{cases} \)
Equations (10) and (11) are estimated using two-stage least squares. The endogenous variables $\Delta E(t)$ and $E(t)$ are replaced by their predicted values from ordinary least squares regressions on the exogenous variables, $X D(t)$ and $X S(t)$. Results from applying this quantitative method to the Japanese loan market are included in this chapter.

5.2.2 Haddala and Nelson (1979)

Haddala and Nelson revise the Fair and Jaffee approach. They note that the suggested methods do not adequately take account of the fact that the model itself allows one to determine a probability with which each observation belongs to the demand equation or the supply equation. By incorporating this information into the specification of the likelihood function, Haddala and Nelson present improved maximum-likelihood methods for estimating the model with no prior sample separation and with sample separation based on price-change information.

These maximum-likelihood estimation methods are also applied to the Japanese loan market. In the case without prior sample separation, the estimation procedure breaks down. Quandt (1962) notes that disequilibrium models with no sample separation information tend to have unbounded likelihood functions. That is, the value of the likelihood function tends toward infinity in certain parameter regions.
It is probable that this problem occurs in the application to the Japanese loan market. The estimates of the Japanese loan market using the Maddala and Nelson procedure with sample separation are presented in this chapter.

5.2.3 Applications to Loan Markets

Disequilibrium estimation techniques have been applied to several loan markets. Laffont and Garcia studied the market for business loans by chartered banks in Canada. After specifying loan supply and demand equations based on the work of Melitz and Pardue (1973), the model was estimated using both equilibrium and disequilibrium techniques. Laffont and Garcia use various disequilibrium procedures, including one based on the Fair and Jaffe approach and one based on Maddala and Nelson's likelihood procedure. All results are dependent on correct function specifications and regime-determination assumptions.

When estimated under the assumption of full equilibrium, Laffont and Garcia find that their model produces significant coefficients with the expected signs. Disequilibrium estimations return similar results except in the estimation using Maddala and Nelson's maximum-likelihood method. The Maddala and Nelson results indicate that almost the entire sample period is characterized by observations lying along the demand curve. Estimating the demand curve
using the Maddala and Nelson method produced results similar to the other demand estimates but estimation of the supply curve was so "catastrophic" that Laffont and Garcia do not report the results.

Sealey applied disequilibrium estimation techniques to the U.S. commercial loan market. Sealey noted that, though previous studies had suggested that credit rationing existed, there had been no direct evidence or estimates of the extent of credit rationing. His work provides such evidence.

After specifying loan demand and supply equations and estimating these under equilibrium assumptions, Sealey estimates the functions using Maddala and Nelson's likelihood method with sample separation. In the estimation, Sealey assumes that price changes are a stochastic function of excess demand. Though results of the equilibrium and disequilibrium estimations are similar, Sealey found evidence of significant disequilibrium in the U.S. commercial-loan market. In estimating the probability with which the quantity observed belonged to the demand equation, Sealey found that U.S. loans are essentially determined by bank supply with only a few periods where loans are determined by customer demand.9

9 Sealey's results lead to the question of why Japanese banks would choose to locate in the U.S. if U.S. loan markets reflect credit shortages also. If credit shortages occur at different times in the two countries,
Evidence of disequilibrium in bank-loan markets obtained by Laffont and Garcia and Sealey could be interpreted as evidence of the importance of factors other than explicit prices in clearing loan markets. If explicit prices do not change when demand or supply fluctuates, it is probable that other loan conditions, such as repayment terms or compensatory balances, do change. In addition, Kane and Malkiel (1965) note that pre-existing relationships and implicit contracts with good customers may help determine loan allocation during credit shortages. In this case, the implicit payment to the bank is the maintenance of a steady business relationship.

5.3 **Japanese Loan Markets**

Section 5.1 notes conditions and regulations in Japan which may lead to disequilibrium in the loan market. Section 5.2 reviews disequilibrium estimation techniques. In this section, results from applying these estimation methods to Japanese loans are presented. Many observers of the Japanese loan market have suggested that persistent disequilibrium exists. This dissertation provides empirical evidence consistent with these observations.

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Japanese banks could use the U.S. market more extensively during Japanese credit shortages. In addition, Sealey's results may be indicating the importance of implicit returns as opposed to explicit returns.
5.3.1 Demand and Supply Functions

Specifications of demand and supply functions for the Japanese loan market are drawn from the literature on bank loans. Melitz and Pardue provide a well-founded framework that can be used here. The explanatory variables for the demand function in the Melitz and Pardue model may be split into three basic groups — income, productivity of loans, and relative prices. They hypothesize demand for bank loans to be positively related to permanent income and negatively related to transitory income. If the permanent income of a borrower increases he should be encouraged to expand his borrowings as long as suitable positive-value investments exist. However, "windfall" transitory income should not increase borrowings and may result in the individual reducing his overall debt.

Indicators of the productivity of loans help to explain loan demand. As loan productivity increases, borrowings should increase. General indicators of growth and economic well-being such as fixed investment and inventories are used by Melitz and Pardue to measure loan productivity.

Recognizing that bank loans are just one form of credit, consideration of the costs of the loan itself and of alternative financing such as bonds must be incorporated into any model explaining the demand for bank loans. As bank loan costs increase, borrowings should fall off, other
things remaining the same. However, if alternative fund sources become relatively more expensive, bank loans should increase.

Melitz and Pardue divide factors influencing bank loan supply into four categories — a scale constraint, the yield on loans, the yield on alternative earning assets and the cost per dollar of bank deposit liabilities. The scale constraint, often omitted in firm studies because the firm could obtain credit to expand production, is included in the bank loan supply function because the industry as a whole may only obtain credit from the central bank. As long as the central bank controls ultimate lendings, the scale constraint should be included.

The relative yield on loans is an important factor in determining loan supply. As loan yield increases relative to the return on alternative assets, the quantity of bank loans supplied should increase.

The effect of higher deposit costs on bank loans is uncertain. As costs increase, the net return on bank loans is lowered, suggesting the supply of loans falls. However, if higher deposit costs reflect an increase in safer savings deposits relative to demand deposits, the banks would have the impetus of a lower-risk liability structure to further encourage trade-offs of securities or excess reserves for loans. Higher deposit costs could reflect a more stable
portfolio if higher interest rates attract more time deposits relative to demand deposits.

Laffont and Garcia and Sealey draw from the Melitz and Pardue model in finding estimates of loan markets in disequilibrium. Laffont and Garcia, using data from the Canadian commercial bank loan market, specify the demand function to include the difference between the prime-loan rate and the finance-company paper rate, the difference between the long-term bank-loan rate and the industrial-bond rate, the industrial-production index, undistributed profits and several dummy variables to capture structural changes. A linear time trend is also included. Sealey specifies the demand function for bank loans in the U.S. in a similar manner. The cost of bank loans is measured as the prime rate minus the Aaa corporate bond rate. The industrial-production index and undistributed corporate profits are also included as explanatory variables.

In relation to the Melitz and Pardue model, Laffont and Garcia and Sealey make some changes. They point out that explanatory variables such as actual investment may lead to estimation of actual loan demand instead of desired loan demand. The inclusion of explanatory variables affected by possible credit rationing would distort attempts to measure desired loans. However, their work does parallel Melitz and Pardue in including the relative price of loans and measures
of credit productivity such as the industrial-production index. Undistributed corporate profits, as a measure of an alternative source of financing, may be expected to decrease loan demand. However, because undistributed corporate profits may be considered to be indicators of the creditworthiness of a firm, a positive relationship may hold between loans and undistributed profits.

The demand function used in this dissertation to estimate demand for Japanese bank loans is specified in a similar manner. The relative price of loans is measured as the average loan rate minus the industrial-bond rate. The average loan rate is the average rate paid on loans of commercial banks in Japan. Most loans from banks are issued on a short-term basis, as required by law, though many are automatically extended. (Fugott, p. 32).

The choice of the correct interest rates to use is difficult. The average loan rate is used because the standard-loan rate, which more closely parallels the U.S. prime rate in definition, shows very little fluctuation due to government regulation. Because the loan rate used is an average, it does not completely reflect all market information. The term structure of average loans may change over time, causing changes in the average rate. Also, inflation or business cycles may affect the rate. These factors are not accounted for in the demand function
specification. Accordingly, all results are dependent on the average loan rate adequately reflecting market conditions.

The industrial-bond rate is a longer-term (seven year) rate than the loan rate, but other short-term credit markets in Japan are not used extensively. The industrial-production index and undistributed profits are included, as in the above disequilibrium models. Also, the index of final-goods inventories is included as a further proxy for the productivity of credit.

Laffont and Garcia specify bank loan supply to be a positive function of the prime rate, a negative function of the rate of return on alternative assets and a negative function of the relative cost of loans. The level of deposits and the industrial-production index are used as scale variables for loan supply. Sealey's specification is similar — bank loan supply is hypothesized to react positively to the loan rate-treasury bill rate differential, positively to the level of deposits and positively to the industrial-production index. In addition, Sealey notes the uncertain impact of the cost of deposits on loan supply — the same point made by Melitz and Pardue. Increased costs reflect a lower net return on loans but a more stable liability structure which may allow increased lendings. These supply functions incorporate the same considerations as those of Melitz and Pardue.
In this dissertation, the supply function for Japanese bank loans is specified similarly. The difference between the average loan rate and the short-term government-bond rate is included to measure the reaction of loan supply to the return on loans relative to alternative earning assets. The level of bank deposits and the industrial-production index provide information on the importance of bank resources and economic activity to loan supply. A cost variable based on deposit rates and a time trend are also included. The time trend is included as a rough measure of omitted variables in the supply functions. Its use improved the estimation results by lowering serial correlation in the error term.

10 Both the short-term (60-day) government-bond rate and the long-term (7-year) government-bond rate were tested in the estimations presented here. Both gave similar results. The short-term rate was chosen for presentation because banks may prefer to keep funds more available for use as loans. It could be argued that the long-term rate is more appropriate because it corresponds to the maturity of the industrial-bond rate used in estimating the demand curve. However, little empirical difference emerges between the two variables.

11 In banking models which recognize the importance of the customer-bank relationship (for example, Kane and Malkiel, 1965), it is noted that deposits and loans may be determined simultaneously. That is, customers insure access to funds by maintaining deposits with the bank. In return for deposits, banks give these customers preferential treatment during periods of low credit availability. According to Frindl and Suzuki, compensatory balances play an important role in the Japanese loan market. However, for the empirical work here, deposits are assumed to be exogenous to loan supply, greatly simplifying the estimated model.
As noted above, Japanese banks are dependent on the central bank for funds. To measure the impact of central bank loans received by banks or loans issued by banks, central bank loans to banks are included as an explanatory variable. It is hypothesized that loans will increase when banks increase their borrowings from the central bank.

Neither the estimated demand nor supply functions are drawn from well-formulated models of bank behavior. The specifications are similar to previous work in the study of bank loans and include variables considered important in loan demand and supply, such as the price of the loan relative to other credit sources, the return on the loan relative to other investments, the productivity of the loan, the cost of issuing the loan and fund availability. Omitted variables may bias the results if they are correlated with explanatory variables.

5.3.2 Specifications of Equations Estimated

Estimates of the Japanese loan market are obtained through several econometric techniques, under both equilibrium and disequilibrium assumptions. Assuming a simple, linear relationship between the above explanatory variables and Japanese bank loans leads to the following equations to be estimated:
\[(12)\quad LD = a(0) + a(1)(ALB - IBB) + a(2)IFBD \\
+ a(3)UPEF + a(4)FGINV + ud \text{ and} \]

\[(13)\quad LS = b(0) + b(1)(ALB - STGR) + b(2)DEPS \\
+ b(3)COST + b(4)IPEF + b(5)CENTRAL \\
+ b(6)LOGTIME + u_s. \]

Where:

\begin{itemize}
  \item \(LD, LS\) = Loan demand and loan supply respectively. Dependent variable is actual Japanese bank loans, measured in 10 billion yen.
  \item \(ALB\) = Average loan rate on loans and discounts of all Japanese banks. Measured in percent. Japanese banks are restricted to issuing short-term loans though in practice most corporate loans are medium term.
  \item \(IBB\) = Rate on Japanese Class 2 7-year industrial bonds. Measured in percent.
  \item \(IFBD\) = Japanese industrial-production index, 1975=100.
  \item \(UPEF\) = Undistributed corporate profits aggregated by the Bank of Japan from the financial statements of principal Japanese enterprises. Measured in 10 billion yen.
  \item \(FGINV\) = Producer's inventory of finished goods index, 1975=100.
  \item \(STGR\) = Short-term (60-day) government security rate. Measured in percent.
  \item \(DEPS\) = Time plus demand deposits at Japanese banks. Measured in 10 billion yen.
  \item \(COST\) = Interest rate on one-year time deposits multiplied by the ratio of time deposits to total deposits. This measure of cost provides the best results for Melitz and Pardue. Sealey measures costs in the same manner.
  \item \(CENTRAL\) = Loans issued by the central bank to banks in Japan. Measured in 10 billion yen.
\end{itemize}
LOGTIME = Log-linear time trend, equal to zero in first time period.

ud, us = Stochastic error terms.

LD is hypothesized to be a positive function of the relative price of loans, as measured by the average loan rate minus the industrial-bond rate. It is also hypothesized that LD is positively related to the variables measuring economic activity: the industrial production index and the inventory of final goods index. It is uncertain how LD should react to undistributed profits -- an increase in available funds could reflect reduced need for loans or an increase in available funds may increase banks' willingness to lend to firms.

LS is hypothesized to be inversely related to the relative return on funds, as measured by the average loan rate minus the short-term government-bond rate. The level of deposits and the industrial-production index, used as scale variables, should have a positive influence on loan supply. The cost variable should have an uncertain influence. In most profit-maximizing models, higher costs should decrease output. However, in the banking industry, higher deposit costs may reflect a safer portfolio consisting of a higher proportion of time deposits, allowing banks to expand riskier assets such as loans. Also, there may be correlation between loan and deposit rates, and the
positive relationship between return and IS may be picked up by this variable. IS is hypothesized to be positively related to central-bank loans to banks.

5.3.3 Data

Data to estimate demand and supply functions for Japanese bank loans are obtained from various issues of the Economic Statistics Monthly, published by the Bank of Japan. The functions are estimated over the period November 1972 through May 1980. This time period coincides with the period studied on Japanese bank activity in the U.S. in Chapter VI. The SHAZAM econometric package (White, 1978) is used for all estimations, except those involving maximum-likelihood procedures. The LIMDEP econometric package (Greene, 1982) is used in the latter case.

5.3.4 Estimation Procedures

Equilibrium

The model of the Japanese loan market is initially estimated under equilibrium conditions. Ordinary least squares (CLS) and two-stage least squares (2SLS) results are reported. 2SLS results are reported because, if CLS is to provide unbiased estimates, the error term must be uncorrelated with any of the explanatory variables. In models of market behavior, a change in demand or supply
caused by a fluctuation in the error term will also cause a price change. Therefore, the price variable in a market model is correlated with the error term and 2SLS techniques are used. The relative price variables (ALB-IEE and ALB-STGE) are considered endogenous in the 2SLS estimation.

**Disequilibrium -- Fair and Jaffee**

Disequilibrium estimates are obtained through two different procedures. Estimation is first carried out using the Fair and Jaffee 2SLS method discussed in section 5.2.1. The model includes, in addition to equations (12) and (13), the following relationships:

\[(14)\quad L = \min(LD, LS)\, ,\]

\[(15)\quad LD - LS = \frac{1}{g} [\Delta ALB] \text{ if } \Delta ALB > 0\]

\[(16)\quad LD - LS = \frac{1}{h} [\Delta ALB] \text{ if } \Delta ALB < 0\, .\]

Therefore, the equations to be estimated become:

\[(17)\quad LD = a(0) + a(1) (ALB-IEE) + a(2) IEEL + a(3) UPRF + a(4) EGINV - \frac{1}{g} [\Delta ALB] + ud\]

where \(\Delta ALB = \begin{cases} \Delta ALB \text{ if } \Delta ALB > 0 \\ 0 \text{ otherwise} \end{cases}\)
and

\[ IS = b(0) + b(1)(AIR-SIGB) + b(2)DEES \]
\[ + b(3)COST + b(4)IPED + b(5)CENTRAL \]
\[ + b(6)LOGTME - 1/b(\Delta ALE) + \epsilon \]

where \( \Delta ALE = \begin{cases} 
-\Delta ALE & \text{if } \Delta ALE < 0 \\
0 & \text{otherwise} 
\end{cases} \)

Equations (15) and (16) allow price adjustment to occur at differing speeds in conditions of excess demand and excess supply. This is a more general model than that of Fair and Jaffe. Note that according to the statement of the model, it is expected that the coefficient on \( \Delta ALE \) will be negative in both equations (17) and (18).

Equations (17) and (18) are estimated twice using two-stage least squares. In the first estimation, it is assumed that only \( \Delta ALE \) is endogenous to the system. 2SLS estimation requires \( \Delta ALE \) to be replaced by its predicted value from the OLS regression of \( \Delta ALE \) on all exogenous variables in the system. The alternative method assumes that \( AIR-SIGB \) and \( AIB-IBB \) are endogenous and they are also replaced by their predicted values, obtained in a similar manner. The estimation is performed using both procedures.
because while AIR is endogenous to the system, SIGB and IER may be assumed to be determined primarily by other factors. If they are independent of the system, then the difference between AIR and the independent rates will also be independent of the system. This assumption of independence of the difference in interest rates is used by both Laffont and Garcia and Sealey in their research. Little empirical difference emerges between the two methods.

**Disequilibrium — Maddala and Nelson**

The LIMDEP econometric package is used to estimate functions describing the Japanese loan market using Maddala and Nelson's maximum-likelihood procedure. The model is estimated in two ways — using no prior sample separation and using the change in the average loan rate to separate the sample. Final estimates of the model using no prior sample separation could not be obtained. The estimation procedure broke down because the maximum-likelihood estimates of the error-term variances became less than zero. Results from the method using prior sample separation are included here.

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12 If the change in the average loan rate is positive, then the observation is assigned to the supply regime and if the change in the average loan rate is negative, the observation is assigned to the demand regime.
5.3.5 **Equilibrium Results**

The equilibrium model of the Japanese loan market is estimated using OLS and 2SLS. OLS estimates are appropriate if the price variables ALB-IEF and ALB-SIGR are not correlated with the error term. If IEF and SIGR, and therefore the differences between IEF and these variables, are independent of the loan market, CIS will provide unbiased estimates. However, if these differences are endogenous to the system, as they would be if the system determined ALB-IEF and ALB-SIGR, then 2SLS is the appropriate method of estimation. Overall, results from both methods of estimation are similar.

Table 10 presents the results of estimations of demand and supply functions under equilibrium conditions. The demand and supply functions are discussed in turn below.

**Demand**

Though both estimates of the demand function have relatively high $R^2$'s (.95 and .92 in the CIS and 2SLS estimates respectively), the Durbin-Watson statistics (.36 and .38) are very low. These statistics indicate the presence of autocorrelation in the error terms, possibly reflecting a larger problem of misspecification of the demand function. The specification presented here produced the best results overall for the demand function, keeping in
<table>
<thead>
<tr>
<th>Variable</th>
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<th>OIS</th>
<th>2SIS</th>
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</thead>
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<td>-.10</td>
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<td>(-2.09)b</td>
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<td>.25</td>
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<td>(1.51)c</td>
<td>(1.79)c</td>
<td>(1.41)</td>
</tr>
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<td>-.02</td>
</tr>
<tr>
<td></td>
<td>(16.1)a</td>
<td>(9.22)a</td>
<td>(33.0)a</td>
<td>(15.24)a</td>
</tr>
<tr>
<td>ALB-STGB</td>
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<td>-.02</td>
</tr>
<tr>
<td></td>
<td>(1.79)c</td>
<td>(1.41)</td>
<td>(1.79)c</td>
<td>(1.41)</td>
</tr>
<tr>
<td>DEPS</td>
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<td>.12</td>
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<td>.02</td>
<td>.12</td>
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<td>-.42</td>
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<td></td>
<td>(-12.4)a</td>
<td>(-5.63)a</td>
<td>(2.41)a</td>
<td>(-.34)</td>
</tr>
</tbody>
</table>

$R^2$: .95 \hspace{1cm} .92 \hspace{1cm} .99 \hspace{1cm} .99

D.W.: .36 \hspace{1cm} .38 \hspace{1cm} 1.48 \hspace{1cm} 1.56

**Notes:**

- a = significant at the 99 percent level.
- b = significant at the 95 percent level.
- c = significant at the 90 percent level.
mind the theoretical foundation of the model. It may be that any misspecification is an indication of the disequilibrium nature of the loan market. In a period of excess demand, desired demand for loans is not observed. Rather, actual loans are observed, a quantity affected by credit rationing. If desired demand cannot be adequately measured, poor results are not surprising.

Low Durbin-Watson statistics also indicate a problem in interpreting the estimates. The estimates themselves are unbiased as long as the model is specified correctly. However, the standard error of each coefficient is biased, yielding incorrect t-statistics. Therefore, though most of the coefficients are highly significant and have the expected signs, the validity of the estimation as a whole is questionable. If misspecification is causing the low Durbin-Watson statistics and if any omitted variables are correlated with included explanatory variables, the estimates themselves are biased.

To correct for serial correlation in the error terms, as indicated by low Durbin-Watson statistics, additional explanatory variables were tested in the model specification. These included Japanese GNP, time trends and additional interest rates. None were successful in reducing serial correlation. As noted, an alternative explanation for the poor results is the existence of possible market
disequilibrium. If desired demand is never observed, then estimation of the demand curve is difficult. However, the low Durbin-Watson statistics do indicate a serious problem in interpreting the estimates.

The coefficients are similar under both CIS and 2SLS estimations. The coefficient of the relative price variable is negative and significant in both set of results, with the indication of a greater decrease in the quantity of loans demanded in the 2SLS results than in the CIS results for a given increase in the price variable. The negative coefficient indicates that as loans become more expensive relative to other credit sources, as measured by industrial bonds, the demand for loans falls.

The demand for loans reacts positively to measures of economic activity, the industrial production index and the index of final-goods inventories. The coefficients on these variables are positive and significant in both the CIS and 2SLS results. Undistributed corporate profits, a measure of alternative fund availability, does not significantly affect the demand for loans in the CIS results but has a significant, positive impact in 2SLS estimation.

The estimated coefficients correspond to the theoretical and empirical work of Helitz and Farde, Laffont and Garcia and Sealey. In the demand equations estimated by these researchers, the relative price variable is always negative...
and significant. Melitz and Pardue use an average loan rate from 18 U.S. cities. Laffont and Garcia use the Canadian prime rate minus the commercial paper rate and Sealey uses the U.S. prime rate minus the Aaa corporate bond rate. A negative, significant relationship between loan demand and relative price is also obtained in the Japanese case.

Measures of loan productivity indicate a positive relationship between loan demand and loan productivity. Loan productivity is proxied with several different measures of business activity in these studies. Melitz and Pardue find a positive, significant relationship between loan demand and inventories and fixed investment. Sealey and Laffont and Garcia find a similar relationship between loan demand and U.S. and Canadian industrial production indices, respectively. In the Japanese case investigated here, a positive, significant relationship is found between loan demand and both the Japanese industrial-production index and inventories.

Sealey and Laffont and Garcia found a positive, significant relationship between loan demand and undistributed profits, the same result found in the Japanese case.

Despite the similarity of results, the low Durbin-Watson statistics throw the specification of the model into doubt. Unfortunately, alternative specifications were not successful in raising the Durbin-Watson statistics.
Supply

As presented in Table 10, equilibrium estimates of the supply function have very high $R^2$'s (.95 in both cases) and Durbin-Watson statistics (1.48 and 1.56) which lie in the uncertain region for autocorrelation. These Durbin-Watson statistics are much improved from those in the demand equations but they may again indicate either autocorrelation or misspecification of the supply function.

As the return on loans increases relative to the return on other earning assets, as measured by short-term government-bond rate, it is expected that loan supply will increase. Though the coefficients on this variable are positive in the OLS and 2SLS estimates, it is significant only in the OLS case. The dominant explanatory variable for loans, according to these results, is the availability of funds as measured by the level of deposits. As deposits increase, so do loans supplied. Central bank borrowings have a positive, though insignificant impact on loans supplied.

A log-linear time trend is included in the estimation. This trend variable does not have a firm theoretical foundation. It attempts to capture any trend in loan supply. Its use raised the Durbin-Watson statistic significantly. Though it would be preferable to identify what this variable is actually measuring, it serves as a
very rough proxy for omitted variables. The coefficient on the time trend variable is positive and significant in both estimates. If the time trend is excluded, there are no major changes in coefficients or significance levels.

The coefficient of the cost variable is negative and insignificant in both estimates. The hypothesized sign on this variable is uncertain so this result is not unexpected. However, the supply of loans is expected to be positively related to the industrial production index. In both OLS and 2SLS results, the effect of this variable's coefficient is negative, significantly so in the CLS case. However, the relatively high correlation (.76) between deposits and the industrial production index and the very significant coefficient on deposits may produce a multicollinearity problem. This could turn the sign of the coefficient on IPPE negative.

These results are similar to the previous works discussed here. In estimating the supply of loans, Melitz and Pardue, Sealey and Laffont and Garcia find a positive, significant relationship between loan supply and the relative return on loans. This result is also obtained in the Japanese case, though the coefficient on the Japanese loan rate minus the government-bond rate is insignificant in the equilibrium results.
Fund availability, as measured by total deposits by Laffont and Garcia and Sealey, and by total assets by Melitz and Pardue, positively and significantly influence loan supply in these studies. Total Japanese deposits positively and significantly influence Japanese loan supply in these estimates. Japanese loans are also positively influenced by central bank loans to banks, though this relationship is insignificant.

With respect to the variable measuring the cost of deposit funds, the Japanese results differ from the others. Melitz and Pardue, Sealey and Laffont and Garcia find a positive relationship between loan supply and deposit costs while the relationship is negative (and insignificant) in the Japanese case. The hypothesized sign of the variable is uncertain because in addition to reflecting a change in cost it could also reflect a change in the ratio of time deposits to total deposits.

5.3.6 Disequilibrium Results — Fair and Jaffee

The Fair and Jaffee technique provides more satisfactory estimates than those obtained under the assumption of continual equilibrium. The estimated functions differ from those of equilibrium by the inclusion of the \( \Delta AIB \) variable. The functions are first estimated under the assumption that the relative price variables (\( AIB-IEB \) and \( AIB-STGB \) are
exogenous and then that they are endogenous. \( \Delta \text{ALB} \) is always assumed to be endogenous. Results are reported in Table 11.

Demand

The most interesting variable in this set of regressions is \( \Delta \text{ALB} \). Recall that this variable is obtained from the price adjustment equation. Under conditions of perfectly flexible prices, \( g \) (in conditions of excess demand) or \( h \) (in conditions of excess supply) will approach infinity. If prices are perfectly inflexible, they will equal zero. The coefficients estimated here are actually \( 1/g \) and \( 1/h \).

Therefore, if \( 1/g \) and \( 1/h \) are not significantly different from zero, there is no evidence of inflexible prices. If, in estimating the demand curve, \( 1/g \) is significantly less than zero, then prices do not adjust immediately under conditions of excess demand.

In the estimates here, \( 1/g \) is not significantly different from zero. However, the overall poor explanatory success of the regressions in general, as discussed in the equilibrium results, may have more to do with the insignificance of this variable than the nature of credit rationing in the market.

Otherwise, the Fair and Jaffe results are very similar to those from equilibrium estimation. All coefficients take the same signs and exhibit the same level of significance.
TABLE 11
Japanese Bank Loans -- Fair and Jaffee Method
November 1972 - May 1980
Coefficient Estimates
(t-Statistics in Parentheses)

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<tr>
<th>Variable</th>
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<th>2SLS:</th>
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<td></td>
<td>ALB-IBB</td>
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<td>ALB-STGE</td>
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<tr>
<td></td>
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<td>Endogenous</td>
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<td>Endogenous</td>
</tr>
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<td>△ALR</td>
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<td>ALB-STGE</td>
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<td>.27</td>
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<td>-3.42</td>
<td>1.60</td>
<td>.53</td>
</tr>
<tr>
<td></td>
<td>(-8.15)a</td>
<td>(-2.45)b</td>
<td>(3.00)a</td>
<td>(.36)</td>
</tr>
</tbody>
</table>

R^2       | .95      | .92     | .59     | .59     |
D.F.      | .40      | .47     | 1.40    | 1.50    |

Notes: a = significant at 99 percent level.
b = significant at 95 percent level.
c = significant at 90 percent level.
The similarity in results may be attributed to the insignificance of the $\Delta ALB$ variable.

**Supply**

The inclusion of $\Delta ALB$ as an explanatory variable greatly improves the estimated supply functions. The supply function is estimated twice — once assuming the relative price variables are exogenous and once assuming the relative price variables are endogenous. $\Delta ALB$ is always assumed to be endogenous.

The specification of the disequilibrium model does not require prices to adjust at the same speed in supply regimes and demand regimes. The results here show that the quantity supplied does not respond immediately to disequilibrium. The value of $1/h$ is significantly different from zero in both estimated functions.

This significant, negative value for the coefficient on $\Delta ALB$ provides the best evidence obtained of disequilibrium in the loan market. Sealey and Laffont and Garcia argue that the appropriateness of the disequilibrium model depends on the significance of this coefficient. Japanese banks do not, either because they cannot or because it is too costly, adjust loan supply immediately to changes in price. Rather, the coefficient on $\Delta ALB$ indicates a slower reaction.
Rather than indicating disequilibrium in the loan market, a significant value for the coefficient on $\Delta ALB$ may indicate the importance of implicit interest rates in clearing the market. The importance of compensatory balances is not considered in these estimates nor are other services banks may provide to their best customers. The significance of $\Delta ALB$ may be indicating that explicit prices are not clearing the market and supporting the importance of implicit prices in market decisions.

Overall, the disequilibrium estimates provided more information than obtained under equilibrium assumptions. All coefficients kept the same signs as discussed above, but the significance level of the coefficients improved dramatically. This is especially true for the relative price variable -- an increase in the relative return on loans increases loan supply significantly. The negative coefficient on $\Delta ALB$ indicates that the total impact is not felt immediately.

The Durbin–Watson statistics improved slightly from the equilibrium model but they still fall slightly below the lower limit for inconclusive region of the test statistic for autocorrelation.
5.3.7 Disequilibrium Results: Maddala and Nelson

The model is also estimated by maximizing the likelihood function specified by Maddala and Nelson. The function used divides the sample into demand and supply regimes based on the direction of change in the average loan rate. These estimates, presented in Table 12, are not very satisfactory. All t-statistics, which are only valid asymptotically, are extremely small, reflecting large standard errors. Various alternative specifications of the model were attempted and none produced better results. Many of the maximizations moved into inappropriate regions and the estimation broke down. This is may be due to the complicated likelihood function involved though other researchers report difficulties in obtaining a convergence in maximum-likelihood estimation using the LIMDEP package.
### TABLE 12

**Japanese Bank Loans -- Maddalena and Nelson Method**

**November 1972 - May 1980**

**Coefficient Estimates**

*(t-Statistics in Parentheses)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Demand</th>
<th>Supply</th>
<th>Demand</th>
<th>Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIR-IEE</td>
<td>-0.62</td>
<td></td>
<td>-.74</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-6.02)a</td>
<td></td>
<td>(-6.67)</td>
<td></td>
</tr>
<tr>
<td>IPRD</td>
<td>9.57</td>
<td>.57</td>
<td>8.76</td>
<td>6.99</td>
</tr>
<tr>
<td></td>
<td>(14.6)a</td>
<td>(.72)</td>
<td>(1.22)</td>
<td>(.23)</td>
</tr>
<tr>
<td>UDEP</td>
<td>-14.62</td>
<td></td>
<td>-41.38</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-3.41)a</td>
<td></td>
<td>(-.99)</td>
<td></td>
</tr>
<tr>
<td>FGINV</td>
<td>7.16</td>
<td></td>
<td>11.26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(13.2)a</td>
<td></td>
<td>(1.61)</td>
<td></td>
</tr>
<tr>
<td>ALIE-STGE</td>
<td>-.02</td>
<td>-.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-.21)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEPS</td>
<td>40.76</td>
<td>162.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(5.51)a</td>
<td></td>
<td>(-3.31)</td>
<td></td>
</tr>
<tr>
<td>COST</td>
<td>-.30</td>
<td></td>
<td>.29</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-2.08)a</td>
<td></td>
<td></td>
<td>(.06)</td>
</tr>
<tr>
<td>LOGTIME</td>
<td>-.24</td>
<td></td>
<td>-14.57</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-.22)</td>
<td></td>
<td></td>
<td>(-.23)</td>
</tr>
<tr>
<td>INTERCEPT</td>
<td>-9.16</td>
<td>1.45</td>
<td>-7.64</td>
<td>42.34</td>
</tr>
<tr>
<td></td>
<td>(-14.1)a</td>
<td>(-.39)</td>
<td>(-.82)</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The LIMDEP econometric package obtains the starting values for this estimation through ordinary least squares regressions over the demand and supply regimes. Regimes are determined by the sign of ΔAIR.

Maximum-likelihood t-statistics are valid only asymptotically.

- **a** = significant at the 99 percent level.
- **b** = significant at the 95 percent level.
- **c** = significant at the 90 percent level.
5.4 SUMMARY

This chapter reviews conditions in the Japanese loan market which suggest that the observed loan quantity may not continually reflect equilibrium loan quantity. Bank of Japan regulation restricts interest rates which may be charged on loans and the Bank of Japan also participates indirectly in bank loan decisions. Because banks are heavily dependent on central-bank loans, it is suggested that the Bank of Japan has a large amount of influence over the banks.

This dissertation investigates the possibility that Bank of Japan control over banks in Japan may encourage these banks to move away from Japanese control. The U.S. offers a well-developed market in which they may obtain funds and offer loans.

Empirical evidence on the disequilibrium nature of the Japanese loan market is presented in this chapter. Disequilibrium-estimation methods, as pioneered by Fair and Jaffee, indicate that though demand does seem to adjust to changes in price, supply is much less flexible. In the next chapter, this information is used to investigate whether it can help to explain the behavior of Japanese banks in the U.S.
Chapter VI

EMPIRICAL EVIDENCE ON JAPANESE BANKS IN THE U.S.

To this point, this dissertation has focused on explanations for the presence of Japanese banks in the U.S. Two hypotheses are developed, both of which help explain Japanese banking activity in the U.S. The first suggests that Japanese banks are active in the U.S. because of the regulated nature of the Japanese banking environment. U.S. offices allow Japanese banks to escape some constraints. The second hypothesis ties direct investment in banking to the literature of foreign direct investment. Pre-existing customer relationships are suggested to be an advantage which allows Japanese banks to be competitive in the U.S. This chapter presents empirical evidence supporting these hypotheses.

The first section of this chapter reviews the theoretical framework developed to explain Japanese banks' U.S. activities. The second section links the theoretical work to the specifications of empirical functions estimated. Data sources and estimation procedures are included in the third section. Empirical results are discussed in the fourth section. A summary concludes the chapter.
6.1 THEORETICAL FRAMEWORK

This section summarizes the theoretical framework developed in this dissertation. The main hypotheses are reviewed to help clarify the empirical work following.

6.1.1 Japanese Banks in Japan

Chapter V reviews the Japanese banking environment and ways in which bank behavior is constrained. In addition, evidence consistent with constraints in the Japanese loan market is presented. The evidence of Chapter V indicates that loan supply does not adjust immediately to changes in the price of loans.

It is hypothesized here that conditions in Japanese credit markets encourage Japanese banks to establish U.S. offices. U.S. offices offer Japanese banks an alternative location and regulatory environment from which to make loans, accept deposits and obtain funds for use in Japan. This alternative should ease the impact of credit shortages in Japan. Until 1968, the Japanese government used foreign-exchange controls to prevent outside funds from returning to Japan. Since the relaxation of these regulations, Japanese banks have rapidly expanded their U.S. operations.
6.1.2 Literature on Foreign Direct Investment

Literature on foreign-direct investment emphasizes that a foreign firm investing in another country is at a disadvantage relative to the domestic firms. The foreign firm is less familiar with the language, laws, customs and market of the country where it has invested and must acquire this information at some cost. For a foreign firm to be a viable competitor, it must have some offsetting advantage. The literature shows that this advantage must be one which cannot be readily transferred through licensing or sale to a domestic firm.

In the banking industry, this asset is thought to consist of an already established working relationship with the client and the special knowledge of the social and economic environment common to both the bank and his client. Kane and Malkiel (1965) discuss the importance of reliable customers to the bank, noting that these customers reduce the variability of bank profits. The importance to the bank of these customers may lead to implicit contracts between them. The bank agrees to provide preferential treatment to its best customers in return for a stable relationship. Fried and Howitt (1980) discuss implicit contracts in terms of understandings between banks and customers about future relationships, thereby lowering risks associated with an uncertain future. These implicit relationships dampen the
role of explicit prices in determining credit allocation and non-price variables become more important. Opening bank branches in the U.S. may be one form of implicit payment to the banks' reliable customers.

The relationship between the bank and client is not readily transferable to a firm in the other country. Some are banking services products which are easily exported. To exploit this advantage built on a pre-existing relationship, banks must directly invest in the other country.

The presence of Japanese banks in the U.S. is advantageous to both other Japanese firms in the U.S. and to the bank itself. Other Japanese firms are helped because they may obtain banking services from familiar banks, which may provide less expensive, more reliable financing due to pre-existing business relationships. Japanese banks also benefit from opening U.S. offices. By following (or even preceding) customers to the U.S., they lower the risk that their customers will reduce their business with them for a U.S. bank or another Japanese bank with U.S. offices.

Regulatory advantages for foreign banks in the U.S. over domestic banks may also improve the competitive footing of a foreign firm. Again, this advantage may not be transferred to U.S. banks because it is inherent in foreign ownership. Until the passage of the International Banking Act in 1978, foreign banks were not subject to federal regulation unless
they entered the U.S. as subsidiaries. This situation gave foreign banks several advantages over domestic firms, especially in the ability to branch interstate, in not being required to pay FLIC assessments and in being subject to lower reserve requirements. Also, foreign banks may find it easier to take over U.S. banks due to the nature of antitrust legislation. The 1978 law tries to reduce or eliminate most of foreign-owned banks' advantages, bringing them under federal reserve requirements and requiring FLIC insurance if deposits less than $100,000 are accepted. Interstate branching is also limited by the International Banking Act.

Since most of the period investigated in this empirical work precedes the International Banking Act, the importance of regulatory advantages cannot be dismissed. As noted in Chapter II, the extent of the importance of the regulatory differences has been questioned. In the Japanese case, very few banks (three in 1975, eleven in 1982) accept deposits in more than one state. Japanese banks have not been active in taking over large U.S. banks and most of the U.S. banks purchased by Japanese banks were purchased by Japanese-owned subsidiaries in the U.S. These subsidiaries are subject to the same regulations as U.S. banks.

To test the significance of more uniform banking regulation, several dummy variables were included in the estimated regressions. Two different dummy variables are
included in the results presented here. The first equals one in the year prior to the passage of the International Banking Act in September 1978 and zero other times. During the period prior to the IBA, there was uncertainty over what would be included in the new regulation. The second dummy equals one after the IBA and zero prior to it. A change in banking activity may have occurred following the new regulation.

Before proceeding, it must be noted that dummy variables serve as rough measures of changes in functional relationships. At best, the included dummy variables will provide evidence that the estimated relationship changed during the respective time periods. Any observed change cannot be assumed to be from the IBA -- other factors in either the U.S. or Japanese economy may have caused the change. However, the dummy variables are tested to see if they provide further information about the functions under investigation.

The expected signs of the dummy variables are difficult to determine. In the period immediately prior to the IBA, foreign banks may have slowed their activities because of the uncertainty about the future regulatory environment. However, if foreign banks expected grandfathering provisions to be included in the law, their activities may have accelerated. The dummy for the period following the IBA may
indicate a decline in foreign-bank operations in the U.S. if
the legislation effectively decreased foreign-bank
opportunities. However, grandfathering provisions and
loopholes in the IBA may have reduced the law's
effectiveness. In addition, the IBA expanded some
foreign-bank opportunities in the U.S. It allowed foreign
banks to obtain federal charters and FDIC insurance. It
lowered the nationality requirement for directors of
subsidiary banks. Also, it eliminated some of the
uncertainty about the U.S. position on the presence of
foreign banks in the U.S. For these reasons, foreign
banking activities in the U.S. may have expanded following
the IBA.

These qualifications about the use of dummy variables
lead to the conclusion that they must be interpreted
carefully. Many different factors may result in their
significance or insignificance. However, they are tested
here in the hope that they increase the explanatory power of
the empirical work.

6.1.3 Financial Markets

Chapter IV and Chapter V discuss other economic and
financial market variables expected to influence bank
behavior. In general, Melitz and Pardue and others note
that the price or return of bank products and the cost of
bank inputs will influence demand and supply of bank products. In addition, variables reflecting general economic well-being and the scale of economic activities are important explanatory variables.

The demand for bank products, such as commercial and industrial loans or interbank loans, is expected to depend on the price of those products and their price relative to other sources of credit. Demand should also depend on general economic conditions.

The supply of bank products is expected to react positively to the return on the product relative to other uses of funds. Factors increasing the relative cost of production for any specific product should lower output of that product, other things remaining the same. Increasing availability of funds and improving economic conditions are expected to increase output. The model in Chapter IV develops specific factors expected to influence loan supply.

6.2 FUNCTIONS ESTIMATED

Two activities of Japanese banks in the U.S. are investigated -- the issuance of commercial and industrial loans in the U.S. and funds returned to related foreign institutions from the U.S. This section develops the link between the theoretical framework and the empirical work.
6.2.1 Commercial and Industrial Loans

Thirty percent of assets of Japanese-owned U.S. banks were held as commercial and industrial loans in 1980. The extent to which these loans are divided between U.S. and foreign customers is difficult to determine. For example, if a Japanese firm with U.S. offices borrows from a Japanese bank in the U.S., the loan may be recorded as either to a U.S. customer or a foreign customer. The decision is based on where the ultimate responsibility for repayment lies.

The demand and supply functions specified are estimated using total commercial and industrial loans of U.S. offices. A more interesting subject to test the suggested hypotheses might be loans to Japanese firms in Japan and in the U.S. However, the necessary data are not available. Because total loans rather than Japanese-related loans are investigated, the explanatory variables may not have as strong an impact as expected.

Demand

In the specification of the demand function for loans, the main hypotheses developed in this dissertation are considered. The impact of Japanese credit conditions, the tie of Japanese bank business in the U.S. to total Japanese activities in the U.S. and the effect of several price and economic variables are investigated.
If Japanese firms are unable to obtain adequate financing in Japan, they may turn to the U.S. (or other foreign markets) for additional funds. Chapter V offers evidence that Japanese banks operate in a constrained environment. Japanese banks in the U.S. have the opportunity to meet these Japanese needs. If it is true that U.S. offices are used to alleviate fund shortages in Japan, we would expect to observe that Japanese credit shortages are accompanied by increases in loans of Japanese banks in the U.S.

The disequilibrium literature discussed in Chapter V suggests that if the explicit price is not clearing the market, disequilibrium exists. However, if implicit prices provide equilibrium, the functional forms are misspecified. In any case, credit shortages in Japan are hypothesized to increase Japanese use of the U.S. loan market. This should be true whether credit shortages are interpreted as disequilibrium or as periods when implicit prices increase.

To test whether this relationship exists, survey results on the "accommodative stance of Japanese financial institutions" are included as an explanatory variable in the demand for U.S. loans function. The survey data comes from a short-term economic survey of principal Japanese enterprises carried out by the Bank of Japan. Approximately 500 principal enterprises are asked to indicate if fund positions are "tight," "not so tight" or "easy." The
independent variable used here is the percent of "easy" responses.\textsuperscript{13}

Rather than necessarily representing true disequilibrium in the Japanese loan market, the percent of "easy" responses may represent periods in Japan when implicit payments, such as compensatory balances, are relatively low. If the explicit interest rate is not flexible, as discussed in Chapter V, then other factors should adjust to clear the market. The percent of "easy" responses could proxy the implicit payments involved in loan decisions rather than disequilibrium conditions.

An additional measure of Japanese banks' ability to lend in Japan is the level of central-bank loans to Japanese banks. As noted in Chapter V, the Bank of Japan uses its lending power as an important monetary tool. If the Bank of Japan decreases its loans to banks, a tightening of credit conditions is expected. Central-bank loans are included as an explanatory variable in the estimated demand for loans in the U.S. function. A negative relationship should be

\textsuperscript{13} Several other proxies of this relationship were used in the empirical work. These included the percent of "tight" responses, the percent of "tight" minus the percent of "easy" responses, the cost of Japanese deposits and the level of funds returned to Japan from U.S. offices. All indicated the same results as obtained with the "easy" variable. As Japanese credit conditions seemed to tighten, loans in the U.S. increased. The "easy" variable is chosen for presentation here because it was the most successful in decreasing serial correlation in the error term.
observed.

If Japanese banks are able to compete in the U.S. because other Japanese firms in the U.S. are more willing to deal with them than with U.S. banks, this relationship is also expected to be observed in the demand for loans function. To test for this, Japanese trade is incorporated into the demand function. The CED (1981, p. 42) notes that the financing of exports and imports is the major business of Japanese banks in the U.S. As trade increases, there should be an increase in loans at U.S. offices of Japanese banks.

Important to the demand for any good is its relative price. Two relative price variables are incorporated into the demand for loans function estimated here. The first is the difference between the U.S. prime rate and the Japanese average loan rate, adjusted for foreign-exchange risk. As the cost of a U.S. loan increases relative to the cost of a loan in Japan, the demand for U.S. loans should decrease.

---

14 Japanese foreign direct investment in the U.S. was used as an alternative proxy for Japanese firms in the U.S. However, it had an insignificant impact in all estimated functions. This is not surprising since it measures net capital inflows rather than the total position of Japanese firms in the U.S. Khoury found a positive, significant relationship between foreign direct investment of Japanese firms in the U.S. and loans of Japanese banks in the U.S.
The second relative price variable incorporated into the demand function is the difference between the U.S. prime rate and the U.S. Aaa corporate bond rate. This difference indicates the cost of loans relative to other U.S. fund sources. As the cost of bank loans increases relative to the cost of U.S. bond financing, loan demand should decrease.

A measure of U.S. business activity is also included as an explanatory variable in determining loan demand. Inventories have been used in several previous works (Goldfeld, 1966 and Hendershott, 1966). Also, Melitz and Pardoe note the importance of bank financing in fixed investment in the U.S. The U.S. industrial production index may also help explain loan demand. Increases in business activity, as proxied by any of these variables, are expected to increase loan demand. The results from using fixed investment are included here, though all proxies provided similar results.

The estimated demand function assumes a simple linear relationship between the explanatory variables and loan demand. The estimated function is:

\[
\text{LCan} = a(0) + a(1)\text{SUVEY} + a(2)\text{CENTRAL} + a(3)\text{TRADE} + a(4)\text{PRIME-AL} + a(5)\text{PRIME-USE} + a(6)\text{INVEST} + u(1)
\]

where:

SURVEY = percentage of "easy" responses to question on fund availability from financial institutions. From survey of principal Japanese enterprises.

CENTRAL = Loans issued by the central bank to banks in Japan. Measured in millions of U.S. dollars, converted from yen at contemporaneous exchange rates.

TRADE = total Japanese trade with the U.S. In millions of U.S. dollars.

PRIME = U.S. prime-loan rate. In percent.

ALBJ = Japanese average loan rate. In percent.

USBOND = rate on Aaa corporate bonds in the U.S. In percent.

INVEST = U.S. fixed investment. In millions of U.S. dollars.

u(1) = stochastic error term.

Coefficients a(3) and a(6) are hypothesized to be greater than zero. Coefficients a(1), a(2), a(4) and a(5) should be less than zero. No prior expectations are formed on the sign of the intercept, a(0).

Supply
The specification of the supply of loans of Japanese-owned U.S. banks is drawn from the model developed in Chapter IV. Commercial and industrial loans of Japanese banks in the U.S. are indicated as I(2) in that model. The supply equation for I(2) developed in Chapter IV hypothesizes that I(2) is a positive function of the return on the loan and a negative function of various measures of cost. Costs include not only processing and deposit costs but also opportunity costs as measured by the return on alternative investments. Alternative investments include the return of funds to Japan and the purchase of government securities.

In addition to the considerations developed in Chapter IV, the loan supply function estimated incorporates factors in the Japanese economy which could influence U.S. offices. These factors were ignored in Chapter IV to simplify the model. However, in the empirical work, they help to further explain U.S. office activities. The impact of the Japanese average loan rate on issuing U.S. loans as opposed to loans in Japan is considered in the estimated function.

Relative loan return is measured as the U.S. prime rate minus the Japanese average loan rate, adjusted for foreign-exchange risk. It is expected that as U.S. loan rates increase relative to rates in Japan, the U.S. market will become more attractive to Japanese banks as a place to originate loans and supply will increase.
The relative cost of loans is measured in several ways. Though theoretically it is expected that as U.S. wages increase relative to Japanese wages, U.S. loan supply should fall, this result was not observed. Wage differences were insignificant in impact in all model specifications estimated. For this reason, wage differences are not included in the final results presented here.

Another cost of using available funds for loans is investigated. Funds used for loans may not be used for alternative investments. Therefore, the opportunity cost of loans is also incorporated into the supply function. The prime rate minus the 3-month U.S. Treasury bill rate is used to measure this cost. Treasury bills are an alternative, relatively risk-free investment which banks could choose.

Previous loan studies suggest the use of two additional variables. U.S. fixed investment, a measure of U.S. economic activity, should have a positive effect on loan supply. Sealey suggests that general economic well-being will increase loan supply because it reflects positively on future returns. This variable is not used in all loan studies but its importance is tested here.

Melitz and Pardue note the need for a scale variable in estimating bank production. Available funds of U.S. offices of Japanese banks are proxied with deposits. Deposits of U.S. offices of Japanese banks are expected to have a
positive influence on loan supply. As banks increase their deposit base, more funds are available for loans. In customer-relationship banking, the argument may be made that loans and deposits are determined simultaneously. That is, good loan customers are those which keep deposits with the bank. This may be especially true in the Japanese case due to the controlled nature of explicit interest rates in Japan. However, it is assumed here that deposits are exogenous to loans.

A simple linear relationship is assumed between loan supply and the explanatory variables. The estimated function is:

\[
(2) \quad \text{LCAN} = a(6) + a(7) (\text{PRIME-ABJ}) + a(8) \text{INVEST}
\]

\[
a(9) (\text{PRIME-TEILL}) + a(10) \text{USDEPS} + u(2)
\]

All abbreviations are as in equation (1) and additionally:

\[
\text{TRILL} = \text{rate on 3-month U.S. Treasury bills. In percent.}
\]

\[
\text{USDEPS} = \text{deposits in U.S. banks owned by Japanese banks. In millions of U.S. dollars.}
\]

\[
u(2) = \text{stochastic error term.}
\]
The coefficients on the explanatory variables, \(a(7)\) through \(a(10)\), are all hypothesized to be greater than zero. No prior expectations are formed with respect to the sign of the intercept, \(a(6)\).

6.2.2 \textbf{Funds Returned to Related Institutions}

Funds returned to related foreign institutions are the second category of bank activities investigated here. In developing demand and supply functions, it is assumed that these funds are primarily funds returned to Japan. It is possible, of course, that the funds are sent to offices of Japanese banks in other countries. Because it is impossible to sort out where the funds actually end up, and because it does not seem unlikely that the majority are returned to Japan, the specifications of demand and supply function of total funds returned to related institutions rely on U.S. and Japanese considerations only.

Factors determining the quantity of funds returned to Japan are especially interesting because of the hypothesis suggesting that Japanese banks in the U.S. can use their U.S. offices when credit conditions in Japan are strained. Funds returned to Japan can be used to alleviate these conditions.
Demand

Demand for interbank funds from the U.S. is expected to be positively related to conditions indicating fund shortages in Japan, whether interpreted as disequilibrium or high implicit interest rates. Because the exact measurement of credit conditions is difficult, fund shortages are measured in several ways. Cost of deposits is one possible measure. An increase in cost may indicate low availability of domestic funds. Of course, it could also indicate a high demand for funds by banks but, in either case, funds returned to Japan from the U.S. are expected to increase with increases in deposit cost. The definition of deposit cost which Belitz and Pardue found to work best, the time-deposit rate times the ratio of time deposits to total deposits, is used here.

Another possible measure of bank loan conditions in Japan is the difference between the average loan rate and the industrial-bond rate. As bank financing becomes increasingly expensive relative to other sources of funds, it suggests a demand for additional bank funds. This demand can be accommodated with funds returned to Japan from the U.S. Therefore, a positive relationship is expected between funds returned and the difference between the average loan rate and industrial-bond rate.
A third measure of Japanese credit conditions is the level of central-bank loans to Japanese banks. When loans decrease, funds available for bank use in Japan fall and U.S. funds may be used to compensate for any shortage. A negative relationship is expected between funds returned to Japan and central-bank loans.

The fourth possible indicator of Japanese credit conditions is the survey information used in predicting demand for loans in the U.S. However, when this variable is included with deposit cost, it has a positive coefficient. If deposit cost is not included, the survey information has a negative impact as expected. This information and a high correlation coefficient of -.8 between the two variables suggests that these variables might be determined simultaneously. In the results presented in the following section, survey results are not included as an explanatory variable.

In determining the impact of the price of funds returned to Japan on funds actually demanded, two prices are considered. First, the federal-funds rate, the price of interbank funds in the U.S., is used to measure the price paid by Japanese banks for the use of U.S. funds. Even if the price actually paid is different from the federal-funds rate, this is a valid approximation because it represents the opportunity cost of lending funds to Japanese banks.
rather than to U.S. banks. Japanese banks in Japan should increase their demand when the price of funds falls and decrease their demand when the price of funds goes up, other things remaining the same. Therefore, a negative relationship is expected between the demand for funds and the federal-funds rate.

The second price considered is based on demand derived from the ultimate borrowers. The ultimate borrowers could obtain the funds as loans in the U.S. at the U.S. interest rate or in Japan at the Japanese interest rate. The ultimate borrowers are expected to prefer to book the loan where it costs the least. To include this consideration in the demand for funds returned to Japan, the difference between the U.S. prime rate and the Japanese average loan rate, adjusted for foreign-exchange risk, is incorporated into the demand function. As the U.S. rate increases relative to the Japanese rate, the ultimate borrowers are expected to prefer Japanese loans and therefore funds returned to Japan are expected to increase.

Japanese business activity is also expected to explain the demand for funds returned to Japan. As the Japanese industrial-production index improves, the demand for funds returned to Japan should increase.

A simple linear relationship is assumed between funds returned to Japan and the explanatory variables discussed above. The estimated function is:
\[(3) \quad \text{FUNDS} = b(0) + b(1) \text{DEPCOST} + b(2) (\text{AIEJ-IEEJ})
\]

\[+ e(3) \text{CENTRAL} + b(4) \text{FEDFUND}
\]

\[+ e(5) (\text{FRIME-AIEJ}) + e(6) \text{JIPBD} + u(3)
\]

where abbreviations are as above and:


DEPCOST = rate on Japanese one-year time deposits multiplied by the ratio of time deposits to total deposits.

IBBJ = rate on Japanese 7-year industrial bonds. In percent.

FEDFUND = rate on short-term loans between banks in the U.S. In percent.

JIPBD = Japanese industrial-production index.

u(3) = stochastic error term.

All coefficients except b(3) and e(4) are hypothesized to be positive. Coefficients b(3) and e(4) are expected to be less than zero.

Supply

The supply function of funds returned to Japan is similar to that of the supply function of commercial and industrial
loans of Japanese banks in the U.S., as developed in Chapter IV. Funds returned to Japan are indicated as B(2) in that model. The supply equation of B(2) developed in Chapter IV hypothesizes that B(2) is a positive function of the return on B(2) and a negative function of various measures of cost. Costs include not only processing and deposit costs but also opportunity costs as measured by the return on alternative investments. These alternatives include the issue of loans in the U.S. and the purchase of government securities.

As in the supply function developed for commercial and industrial loans issued in the U.S., the Japanese average loan rate is also included in the estimated function. This factor from the Japanese market is included to note the impact of Japanese conditions on U.S. activities.

The return on interbank funds is measured as the U.S. federal-funds rate. As the federal funds rate increases, the quantity supplied of all interbank loans, including those to Japan, should increase.

The relative return on funds sent to Japan is measured as the U.S. prime rate minus the Japanese average loan rate, adjusted for foreign-exchange risk. As the U.S. rate increases relative to the rate in Japan, Japanese banks should prefer to keep their funds in the U.S. for use there. Therefore as the differential increases, funds returned to Japan should decrease.
Wage differences between the U.S. and Japan did not have a significant impact in all specifications tested. However, the cost of using available funds in Japan as opposed to other U.S. non-loan assets is considered. This cost is measured as the Japanese average loan rate minus the rate on 3-month U.S. Treasury bills. It is expected that as the return available in Japan increases relative to the return on alternative U.S. assets, funds returned to Japan for use there will increase.

Deposits of U.S. offices of Japanese banks are also included as an explanatory variable in determining the supply of funds returned to Japan. Again, deposits are assumed to be exogenous to loans. As U.S. offices increase their deposit base, funds available for loans increase.

The linear function estimated is:

\[ \text{Funds} = \beta(6) + \beta(7)\text{FEFUND} + \beta(8)\text{(PRIME-ALBJ)} + \beta(9)\text{(ALBJ-IEIII)} + \beta(10)\text{USDEF} + \varepsilon(4) \]

where abbreviations are as above. Coefficients \( \beta(7) \), \( \beta(9) \) and \( \beta(10) \) should be greater than zero and \( \beta(8) \) is hypothesized to be less than zero. No expectations are formed about the sign of \( \beta(6) \).
6.3 **EMPirical PROCEDURES**

6.3.1 **Data**

Data to estimate the demand and supply of Japanese banks' U.S. activities are obtained from several sources. Data on the Japanese economy are obtained from various issues of the *Economics Statistics Monthly* published by the Bank of Japan. Data on the U.S. economy are taken from the *Federal Reserve Bulletin* published by the Board of Governors of the Federal Reserve System. Data on activities of Japanese banks in the U.S. are published by the Board of Governors as a special release named the "Key Report."

The time period used in the empirical work corresponds to the data released in the "Key Report." Though similar data are collected after mid-1980, figures are not available in a consistent form. The lack of later data does not invalidate the results presented here though later data would provide further information on bank activities. Literature on foreign direct investment suggests that as the length of time increases during which a foreign firm participates in another country, the disadvantage of being foreign diminishes. As a foreign bank learns about the other country and becomes accepted there, it can compete more equally with domestic banks. Therefore, it is the early period of a bank's residence in another country which is particularly interesting.
Interest rates are adjusted for foreign-exchange risk by subtracting (adding) the forward exchange discount (premium) as indicated through future exchange rates relative to current rates. Although this adjustment introduces a potential simultaneous-equation bias, the amount of adjustment is minor throughout the period and empirical results are very similar whether or not this adjustment is included.

6.3.2 Estimation

In estimating the specified functions, two important problems are encountered. The first deals with simultaneity in the system. The second centers on the serial correlation of the error terms, possibly caused by specification error. These considerations are reviewed in turn below. The SHAZAM econometric package is used for all estimations.

Simultaneity

Ordinary-least-squares regressions will provide consistent estimates of the coefficients in the above-specified functions if the functions are correctly specified and if independent variables and the error terms of each equation are not correlated. However, in the demand and supply models presented here, the second assumption may be violated.
In demand and supply equations, the error terms indicate changes in the respective functions. If, for example, the demand curve were to change due to a fluctuation in the error term, both price and quantity will change unless the supply curve is perfectly inelastic. This holds similarly for a shift in the supply curve. Thus, the price variable and the error terms are generally thought to be correlated. (Maddala, p. 220.)

In the models specified here, this correlation may not exist for two reasons. First, the variable used to measure price of commercial and industrial loans is actually the relative price — that is, the difference between the actual price and the price of loans in Japan. If the price of the substitute is exogenous to the market considered, the difference between prices may also be exogenous to the system. Even if the difference is not completely exogenous, the correlation between the error term and the relative price variable should be weakened.

The above consideration concerns only the market for commercial and industrial loans, not the market for funds returned to Japan. A second possible argument for exogeneity of the price variables lies in the relatively small market share of Japanese banks in the determination of the U.S. prime-loan rate and the federal-funds rate. In 1980, commercial and industrial loans of U.S. offices of
Japanese banks equalled seven percent of all U.S. commercial and industrial loans and funds returned to foreign related institutions equalled nine percent of all U.S. interbank loans. In the strictest sense of endogeneity, the price variables are endogenous but in a practical sense, the small market share may near that U.S. offices of Japanese banks are price-takers in these markets.

Because of the uncertainty concerning the endogeneity of the price variables included in the regressions, all equations are estimated using ordinary least squares (OLS) and two-stage-least squares (2SLS). In 2SLS estimation, any endogenous variables are replaced by instrumental variables which are correlated with the respective replaced variables and uncorrelated with the error term. The instrumental variable used in each case is the predicted value of the replaced variable obtained from OLS regression of the variable on all of the exogenous variables of the system. 2SLS results are asymptotically consistent.

In the 2SLS regression of commercial and industrial loans of Japanese banks' U.S. offices, the U.S. prime rate minus the Japanese average loan rate is considered endogenous. The other explanatory variables of the system, the U.S. prime rate less the corporate bond rate, trade, survey results, central-bank loans, U.S. fixed investment, the U.S. prime rate less the Treasury-bill rate and the level of U.S. deposits are considered exogenous.
Two-stage least square estimates of the market for funds returned to Japan are also obtained. The estimation assumes that the federal-funds rate is endogenous to the system, while the other explanatory variables, the U.S. prime rate less the Japanese average loan rate, the Japanese loan rate minus the U.S. Treasury bill rate, the Japanese industrial-production index, the Japanese loan rate less the Japanese industrial-bond rate, central-bank loans and the cost of deposits are considered exogenous.

Overall, as seen in the results presented in Section 6.4, 2SLS results are extremely close to CIS estimates. This is expected because the $B^2$'s from the first-stage estimation of the relative-price variables are .57 in each case. The higher the $B^2$ from the first stage, the closer CIS results will be to 2SLS results. (Intriligator, 1978, p. 392).

Serial Correlation

A second econometric problem is encountered in the estimation of the above functions. There is some evidence of serial correlation in the error terms, especially in the estimated supply functions. The Durbin-Watson statistics resulting from OLS and 2SLS estimation of the respective supply functions lie in the inconclusive region at the 95 percent significance level. The inconclusive region indicates that there is not sufficient evidence to reject
the null hypothesis of no serial correlation nor is there sufficient evidence to accept the null hypothesis.

Serial correlation often occurs in the use of time-series data. Explanations for serial correlation suggest that the omitted variables included in the error term are themselves serially correlated. Under the assumption that the expected value of the error term equals zero, the resulting estimates are unbiased, though the standard errors are biased. In the case of positive correlation, it is generally thought that the standard errors are biased downwards. However, this is not necessarily true.

It must be noted that if the omitted variables are correlated with the included explanatory variables, the estimated coefficients are themselves biased. In this case, Maddala (p. 291) indicates that the standard correction for autocorrelation procedures may do more harm than using the OLS estimates. The standard correction procedures assume that the error term and the included explanatory variables are independent of each other and that the autoregressive process is of the first order. However, if these assumptions are incorrect, the estimates from autocorrelation correction will be biased.

Intriligator (p. 164) notes that if the Durbin-Watson statistic indicates first-order serial correlation, the best correction procedure is to add relevant explanatory
variables. If the omitted variables, or suitable proxies for them, are included, the problem of serial correlation should be resolved. If additional variables do not reduce the serial correlation, then a simple autoregressive estimation procedure should be tried.

In the estimated supply functions, the Durbin-Watson statistics were improved by including measures of business activity, though the statistics remained in the inconclusive region. In estimating the supply of commercial and industrial loans, the Japanese industrial production index improved the results, increasing the Durbin-Watson statistic from .70 to 1.43. The sign of the coefficient on this variable is significant and negative. In estimating the supply of funds returned to Japan, adding the U.S. industrial-production index improved the Durbin-Watson statistic from 1.23 to 1.43. The coefficient on this variable is also significant and negative.

An explanation for this observed behavior may be found. Japanese banks in the U.S. will use their funds where the return is the highest. An increase in the U.S. industrial-production index indicates increased U.S. business activity and perhaps a corresponding increase in loan return. Therefore, it is hypothesized that Japanese banks in the U.S. keep their funds in the U.S. rather than returning their funds to Japan when U.S. business activity
increases. The Japanese industrial production index and its affect on loans in the U.S. may be thought of similarly. When Japanese business activity increases, it is hypothesized that Japanese banks in the U.S. use more of their available funds in Japan rather than issuing commercial and industrial loans in the U.S. The estimated coefficients further emphasize the interdependency of the U.S. and Japanese banking markets.

Though the Durbin-Watson statistics of the supply curves remain in the inconclusive region, the results are satisfactory for the investigation undertaken here. The estimated demand functions are of primary interest because they offer evidence on the validity of the hypotheses developed concerning Japanese bank activities in the U.S. The supply functions insure consistency between expected and observed bank behavior. Also, they provide information on the exogenous variables to be used for 2SLS estimation of the demand curve. Omitted variables in the supply curves could affect 2SLS estimation of the demand curves. However, the high R²'s obtained in first-stage estimation suggest that additional exogenous variables would not dramatically change the second-stage results.

The Durbin-Watson statistics obtained in estimating the demand functions for commercial and industrial loans issued in the U.S. and funds returned to Japan allow acceptance of
the null hypothesis of no serial correlation in the error term. This is true in both OLS and 2SLS results.

6.4 **EMPIRICAL RESULTS**

This section presents results from various procedures estimating demand and supply functions of commercial and industrial loans issued by Japanese banks in the U.S. and of funds returned to related foreign institutions from U.S. offices of Japanese banks.

6.6.1 **Commercial and Industrial Loans**

The demand and supply functions of loans were estimated using OLS and 2SLS procedures. The results of each are presented and compared here.

**Demand**

As developed in Section 6.2, the demand for loans is expected to be a positive function of Japanese trade with the U.S. (TRADE), and U.S. fixed investment (INVEST). Additionally, demand is expected to be a negative function of survey results indicating easy Japanese credit conditions (SURVEY), central bank loans to Japanese banks (CENTRAL), the U.S. prime rate minus the Japanese average loan rate (PRIME-ALBDJ) and the U.S. prime rate minus the U.S. corporate bond rate (PRIME-USEOBD). Two dummy variables are
also included to measure the impact of changes in U.S. regulation. The first (DUMMY) equals one for the year prior to the passage of the International Banking Act in September 1976 and zero otherwise. The second (DUMMY2) equals one after September 1976 and zero otherwise. The hypothesized signs of these coefficients are uncertain due to varying effects of regulatory changes and uncertainty about what the variables are measuring. Estimates of the demand function are in Table 13 and Table 14.

Both OLS and 2SLS estimates significantly support the importance of Japanese credit conditions, measured by SURVEY and CENTRAL, to loans issued in the U.S. This is the most important result of this estimated function. Previous studies of international banking in general and Japanese banks in particular ignore this use of a host market as an alternative source of funds. Terrell, in fact, suggests the opposite — that tight credit conditions at home will inhibit activities in the foreign country. Though this may be true for some countries, the nature of Japanese banking suggests an opposite effect.

Support of the customer relationship hypothesis is found in the estimation of the demand for loans function. In the OLS and 2SLS results, Japanese trade with the U.S. has a significant positive impact on loans. The importance of the customer relationship found by Terrell and Khoury is consistent with the results here.
### TABLE 13

Demand for Commercial Loans From Japanese Banks in the U.S.

**1972-IV to 1980-II**

**Coefficient Estimates**

(t-Statistics in Parentheses)

<table>
<thead>
<tr>
<th>Variable</th>
<th>CIS</th>
<th>2SIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBVEY</td>
<td>-45.28</td>
<td>-47.21</td>
</tr>
<tr>
<td></td>
<td>(-4.10) a</td>
<td>(-2.86) a</td>
</tr>
<tr>
<td>CENTRAL</td>
<td>-.23</td>
<td>-.67</td>
</tr>
<tr>
<td></td>
<td>(-1.92) c</td>
<td>(-2.42) b</td>
</tr>
<tr>
<td>TRADE</td>
<td>-.10</td>
<td>.10</td>
</tr>
<tr>
<td></td>
<td>(4.65) a</td>
<td>(2.91) a</td>
</tr>
<tr>
<td>INVEST</td>
<td>.03</td>
<td>-25.55</td>
</tr>
<tr>
<td></td>
<td>(.29)</td>
<td>(-1.23)</td>
</tr>
<tr>
<td>PRIME-USBOND</td>
<td>-685.90</td>
<td>-1783.78</td>
</tr>
<tr>
<td></td>
<td>(-3.23) a</td>
<td>(-2.94) a</td>
</tr>
<tr>
<td>PRIME-ALBJ</td>
<td>916.66</td>
<td>2262.06</td>
</tr>
<tr>
<td></td>
<td>(3.84) a</td>
<td>(3.11) a</td>
</tr>
<tr>
<td>INTERCEPT</td>
<td>4330.1</td>
<td>13323.0</td>
</tr>
<tr>
<td></td>
<td>(2.29) b</td>
<td>(2.61) a</td>
</tr>
</tbody>
</table>

| R²   | .98   | .95   |
| D.W. | 1.50  | 1.66  |

**NOTES:** Significance levels are adjusted for degrees of freedom. In 2SLS estimation, t-statistics are asymptotically correct and therefore normal tables are used to determine significance.

- a = significant at the 99 percent level.
- b = significant at the 95 percent level.
- c = significant at the 90 percent level.
TABLE 14

Demand for Commercial Loans From Japanese Banks in the U.S.

1972-IV to 1980-II

Coefficient Estimates
(t-Statistics in Parentheses)

<table>
<thead>
<tr>
<th>Variable</th>
<th>CIS</th>
<th>2SIS</th>
<th>CIS</th>
<th>2SIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SURVEY</td>
<td>-33.95</td>
<td>-37.60</td>
<td>-37.25</td>
<td>-41.43</td>
</tr>
<tr>
<td></td>
<td>(-3.49)a</td>
<td>(-2.32)b</td>
<td>(-4.16)a</td>
<td>(-2.62)a</td>
</tr>
<tr>
<td>CENTRAL</td>
<td>-.19</td>
<td>-.61</td>
<td>-.33</td>
<td>-.67</td>
</tr>
<tr>
<td></td>
<td>(-1.93)c</td>
<td>(-2.46)b</td>
<td>(-3.35)a</td>
<td>(-2.90)a</td>
</tr>
<tr>
<td>TRADE</td>
<td>.11</td>
<td>.11</td>
<td>.09</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td>(6.00)a</td>
<td>(3.41)a</td>
<td>(4.92)a</td>
<td>(3.07)a</td>
</tr>
<tr>
<td>INVEST</td>
<td>2.64</td>
<td>-24.04</td>
<td>1.29</td>
<td>-22.17</td>
</tr>
<tr>
<td></td>
<td>(.30)</td>
<td>(-1.27)</td>
<td>(.15)</td>
<td>(-1.25)</td>
</tr>
<tr>
<td>PRIME-USEFORD</td>
<td>-667.98</td>
<td>-1694.9</td>
<td>-643.30</td>
<td>-1576.46</td>
</tr>
<tr>
<td></td>
<td>(-3.79)a</td>
<td>(-3.06)a</td>
<td>(-3.63)a</td>
<td>(-2.95)a</td>
</tr>
<tr>
<td>PRIME-ALIIJ</td>
<td>849.77</td>
<td>2116.3</td>
<td>761.43</td>
<td>1937.9</td>
</tr>
<tr>
<td></td>
<td>(4.27)a</td>
<td>(3.17)a</td>
<td>(3.95)a</td>
<td>(2.94)a</td>
</tr>
<tr>
<td>DUMMY1</td>
<td>-1323.0</td>
<td>-1084.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-3.44)a</td>
<td>(-1.67)c</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DUMMY2</td>
<td></td>
<td></td>
<td>1189.9</td>
<td>809.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(3.52)a</td>
<td>(1.54)</td>
</tr>
<tr>
<td>INTERCEPT</td>
<td>3687.6</td>
<td>12189.</td>
<td>6173.3</td>
<td>13117.</td>
</tr>
<tr>
<td></td>
<td>(2.33)b</td>
<td>(2.60)a</td>
<td>(3.93)a</td>
<td>(3.08)a</td>
</tr>
<tr>
<td>R²</td>
<td>.98</td>
<td>.98</td>
<td>.98</td>
<td>.96</td>
</tr>
<tr>
<td>D.W.</td>
<td>1.89</td>
<td>1.83</td>
<td>2.60</td>
<td>1.90</td>
</tr>
</tbody>
</table>

NOTES: Significance levels are adjusted for degrees of freedom. In 2SLS estimation, t-statistics are asymptotically correct and therefore normal tables are used to determine significance.

a = significant at the 99 percent level.
b = significant at the 95 percent level.
c = significant at the 90 percent level.
The signs of the remaining coefficients are as expected (with one exception) and are consistent in both CIS and 2SIS estimates. As the U.S. prime rate increases relative to the U.S. bond rate, loans decrease significantly as expected in both CIS and 2SIS procedures. However, U.S. business activity, proxied with fixed investment, is insignificant in impact. The same result was found whether activity was proxied with fixed investment, inventories or the U.S. industrial-production index.

The sign of the coefficient on the U.S. prime rate minus the Japanese average loan rate is positive, opposite the expected result. When the U.S. prime rate and the Japanese average loan rate are entered in the regressions separately rather than as a difference, the U.S. rate is positive and significant while the Japanese rate is insignificant. Why the U.S. rate has a positive influence on loan demand is not clear. A possible explanation could be that an increase in the U.S. rate, reflecting a tightening in the U.S. loan market, could be correlated with a tightening in the Japanese loan market. If the Japanese average loan rate is not able to increase as quickly as Japanese credit conditions would indicate, then the U.S. prime rate may be a further indicator of the importance of Japanese credit conditions to loans issued in the U.S.
Table 14 presents results of estimations when the dummy variables are included. The dummy variables were tested in the demand and supply functions of both bank activities investigated here. They had a significant impact only in the demand for commercial and industrial loans. In addition to the significance of the dummy coefficients in the demand function, they move the Durbin-Watson statistic into the region indicating no serial correlation.

No hypotheses about the signs of the dummy variables were formed. DUMMY1, equal to one in the year prior to the IEA, could have a negative coefficient if foreign banks were uncertain about the future regulatory environment and they took a "wait-and-see" attitude about U.S. activities. However, if foreign banks expected existing activities to be allowed through grandfathering provisions, they may have hurried to expand in the U.S. In the results, the coefficient on DUMMY1 is negative, indicating that foreign bank activities slowed prior to the IEA. This is consistent with foreign banks' hesitation to expand in an uncertain period.

DUMMY2, equal to one after the passage of the IEA, would have a negative coefficient if the new regulation hindered U.S. activities of foreign banks. However, if it did not significantly constrain foreign banks, the coefficient may be insignificant. Because the passage of the IEA reduced
uncertainty over the direction of U.S. regulation and because it expanded foreign-bank opportunities in the U.S., DUMMY2 may indicate that foreign-bank activities expanded. The results indicate a significant, positive expansion of U.S. activities of foreign banks after September 1978. This result is consistent with banks' willingness to expand once uncertainty about regulation is reduced. Of course, some totally unaccounted for factor may be causing the significance of DUMMY2, as well as DUMMY1.

Supply

The estimates of the supply function of commercial and industrial loans of Japanese banks in the U.S., presented in Table 15, are substantially as expected. In both CIS and 2SLS results, loans supplied are significantly and positively related to their relative price, E1IME/lE1I, and to deposits in U.S. offices of Japanese banks, USEEES. It was hypothesized that U.S. business activity would have a positive effect on loan supply but the estimated relationship here between U.S. fixed investment and loans is insignificant.

It is expected that as the loan rate increases relative to the return on other uses of funds (as measured by PRIME-TEILL), the supply of loans will increase. This result is observed though it is insignificant. Loans
### TABLE 15

**Supply of Commercial Loans From Japanese Banks in the U.S.**

1972-IV to 1980-II

**Coefficient Estimates**

*(t-Statistics in Parentheses)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>1LS</th>
<th>2LS</th>
</tr>
</thead>
<tbody>
<tr>
<td>INVEST</td>
<td>-1.25</td>
<td>-1.24</td>
</tr>
<tr>
<td>USDEPS</td>
<td>1.26</td>
<td>1.26</td>
</tr>
<tr>
<td>PRIME-TEILL</td>
<td>139.83</td>
<td>141.63</td>
</tr>
<tr>
<td>PRIME-MEJ</td>
<td>440.59</td>
<td>437.61</td>
</tr>
<tr>
<td>JIPBD</td>
<td>-108.59</td>
<td>-108.18</td>
</tr>
<tr>
<td>INTERCEPT</td>
<td>19374-</td>
<td>19320-</td>
</tr>
</tbody>
</table>

\[ b^2 \]

\[ D.W. \]

**Notes:** Significance levels are adjusted for degrees of freedom. In 2SLS estimation, t-statistics are asymptotically correct and therefore normal tables are used to determine significance.

- **a** = significant at the 99 percent level.
- **b** = significant at the 95 percent level.
- **c** = significant at the 90 percent level.
supplied are significantly and negatively affected by the Japanese industrial-production index. This further emphasizes the interdependency of the two banking markets. As business activity in Japan increases, U.S. offices of Japanese banks decrease their loans in the U.S. This may be because the offices return the funds to Japan for use there.

6.4.2 Funds Returned to Related Institutions

The demand and supply functions for funds returned to Japan are estimated using CLS and 2SIS procedures. The results are compared here.

Demand

As developed in Section 6.2, the demand for funds returned to Japan is expected to be a positive function of the cost of Japanese funds (DEFCOS1) and the difference between the Japanese average loan rate and the Japanese industrial-bond rate (ALBJ-IEBJ). Funds returned to Japan should be negatively related to central bank loans (CENTRAL). Funds returned to Japan are also expected to be positively related to the Japanese industrial-production index. The cost of funds returned will also influence fund demand — the U.S. federal-funds rate (FEDFUN) should have a negative impact and the U.S. prime rate minus the Japanese average loan rate (PRIME-ALBJ) should have a positive impact on fund demand.
The estimation procedures provide results consistent with these expectations. CIS and 2SIS estimates are very similar. Results are in Table 16.

DEPCOST, ALBJ-IEBJ and CENTEAI were included in the estimated function to note the impact of Japanese credit conditions on the demand for funds returned to Japan. An increase in deposit cost increases the expense of raising funds in Japan and funds from the U.S. become an attractive alternative. The positive coefficient on DEPCOST is significant in all estimations. ALBJ-IEBJ also has a positive, significant impact on funds returned to Japan according to these results. When bank financing becomes more expensive relative to alternative Japanese financing, funds returned to Japan increase. This result again emphasizes the interdependence between the U.S. and Japanese credit markets. U.S. funds may be used in Japan when conditions in Japan indicate the need for additional funds. When central bank loans to Japanese banks decrease, funds returned to Japan increase according to these results, significantly so in the CIS case. This again indicates the use of the U.S. market in periods of credit shortages in Japan.

The effect of the Japanese industrial-production index on funds returned to Japan further illustrates the interdependence of the two markets. The estimates indicate
TABLE 16

Demand For Funds Returned to Japan From Japanese Banks in the U.S.

1972-IV to 1980-III

Coefficient Estimates
(t-Statistics in Parentheses)

<table>
<thead>
<tr>
<th>Variable</th>
<th>CLS</th>
<th>2SLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFCOSt</td>
<td>1266.5</td>
<td>1349.6</td>
</tr>
<tr>
<td></td>
<td>(4.04)a</td>
<td>(4.06)a</td>
</tr>
<tr>
<td>ALBEJ-IEEBJ</td>
<td>696.51</td>
<td>804.38</td>
</tr>
<tr>
<td></td>
<td>(2.97)a</td>
<td>(3.24)a</td>
</tr>
<tr>
<td>CENTRAI</td>
<td>-.16</td>
<td>-.16</td>
</tr>
<tr>
<td></td>
<td>(-1.82)c</td>
<td>(-1.54)</td>
</tr>
<tr>
<td>JIPRD</td>
<td>51.23</td>
<td>51.15</td>
</tr>
<tr>
<td></td>
<td>(3.05)a</td>
<td>(3.06)a</td>
</tr>
<tr>
<td>FEDFUND</td>
<td>-498.76</td>
<td>-561.45</td>
</tr>
<tr>
<td></td>
<td>(-5.22)a</td>
<td>(-5.32)a</td>
</tr>
<tr>
<td>EBRME-ALBEJ</td>
<td>663.36</td>
<td>716.33</td>
</tr>
<tr>
<td></td>
<td>(6.62)a</td>
<td>(6.66)a</td>
</tr>
<tr>
<td>INTERCEPT</td>
<td>-4606.3</td>
<td>-4617.2</td>
</tr>
<tr>
<td></td>
<td>(-1.57)</td>
<td>(-1.56)</td>
</tr>
</tbody>
</table>

R²                    | .53     | .93      |
D-W                    | 2.00    | 2.08     |

NOTES: Significance levels are adjusted for degrees of freedom. In 2SLS estimation, t-statistics are asymptotically correct and therefore normal tables are used to determine significance.

a = significant at the 99 percent level.
b = significant at the 95 percent level.
c = significant at the 90 percent level.
that as JIPBD increases, more funds are returned to Japan for use there.

Two variables, FEDFUND and FEIME-ALEJ, are used to measure the reaction to changes in the prices of funds. FEDFUND represents what Japanese offices pay for the use of U.S. funds. As expected, as the cost increases, the demand for funds falls.

FEIME-ALEJ reflects the cost of the funds to the ultimate borrower. The borrower can compare the cost of obtaining funds in the U.S. or in Japan, and borrow where the cost is lower. As expected, when FEIME increases relative to ALEJ, the demand for funds returned to Japan increases. This relationship is significant in all regressions.

Overall, the results from all estimations of the demand function for funds returned to Japan are as hypothesized. Evidence consistent with the interdependence of the two markets is found. U.S. funds are sent to Japan when conditions there indicate an increased desire for funds.

**Supply**

Estimations of the supply function for funds sent to Japan produced the expected results, as seen in Table 17. As the federal fund rate increases, the supply of funds returned to Japan also increases significantly in CIS and 2SLS regressions. This probably reflects an overall
increase in the supply of interbank funds in response to the increased return.

The coefficient on FRIIME-ABJ takes the expected negative sign, though it is insignificant in all procedures. However, as the return on Japanese loans increases relative to alternative U.S. assets, as measured by AEBJ-TEII, more funds are returned to Japan for use there. This impact is significant. Also, the availability of funds, USSEP, has a positive, significant impact on the supply of funds returned to Japan.

The U.S. industrial-production index is included to rate the impact of U.S. business activity on funds returned to Japan. The significant, negative coefficient indicates that as U.S. production increases, funds returned to Japan decrease.
### TABLE 17

**Supply of Funds Returned to Japan From Japanese Banks in the U.S.**

**1972-IV to 1980-II**

<table>
<thead>
<tr>
<th>Variable</th>
<th>OLS</th>
<th>2SLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEDFUND</td>
<td>338.96</td>
<td>464.73</td>
</tr>
<tr>
<td></td>
<td>(3.09)a</td>
<td>(3.71)a</td>
</tr>
<tr>
<td>PRIME-ALBJ</td>
<td>-56.37</td>
<td>-212.22</td>
</tr>
<tr>
<td></td>
<td>(-.33)</td>
<td>(-1.14)</td>
</tr>
<tr>
<td>ALBJ-TEILL</td>
<td>424.51</td>
<td>445.51</td>
</tr>
<tr>
<td></td>
<td>(3.80)a</td>
<td>(3.67)a</td>
</tr>
<tr>
<td>USDEP</td>
<td>-66</td>
<td>.70</td>
</tr>
<tr>
<td></td>
<td>(-.26)a</td>
<td>(8.23)a</td>
</tr>
<tr>
<td>USIPRD</td>
<td>-56.20</td>
<td>-36.52</td>
</tr>
<tr>
<td></td>
<td>(-2.07)k</td>
<td>(-1.57)</td>
</tr>
<tr>
<td>INTERCEPT</td>
<td>-4775</td>
<td>66.33</td>
</tr>
<tr>
<td></td>
<td>(-5.45)a</td>
<td>(-.05)</td>
</tr>
</tbody>
</table>

R²       | .91     | .51     |
D.W.     | 1.43    | 1.36    |

**NOTES:** Significance levels are adjusted for degrees of freedom. In 2SLS estimation, t-statistics are asymptotically correct and therefore normal tables are used to determine significance.

- a = significant at the 99 percent level.
- b = significant at the 95 percent level.
- c = significant at the 90 percent level.
6.5 ADDITIONAL CONSIDERATIONS

The empirical results presented here are consistent with the hypotheses developed in this dissertation. The evidence suggests that U.S. activities of Japanese banks increase during periods of tight Japanese credit conditions. In addition, loans of U.S. offices of Japanese banks are positively related to Japanese trade with the U.S.

As in any empirical work, the results are dependent on the specifications tested. Several simplifying assumptions are made in this work. Only conditions in Japan and the U.S. are considered in explaining the activities of U.S. offices. If Japanese banks have locked to the U.S. for additional financial resources, it is likely that they have looked elsewhere. Japanese banks have established offices throughout Southeast Asia and a few in South America and Europe. Because data are not available on the activities of these offices, they are ignored in this dissertation work. However, it is probable that all of these offices operate interdependently.

Horst (1977) has noted the importance of taxation in multinational activities of firms. Taxation of firms' foreign income has a significant impact on locational decisions. Japanese banks may be incurring tax advantages by opening U.S. offices. This issue is not investigated in this dissertation.
Variable definitions may lead to further problems in interpreting the results. In particular, the various interest rates used may not be representative of true market conditions. As noted, most Japanese interest rates are controlled by the authorities to some extent. Inflexible explicit rates suggest the importance of implicit rates in financial markets. These implicit rates, approximated by survey results and central-bank loans, are difficult to measure. In addition, the explicit interest rates may include adjustments for differing inflation rates or term structures of loan portfolios over time. Because all of these factors are not incorporated into the estimations reported here, the results may be subject to misinterpretation.

6.6 SUMMARY

This chapter provides empirical evidence on determinants of U.S. activities of Japanese banks. Two activities in particular are investigated -- commercial and industrial loans issued by U.S. offices of Japanese banks and funds returned to Japan from U.S. offices of Japanese banks.

Evidence is found consistent with the main hypotheses of this dissertation. Estimated demand functions of loans and funds returned to Japan emphasize the interdependence of the two markets. Tight credit conditions in Japan -- whether
measured through survey results, deposit costs or relative interest rates — result in additional use of U.S. markets. Loans issued in the U.S. and funds returned to Japan increase under the above conditions.

The importance of Japanese customers to U.S. offices of Japanese banks is found in the empirical work also. As Japanese trade increases, Japanese banks in the U.S. increase their loans. This result corresponds to the work of Terrell and Ahoury.

For the most part, the estimated demand and supply functions provide the expected results with respect to the impact of relative return, relative cost and general economic conditions on bank activities.
Chapter VII
CONCLUDING REMARKS

This dissertation investigates the presence and activities of Japanese banks in the U.S. In 1982, assets of U.S. offices of Japanese banks totalled over $100 billion, about four percent of all assets of U.S. banks. Over one-third of assets of foreign-owned banks in the U.S. are in Japanese banks. The factors drawing these banks to the U.S. are of interest because they add to the understanding of multinational banking and of all multinational firms. In addition, the study of the impact of regulation on firm behavior illustrates the importance of considering secondary effects of regulation to policy makers.

Two main hypotheses are developed and investigated in this dissertation. The first centers on the effect of Japanese regulation on Japanese banks. It is suggested that constraints in Japan encourage Japanese banks to open U.S. offices. The second hypothesis, based on previous work in the area of foreign direct investment, suggests Japanese banks come to the U.S. to serve Japanese firms operating in the U.S. In addition, the impact of U.S. regulations and
Japanese and U.S. financial market conditions on U.S. activities of Japanese banks is considered.

Japanese banks play an important role in the Japanese economy. Corporate financing is heavily dependent on bank funds. The growth-oriented policies of the Japanese government following World War II encouraged this dependence. Low interest rates, controlled by the Bank of Japan, and central-bank guidance direct bank loans to industry. Japanese banks rely on central bank loans for their funds and monetary policy is implemented through the allocation of central bank loans.

Evidence presented in this dissertation is consistent with the hypothesis that Japanese banks use their U.S. offices as alternative sources of funds. Demand and supply functions for commercial and industrial loans issued by Japanese banks in the U.S. and for funds returned to Japan from U.S. offices are estimated. Results suggest that tight credit conditions in Japan -- whether measured through survey results, deposit costs or relative interest rates -- lead to additional use of U.S. financial markets. The estimated model suggests that loans issued in the U.S. and funds returned to Japan increase during Japanese credit shortages.

The second hypothesis investigated centers on the ability of foreign firms to compete in another country. Previous
researchers have suggested a link between multinational activities of banks and multinational activities of their clients. Foreign firms are at a competitive disadvantage with respect to domestic firms in a country because they are less familiar with the laws, markets and customs of that country. A foreign firm must have an offsetting advantage to compensate for its foreignness. It is proposed here that Japanese banks are able to compete with U.S. banks because Japanese firms are also operating in the U.S. Japanese firms may prefer to deal with Japanese banks with which they have pre-existing relationships, providing U.S. offices of Japanese banks with a competitive base.

The empirical findings from this dissertation add to existing evidence in support of this hypothesis. In the model tested, it is found that loans of Japanese banks in the U.S. increase as Japanese trade increases. Japanese trade is used as a proxy for Japanese involvement in the U.S. since U.S. offices of Japanese banks participate heavily in trade financing.

The impact of U.S. regulation is also discussed in this dissertation. Before the International Banking Act of 1978, foreign-owned banks in the U.S. were not subject to federal regulation, resulting in several possible competitive advantages. Foreign-owned banks were able to open offices in more than one state, could expand into retail banking
activities, were not subject to federal reserve requirements or FDIC assessments and found it easier to takeover U.S. banks. The International Banking Act of 1978 was designed to reduce or eliminate most of these advantages but some advantages do remain. The importance of these advantages to the activities of Japanese banks in the U.S. has not been established.

The study of Japanese banks in the U.S., and foreign banks in the U.S. in general, suggests subjects for further research. Foreign-direct-investment literature proposes that the disadvantage of being foreign disappears over time as the foreign firm is absorbed into the domestic economy. A study of Japanese bank development in the U.S. could provide information on this hypothesis. Examinations of interdependence between other foreign banking markets and that of the U.S. can further emphasize the global nature of banking. Also, further investigation into the impact of the International Banking Act of 1978 is needed.

This dissertation provides new insights into the motivation behind the entry of foreign banks into the U.S. The study of the activities of Japanese banks isolates the significance of regulatory factors and foreign-direct-investment theories in explaining this phenomenon. In addition to presenting evidence on foreign banks in the U.S., this dissertation provides an interesting
study of the impact of regulation on a market and a way in which regulations may be avoided through foreign direct investment.
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