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CONTENTS

THE INTERNATIONALIZATION OF JAPANESE COMMERCIAL BANKING
—Experiences in the 70's—

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AND
Kenichi ISHIGAKI

I Introduction

During 1977 and 1978, our research group[1] conducted a survey of the internationalization of Japanese banking. Bankers were asked to respond to a questionnaire and be interviewed. Ten of the twelve city banks, all three of the long-term credit banks, one specialised foreign exchange bank and one regional bank participated in the survey[2]. Although some other banks, such as trust banks, are also internationalizing their business, we limited our concern to city banks, long-term credit banks and specialised foreign exchange banks, since they represent virtually all the Japanese banks which are currently international. They account for 90% of the foreign exchange asset balance, 94% of all overseas branches of Japanese banks, 95% of overseas representatives' offices, and 92% of local finance company subsidiaries of banks. It thus seems reasonable that this survey will provide a fairly accurate assessment of the internationalization of Japanese banking.[3]

With the objective of clarifying the current situation as regards the internationalization of Japanese banking and examining the points at issue, the questionnaire was divided into seven sections:

1. The purpose and motives of the internationalization of banking
2. The establishing of branches, offices and local banks
3. International banking operations
4. The present situation and performance of the internationalization

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1) Main members of our research group besides us are as follows; Professor Y. Noritake (Kobe University), Professor R. Mikitani (Kobe University), Professor N. Miyata (Kagawa University). Associate Professor N. Niwa (Toyama University). If this paper has some merits, we must share them with these professors. However, we alone have responsibility for errors which may exist in this paper. Mr. B. Piper and Miss Robin Fletcher assisted us with translation into English. We appreciate this assistance.

2) The following banks co-operated in our research. City banks; Dai-ichi Kangyo, Daiwa, Fuji, Hokkaido Takushoku, Mitsubishi, Mitsui, Sanwa, Sumitomo, Taiyo Kobe, Tokai. Long-term credit banks; Nihon Choki Shinyo, Nihon Kogyo, Nihon Saiken Shinyo. Specialized foreign exchange bank; Bank of Tokyo. Regional bank; Hokuriku. We would like to express our appreciation for their co-operation.

3) Our research group is now conducting a survey of other internationalizing banks and financial institutions, such as trust banks, local banks, and stock companies.

5. The difficulties and limitations in the promotion of internationalization of Japanese banking
6. The administration and regulation of internationalization of banking
7. Present and future problems.

Generally speaking, the internationalization of finance has three aspects. Firstly, it involves the internationalization of domestic currency—that is, domestic currency becomes also an international vehicle currency and reserve currency. Secondly, it involves the internationalization of banks and other financial institutions—financial institutions transact either with non-residents through both domestic and foreign currency, or with residents through foreign currency. Thirdly, it involves the internationalization of the money and capital market—that is, both short-term and long-term funds move freely into and out of the markets, and market interest rates are dertermined by market forces.

These three aspects are closely inter-related. The internationalization of a currency and of the money and capital markets promotes the internationalization of banking business. Conversely, the development of the latter may contribute to the promotion of the former. It would therefore seem to be necessary to approach the issue of the internationalization of banking in the light of these considerations. However, as will be discussed in more detail later, one of the features of the internationalization of Japanese banking is that it has developed without significant corresponding developments in the other two aspects. This paper will concentrate on the examination of the internationalization of Japanese banking, with the other aspects being noted for their effects on the internationalization.

The paper is not intended to be merely a report of the results of the survey. It will depict the internationalization of Japanese banks against the background of the Japanese economy and discuss the problems and limitations of internationalization as perceived through the data collected through our research and from other sources[4]. The subsequent sections deal with the internationalization of the Japanese economy and Japanese banking, the aims and motives of internationalization, the present situation in overseas bases and the performance of internationalization. The paper will also draw out the major issues and note the limitations of internationalization as they emerge from the data collected in the survey.

II The Development of the Internationalization of the Japanese Economy and of Japanese Banking

Since the Second World War, there has been a gradual shift from a closed to an

4) Kinyu Mondai Kenkyu kai (Research group in Ministry of Finance), *Kokusaika ni tomonau wagakuni no kinyukikan no arikata*, 1979 is critically important for researching the internationalization of financial institutions. We made use of the many data attached to this report. Other papers which deal with related problems are as follows. E. W. Hayden, *Internationalizing Japan's Financial System*, Stanford University, December 1980. James Horne, *The Internationalization of Japan Finance: A Preliminary Assessment*, Research Paper No. 69. Australia-Japan Research Centre, ANU 1980.

open Japanese economy. GHQ (General Headquarters) controlled Japanese foreign trade immediately after the war, but some private foreign trade eventually resumed, and in 1949 the single exchange rate of "1 dollar = 360 yen" was determined. In 1960, the Program of Liberalization of Trade and Foreign Exchange was initiated to promote liveralization of trade transactions and increase the percentage of liberalized trade categories to some 80 or 90 per cent. The Program resulted in an increase from 42% in 1960 to 93% in 1964. In 1960 the National Income Doubling Plan was introduced, coinciding with the period of high economic growth in Japan. In 1964 Japan accepted the obligations of Article VIII of the IMF Agreement and became a member of the OECD. This meant that Japan accepted the prohibition of exchange controls on both visible and invisible trade without the approval of the IMF, and agreed in principle not to restrict invisible trade transactions and long-term capital movement. This shift from a closed to an open system indicates that a certain degree of liberalization of foreign trade had been reached by 1964. In that year Japan's share of world trade was 4.1%.

Liberalization of capital transactions, especially direct investment in Japan, followed the liberalization of foreign trade. The fundamental policy for the liberalization of direct investment in Japan was determined in 1967, and proceeded in four stages. Due to the policy, the number of liberalized business categories increased to 527. Still, in 1969, the level of liberalization of Japanese capital movements was not as high as that of other advanced countries. However, at the beginning of the 1970s the Japanese balance of payments surplus, especially the current balance, increased. It remained at a high level, so the Japanese authorities actively promoted the liberalization of trade and capital transactions. The proportion of import trade categories which had been liberalized reached 97%, with only 32 goods, such as beef, flour, leather and computers, remaining unliberalized. During this same period an across the board reduction of 20% on tariffs on mining and manufactured products and processed agricultural products was implemented. With this, Japan's tariff levels reached the international level. The liberalization of capital transactions also proceeded during this period, with four stages finally leading to 100% liberalization in principle by 1973. Japanese direct investment overseas was automatically permitted in principle from 1972.

The process of the liberalization of trade and capital transactions is really also the process of the internationalization of the Japanese economy. Table 1 shows Japan's share of world foreign trade. Japanese exports and imports accounted for 3.2%–3.3% in 1960, reaching 6.4% in 1975. Table 2 shows the level of flow and stock of direct overseas investment of Japan, USA and West Germany. It indicates that Japanese overseas investment increased rapidly during the late 1960s and the 1970s, especially in 1972. It also shows that although the level of both stock and flow of Japanese overseas investment in the late 1970s was considerably lower than that of the USA, Japan's stock levels were about the same as those of West Germany, while its flow level was higher.

Table 1. The Position of Japan in World Trade (million U.S. dollars)

		1960	1965	1970	1975	1979
World	Exports[a]	127,700	186,400	311,800	873,779	16,270,302
	Imports[b]	134,800	197,400	327,300	905,906	16,792,250
Japan	Exports[a]	4,055	8,452	19,319	55,754	103,045
	Imports[b]	4,491	8,170	18,883	57,865	110,672
Share of Japan	Exports[a]	3.2	4.5	6.2	6.4	6.3
%	Imports[b]	3.3	4.1	5.8	6.4	6.6

Source: U.N. Yearbook of International Trade Statistics, 1979.
a. F.O.B.
b. C. I. F.

Table 2. Direct Investment Overseas by Japan, U.S.A. and West Germany (million U.S. dollars)

	Japan		U.S.A.		West Germany	
	Total	The Ratio to Domestic Private Investment	Total	The Raito to Domestic Private Investment	Total	The Ratio to Domestic Private Investment
1967	275	1.2	4,791	5.8	516	3.5
1968	557	2.0	5,372	6.0	573	3.7
1969	665	1.9	6,246	6.3	886	4.2
1970	904	2.2	7,255	7.2	958	3.6
1971	858	2.0	7,577	7.3	816	2.4
1972	2,338	4.3	7,434	6.4	880	2.5
1973	3,494	4.3	11,435	8.4	2,086	4.8
1974	2,396	3.1	8,859	5.9	1,880	4.1
1975	3,280	4.7	14,040	9.4	1,993	4.5
1976	3,462	4.5	13,032	8.0	2,140	4.0
1977	2,806	3.2	11,538	6.1	2,420	3.7
Cumulative Total	22,211		148,782		22,458	

Source: Kinyu Mondai Kenkyukai, *Kokusaika no shinten ni tomonau wagakuni kinyukikan no arikata.*

The internationalization of the Japanese economy, that is, the development of an interdependent relationship between the Japanese and world economies together with the increasing importance of Japan's position in the world economy, obviously has effects on the activities of various large banks, such as city banks, which have played a major role in the financial activities of Japan. However, it should be noted that the internationalization of the Japanese economy has not been accompanied by a sufficient internationalization of currency (yen) and of the money and capital market. Table 3 and Table 4 show the relative positions of currencies such as the US dollar, the mark and the yen in international trade and financial transactions. Clearly, the position of the yen is overwhelmingly low in comparison with the US dollar and is lower than the mark in both transaction categories. With regard to the internationalization of the money and capital market, there has been little improvement in the

Table 3. Percentage of International Trade Transactions in Domestic Currency*

	Export	Import
Japan	18.8%	1.2%
West Germany	86.9	42.0
England	73.0	40.0
France	68.3	31.5
Netherlands	50.2	31.4
Austria	54.7	24.7
Belgium	47.7	25.4
Denmark	54.0	23.0
Sweden	66.1	25.8

*Figures for Japan are for 1977; others are for 1976.

Source: Kinyu Mondai Kenkyu Kai, op. cit.

Table 4. The Percentage of Money—Capital Transaction in Each Currency

	(1) Syndicate Loan		(2) Issue of Securities		(1)+(2)	
	1977	1978	1977	1978	1977	1978
U.S. Dollar	93.7%	89.6%	51.1%	38.6%	76.0%	75.2%
D. Mark	3.8	2.8	20.3	24.6	10.7	9.0
Japan Yen	0.9	3.2	5.1	12.4	2.7	5.8
Swiss Franc	0.4	0.3	15.5	16.0	6.7	4.7
Netherlands Guilder Florin	—	1.1	2.2	2.8	0.9	1.6
Saudi Arabia Riyal	0.3	1.3	0.2	0.3	0.3	1.0
British Pound	0.4	0.9	0.7	0.9	0.5	0.9
Kuwait Dinar	—	0.2	0.5	1.7	0.2	0.6
French Franc	—	0.2	—	0.5	—	0.3
Luxembourg Franc	—	—	0.4	0.7	0.2	0.2
Others	0.3	0.3	3.8	1.3	1.8	0.6
Total	100	100	100	100	100	100

Source: Kinyu Mondai Kenkyu Kai, op. cit.

internationalization of the short-term money market, although there has been a recent improvement in long-term capital transactions such as the issue of foreign yen-denominated bonds in the Japanese market.

On the other hand, the internationalization of the Japanese economy does seem to have promoted the internationalization of some Japanese banks. Generally speaking, this means the increase of transactions with non-residents in yen or foreign currencies and of transactions with residents in foreign currency as a ratio of transactions with residents in yen. More concretely, these operations include dealing in foreign exchange and trade credit, loans activities to non-residents, merchant-banking activities and dollar fund raising. It is natural, therefore, thet dealing in foreign exchange and trade credit and loans to Japanese companies overseas increases with the increase in the volume of Japanese trade and the greater inroads made by bank's customers into overseas markets.

It follows from our discussion so far that one of the features of the internationalization of Japanese banking is that it has been promoted by the internationalization of the Japanese economy, but has not been accompanied by the internationalization of the yen or the Japanese money and capital market. It should be noted, however, that Japanese banks have themselves initiated internationalization of some aspects of their operations against the background of the development of international finance markets, such as the Euro-dollar market. These factors will be explored in the next section.

III The purpose and Motives of the Internationalization of Japanese Banking

The main long-term purpose of the internationalization of Japanese banking must be the acquisition of profit, although various shorter-term objectives are subsumed in this. In this section we will first clarify the target for the proportion of total bank profits which will come from international business, and then consider the short-term objectives apart from the making of profits.

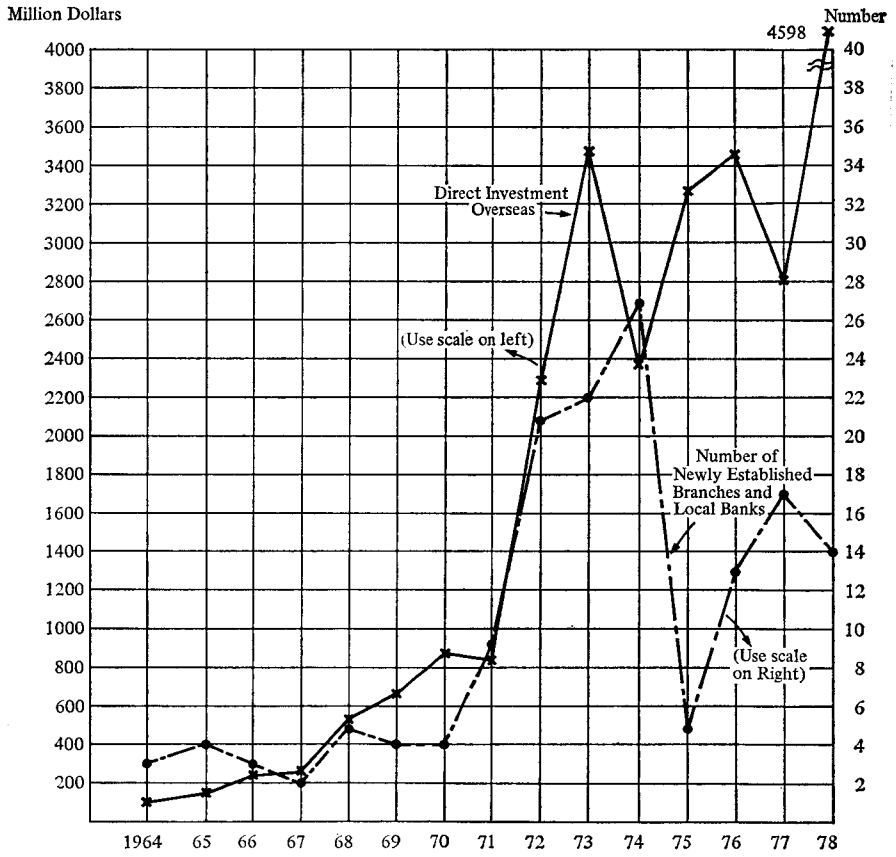
Our research indicates that the long-term target which city banks and long-term credit banks consider feasible is between 11% and 30%. The upper-rank group of city banks gives a figure of 20-30%, while the middle and lower ranks, except the specialized foreign bank, and the long-term credit banks give figures of between 11% and 20%. The specialized foreign exchange bank has a very high target[5]. It is interesting that the higher target figure of the upper-ranking banks (30%) is similar to the actual figure of three internationalized German banks (Deutsche Bank, Dresdner Bank, Commerzbank) whose internationalization is a little more advanced than Japan's banks. These banks' figures were 35%, 30% and 30% respectively in 1977.

Besides profit earning, Japanese banks consider the following objectives important in attaining the long-term target—enlarging the number of customers (twelve banks) and accumulating techniques and 'know-how' in international banking (nine banks). Other objectives include collection of overseas information and the maintenance of banks' prestige in the face of competition. The upper rank group tends to emphasise as important the enlargement of numbers of customers and the accumulation of knowledge, while some middle and lower groups give more weight to the maintaining of prestige.

We will now examine the motives and methods of internationalization of Japanese banking in the past. There are two main ways in which internationalization of banking can develop—firstly, banks may internationalize in accordance with the internationalization of their customers; secondly, they may initiate the internationalization themselves. According to our research, more than half the banks (seven of

5) The grouping of banks is as follows—upper rank group (Dai-ichi, Fuji, Mitsubishi, Sanwa, Sumitomo); middle and lower rank group (Daiwa, Hokkaido Takushoku, Mitsui, Taiyo-Kobe, Tokyo); long-term group (Nihon Choki Shinyo, Nihon Kogyo, Nihon Saiken Shinyo). It should be noted that the Bank of Tokyo is grouped in the middle and lower rank group.

Figure 1. Movement of Japanese Direct Investment Overseas and the Establishment of New Branches and Local Banks



thirteen) think the first way is more significant, three of the thirteen think the second is more significant, while the remaining three stated that their internationalization had paralleled that of their customers. It would seem, therefore, that internationalization in Japanese banking has been primarily motivated by, and proceeded together with, the internationalization of their Japanese customers. That is, the liberalization of trade and capital transactions and the increased overseas activities of Japanese companies have resulted in an increased demand for various foreign exchange and finance dealings on behalf of the banks. Figure 1, which shows the relationship between Japanese companies' direct overseas investment and the increase in the number of overseas branches and local banks, confirms this. It indicates that the latter increased with the increase of direct overseas investment.

However, this is not to say that self-initiated internationalization is an insignificant aspect of the internationalization of banking. For example, the specialized foreign exchange bank proceeded on its own initiative, competing with foreign banks in various aspects of banking business well before the internationalization of Japanese companies. In the case of other banks, too, there are examples of this type of internationalization—for instance, Japanese banks often help customers with their internationalization, especially where the customer is a small or medium-sized enterprise without enough knowledge of overseas conditions to proceed alone. In addition, in the early 1970s, when finance market conditions eased due to excessive domestic liquidity and it seemed that the demand for investment funds was going to slacken in the long term, banks actively sought new business in the international finance market. Similarly, the easing of the regulation of foreign exchange transactions after 1972 by Japanese monetary authorities helped Japanese banks develop international business.

In summary, then, the fundamental reason for the Japanese banks' promotion of internationalization has been the quest for larger profits. They have been assisted in this by the background of liberalization of trade and capital transactions against which it has been carried out. However, self-initiated internationalization has also been a feature, although a secondary one, of Japanese banking, and, as will be discussed later, indications are that it will become increasingly important.

IV Establishing Branches, Offices and Local Banks[6)]

In order to commence international banking business in Japan, banks need to obtain an authorization from the monetary authorities to deal in foreign exchange. They then need to establish foreign exchange sections within domestic banks and enter into correspondent bank contacts with foreign banks overseas. At the end of March 1979, there were 119 authorized foreign exchange banks. However, the establishing of overseas branches, representative offices and local banks is the main way international banking is advanced. As will be discussed further later, the overseas

6) Overseas financial affiliates with equity links with Japanese banks.

operations of Japanese banks, especially fund-raising and accomodation of funds, are conducted in foreign currency, usually U.S. dollars, so the internationalization of the yen and of the Japanese money and capital market has not progressed far. In these circumstances, the establishing of overseas branches and affiliates is critically important for banks. At the end of March 1979, the situation as regards overseas branches, offices and local banks was as follows. Twenty-three banks had a total of 123 overseas branches, 25 banks had a total of 150 representative offices, and 20 banks had a total of 66 local banks (above 50% ownership).

Table 5 and Figure 2 show the number and geographical distribution of overseas branches, offices, local banks and Japanese staff. In terms of the geographical distribution of overseas branches, North American has 38%, Europe 33% and Asia 25%—in total, these three areas account for over 95% of branches. Forty-three per cent of Japanese staff are located in North America, 38% in Europe and 16% in Asia. Representative offices are more scattered, with 22% in America, 22% in Asia, 14% in Central and South America, 13% in Europe, 12% in Oceania, 12% in the Middle and Near East and 3% in Africa. The distribution in terms of staff is similar to the above. Thirty per cent of local banks are in Europe, 30% in Asia, 17% in North America, 11% in Central and South America, 4% in the Middle and Near East and 4% in Oceania. The distribution of Japanese staff, however, is very different—55% in North America, 20% in Europe and 14% in Asia. This indicates that local banks in North America are considerably larger than those in other countries.

The geographical distribution of overseas branches, offices and local banks differ considerably from each other, and, as will be discussed later, they have different but complementary functions in advancing the internationalization of Japanese banks. The local distribution of Japanese staff through these three kinds of overseas bases will also be discussed, in order to make it clear which areas are most important for overseas banking operations. Column (4) of Table 5 shows North America as 43%, Europe as 31%, Asia as 17%, Central and South America 5%, Oceania 2% and the Middle and Near East as 2%. The first three areas together account for over 90%, and can thus be considered important areas.

Figure 3 shows the relationship of the geographical distribution of overseas bases of banks, trade, and direct investment overseas. According to Figure 3, the first is quite different from the other two. In the case of North America and Europe, the figure for geographical distribution is considerably higher than those for trade and direct investment, while in the case of the Middle and Near East and other areas, it is considerably lower. This may mean that even if the internationalization of Japanese banks began in response to the internationalization of their customers, banks' internationalization has now taken a different direction from that of their customers. North America and Europe, in particular New York and London, are the two major international finance markets in which almost all fund raising and a lot of loan accommodation are conducted. It is interesting to note that the geographical distribution of representative offices, whose main function is collecting information rather than

Table 5. Geographical Distribution of Overseas Branches, Representative Offices, Local Banks and Japanese Staff

	(1) Branches			(2) Representative Offices			(3) Local Banks			(4) Total
	I Branches	II Japanese Employees	III Employees of Local Nationality	I Representative Offices	II Japanese Employees	III Employees of Local Nationality	I Local Banks	II Japanese Employees	III Employees of Local Nationality	Total Japanese Employees
(A) North America	36%	43%	25%	22%	19%	13%	17%	55%	39%	43%
(B) Central and South America	3	2	7	14	15	16	11	9	51	5
(C) Europe	33	38	27	13	14	10	32	20	3	31
(D) Middle and Near East	0	0	0	12	11	9	4	1	0	2
(E) Asia	25	16	40	22	24	37	29	14	6	17
(F) Oceania	0	0	0	12	13	7	4	1	0	2
(G) Africa	0	0	0	3	2	6	0	0	0	0
(H) Others	0	0	0	0	0	0	4	0	0	0
Total	100	100	100	100	100	100	100	100	100	100

Figure 2. Geographical Composition of Overseas Bases

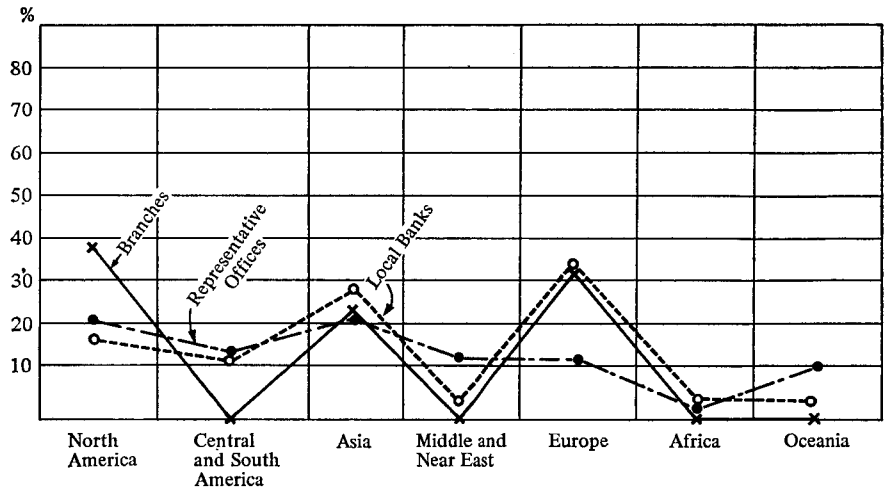
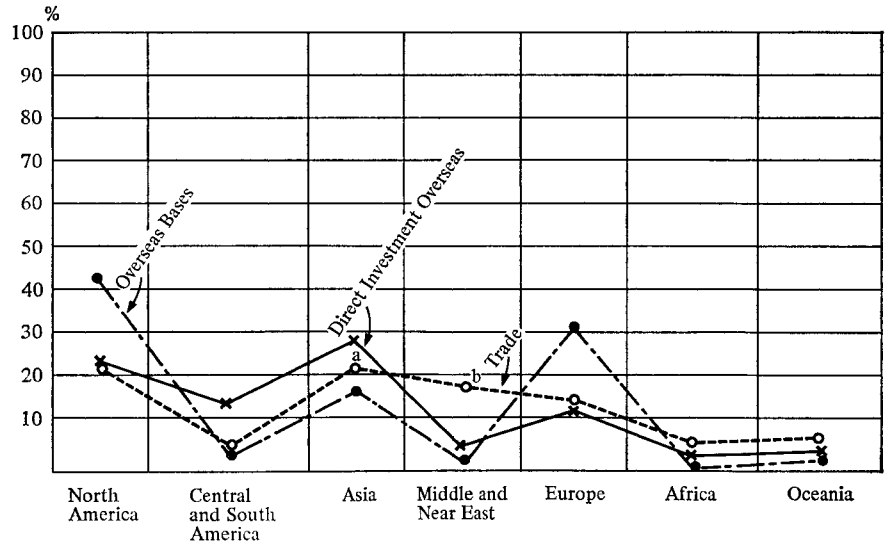


Figure 3. Geographical Distribution of Overseas Bases of Banks, Trade, and Direct Investment



a. Southeast Asia
b. West Asia

conducting fund raising and loans accommodation, is similar to figures for trade and direct investment overseas. It should be noted, however, that the present pattern of geographical distribution of bases reflects the decisions of banks within the framework of regulations and guidelines issued by authorities in Japan and overseas. It is quite likely that the present distribution may change with the progress of internationalization. Our research shows that all Japanese banks want to establish new branches in the near future in North America, half of the banks want to establish branches in Europe and Asia, and a few want to establish branches in Central and South America, and the Middle and Near East. It seems, therefore, that North America will continue to be the most important area, with Asia, the Middle and Near East, and Central and South America gaining in importance, and Europe possibly becoming less important in this regard. This would mean that the distribution of branches would more closely parallel the distribution of trade and overseas direct investment.

These conclusions are based only on predictions of the future distribution of branches of Japanese banks which are already internationalized, or in the process of internationalizing. They do not take into account other banks, especially large regional banks and mutual loan and savings banks, which may establish overseas branches in the future. If they want to establish branches in the international finance markets, particularly in New York and London, the future distribution of branches of Japanese banks will not change as much as indicated earlier[7]. Our research suggests that the establishing of new representative offices will not differ greatly from the present pattern. This would reflect the fact that the function of these offices is not to conduct financial business themselves, but to collect local information on the region in which they are established.

In the case of the establishing of local banks, Japanese banks must consider the advantages and disadvantages of establishing a local bank as opposed to a branch, because both bases conduct similar business. They also need to consider the problem of finance regulation both in Japan and in the country where the base is to be established. Our research indicates that the main advantage of local banks as compared with overseas branches is that they are able to conduct various financial dealings in accordance with local regulations and economic conditions, independent of official Japanese control. The main disadvantage is that local banks cannot benefit directly from economies of scale and the credit power of the parent bank because, legally, local banks must be independent of the parent bank. In fact, however, because of controls imposed on financial activities by both Japanese and overseas authorities, there is often no alternative but to establish a local bank. For example, Japanese banks are not permitted to engage in securities business both domestically and overseas, so it is necessary to establish local banks abroad to carry out this business. Similarly, regulations prevent the establishing of new branches of foreign banks in Australia,

7) According to the Report of Kinyu Mondai Kenkyukai, local banks seem to want to establish branches or representative offices in the international financial market.

so foreign banks are compelled to establish non-bank financial companies (merchant banks, finance companies) instead. Whether they are established because of a purely economic decision or because it is the only alternative, the functions of local banks and overseas branches are complementary, and valuable in helping banks meet the diverse needs of their customers under a variety of regulations and economic conditions. Therefore, provided there is no radical change in the present regulations governing the establishing of branches and local banks in various countries, or in general economic and financial conditions, there will be little change in the distribution of local banks.

In the next section, the content of Japanese international banking business in the overseas bases will be discussed.

V The Operation of International Banking

There are several phases in the process of the internationalization of banking. Table 6 defines the content of each phase in terms of the internationalization of customer companies, international banking operations, method of internationalization and the customers in the international operation.

In the first phase, the initial step is internationalization of customers. Here, the customers are mainly engaged in import and export dealings with foreign companies, so the most important aspects of international banking are foreign exchange operations connected with foreign trade. Capital transactions with customers are limited to short-term finance (trade finance). In this phase, the main method of internationalization is to enter into correspondence contracts with foreign banks. In the second phase, as direct investment overseas increases, banks raise the level of loans to Japanese affiliated companies compared with foreign exchange business. Medium and long-term capital transactions increase correspondingly. Banks aim to internationalize their business by building up a network of overseas branches and representative offices. In the third phase, the multinationalization of big business develops, and foreign as well as Japanese companies become bank customers. International business extends to non-banking fringe activities, such as merchant banking and leasing, through the strengthening of branches and offices, capital participation, business affiliations and the establishing of non-bank fringe business firms. Banks seek the most profitable ways of fund raising and lending. In the fourth phase, retail banking is conducted while at the same time the content of international operations and the methods of internationalization advance and become more complex. The aspect of the fourth phase which distinguishes it from the third phase is the declining importance of the exploitation of new businesses and methods, and the concentration instead on deepening and strengthening the activities commenced in the third phase. This may be measured in terms of the increasing ratio of international business to all banking business.

Our research shows that in 1977–78, four banks were in the fourth phase, seven

Table 6. Phases of Internationalization of Banking

Phases	The 1st Phase (National Banking)	The 2nd Phase (International Banking)	The 3rd Phase (in a broader sense)	
			The 3rd Phase (International full-service banking)	The 4th Phase (World full-service banking)
Internationalization of Customer Companies	Export-Import	Active Direct Overseas Investment	Multinational Corporation	
International Operations in Banking	Mainly foreign exchange operations connected with foreign trade. Capital transactions are mainly short-term ones.	Overseas loans and investments become important and medium- and longer-run capital transactions become important.	Non banking fringe activities such as merchant-banking, leasing, consulting, and others are conducted.	
			No retail banking	Retail banking is done
Methods of Internationalization	Correspondence contracts with foreign bank	To strengthen own overseas-branches and offices	By strengthening of own branches and offices, capital-participation, affiliation in business, establishing non-bank fringe business firms, the most profitable ways of fund-raising and lending are sought on a global basis	
Customers in International Operations	Mainly domestic customers	Mainly domestic customers	Customers are of various nationalities	

Source: Mitsubishi Bank, "Chosa", September 1974.

in the third and three in the second—in other words, it seems that, on average, banks have reached the third phase of internationalization. This result is fairly consistent with the results of investigations into international banking business, as examined later in this section. Our research also confirmed that the internationalization of Japanese banking advanced slowly prior to the 1970s and rapidly in the first half of the 1970s, before slowing down again in the late seventies.

What is the attraction, from the banks' viewpoint, of international business as compared with domestic business? Our research indicates that the major attractions are (i) diversification of banking business and customers (ii) high profitability (iii) high potential for growth and (iv) the existence of a large, flexible and free international finance market. Points (i) and (iii) are consistent with the short-term objective of enlarging the number of customers, while points (ii) and (iv) are consistent with banks proceeding to internationalize in order to attain high profitability in the free international market as opposed to the sluggish domestic financial market and the existence of various controls on domestic banking business. It should be noted, however, that risks which are absent in domestic business, such as exchange risk, country risk and availability risk, are present in international banking business. In addition, competition is much more severe in the free international market, and there are no control or safeguard institutions.

As mentioned previously, Japanese banks have branches in various countries to carry out their international business. We will now examine the relative importance of banking business at the New York, London and 'others' branches (Table 7).

At the New York branch, trade finance is most important (nine of twelve banks), with loans to Japanese affiliated companies taking second place. Fund raising is a less important activity. At the London branch, fund raising is by far the most important activity (all banks), with trade finance and loans to non-Japanese companies being next important and loans to Japanese affiliated companies being last. It should be noted that four of the twelve banks listed loans to non-Japanese companies (not to Japanese affiliated companies) as the second most important activity at the London branch. This suggests that some Japanese banks have already developed various kinds of international banking operations in the international finance market. At the other branches, the ranking of activities is similar to that of the New York branch, with trading finance being the most important, followed by loans to Japanese affiliated companies, fund raising and loans to non-Japanese companies.

Table 7. The Order of Business in each Branch

New York Branch	(1) Trade Finance (2) Loans to Japanese affiliated companies (3) Fund raising (4) Loans to other companies (5) Fringe business
London Branch	(1) Fund raising (2) Trade Finance, Loans to other companies (4) Loans to Japanese affiliated companies (5) Fringe business
Other Branches	(1) Trade Finance (2) Loans to Japanese affiliated companies (3) Fund raising (4) Loans to other companies (5) Fringe business

Typically, then, the relationship between the international operations at the various branches is that banks raise funds at London branches and make use of the funds for trading finance, loans to Japanese affiliated companies and non-Japanese companies through New York and other branches.

Table 8 shows the geographical distribution of fund raising for overseas operations. Almost all funds for overseas operations are raised by overseas branches, with very few being supplied by head office. Japanese banks raise 51% of funds in Europe, 35% in America, 9% in other regions and 6% in head offices. This is consistent with the description of London branch activities given above.

Table 9 shows the maturity structure of the raised funds. About 80% of all funds are short-term (within 12 months), with 20% being long-term. In the case of upper-rank banks, the latter figure is less than 10%. Table 10 shows the ratio of assets and liabilities in foreign currency to all foreign assets and liabilities. The ratio of short-

Table 8. Sources of Funds for Overseas Operations

	Head Office	Overseas				Grand Total
		North America	Europe	Other	Total	
Total	5.85%	35.02%	50.55%	8.75%	94.15%	100%
Upper Rank Group	8.20	29.60	53.93	8.26	91.80	100
Middle and Lower Group	5.00	37.52	46.31	11.16	95.00	100
Long-term Group	3.00	41.08	50.75	4.83	96.67	100

Table 9. Maturity Structure of Raised Funds and Loans

	Maturity Structure of Raised Funds		Maturity Structure of Loans	
	Short-term	Long-term	Short-term	Long-term
Whole	77.7%	22.3%	47.4%	52.7%
Upper Rank Group	90.0	10.0	51.0	49.0
Middle and Lower Group	73.0	27.0	57.8	42.3
Long-term Group	65.0	35.0	21.7	78.3

Table 10. Percentage of Foreign Assets and Liabilities in Foreign Currency

	Short-term Assets	Long-term Loans*	Short-term Liabillities
1973*	98.4%	100.0%	91.3%
1974	94.4	99.2	96.4
1975	93.2	98.1	95.8
1976	92.3	96.0	93.3
1977	91.3	92.6	94.1
1978	89.6	80.0	78.5

Source: Bank of Japan; Tokei Nenpo, MOF; Kokusai Kinyu Nenpo.

*Long-term loan figures are for the end of the fiscal year, while the other figures are for the end of the calendar year.

term liability in foreign currencies in 1978 was 90%. We can therefore characterize fund raising for overseas operations by stating that almost all funds for overseas activities are raised in foreign currency in Europe and North America, and the funds are mainly short-term.

Turning to the use of funds for international business, we note that the main banking business related to the use of funds is dealing in foreign exchange, trading finance, loans to non-residents and merchant banking. The first is growing steadily with the growth of the Japanese economy and foreign trade, and as the stability and certainly of these dealings is very high, it constitutes the fundamental operation of international banking business. However, its relative importance has been decreasing due to the rapid increase in loans activities. The ratio of the trade bill in foreign assets of all banks was about 80% in September 1970; this fell to about 35% by September 1978. This was due to the growing importance of loans to non-residents.

Table 11 shows the distribution of loans among developed, developing and socialist countries. The developed countries' share is 51%, that of developing countries is 42% and socialist countries 7%. It should be noted that the combined total of loans to developing and socialist countries is approximately half of all loans. According to our research, four out of ten banks want to increase the volume and share of loans to developing countries, and three want to increase the volume without changing the share. It can be said, therefore, that Japanese banks generally have a positive attitude towards extending loans to developing countries, despite the greater risk that may often be associated with such loans. These risks are both individual (the customer may have difficulty in repaying the loan) and country (due to political or economic instability) risks. It is interesting to note that banks which lend about 50% of their loan funds to developing countries do not, according to our research, wish to increase the share of developing countries. This presumably reflects the associated risks.

Table 11 shows that the share of loans to Japanese affiliated companies and to non-Japanese companies is 45% and 55% respectively. This confirms that the internationalization of Japanese banks has already reached the third phase. Whilst almost all Japanese banks place considerable importance on existing relations with Japanese customers when accommodating loans to Japanese affiliated companies overseas, they do not always insist on an existing record of domestic transactions in Japan before granting loans to such affiliates. Therefore, Japanese banks aim to acquire new cus-

Table 11. Destination of Loans

	Advanced Countries	Developing Countries	Socialist Countries	Japanese Affiliated Companies	Other Companies
Total	52.41%	39.58%	6.67%	44.59%	55.41%
Upper Rank Group	60.25	36.00	3.75	44.25	55.75
Middle and Lower Rank Group	48.60	42.40	9.00	47.70	52.30
Long-term Group	48.33	45.00	6.67	37.50	62.50

Figure 4. Comparison of Target and Actual Profits of International Sections

	0–10%	11–15%	16–20%	21–25%	26–30%	31–40%	41–50%	51%–
Upper Rank Group								
(1)		+		*				
(2)		+		*				
(3)								
(4)		+			*			
(5)				*				
Middle and Lower Rank Group								
(6)		+	*					
(7)	+	*						
(8)			+		*			
(9)								
(10)								*+
(11)	+	*						
Long-term Group								
(12)	+	*						
(13)		+	*					
(14)			*					
Total*	0	3	3	3	2	0	0	1
Total+	(3)	(5)	(1)	(0)	(0)	(0)	(0)	(1)

* Target for the proportion of profits from international business to all profits.
\+ Actual proportion of profits from international business to all profits.

tomers through internationalization as well as maintain existing ones.

The percentages of short-term and long-term loans are 47% and 53%. Table 9 indicates that Japanese banks carry out "maturity transformations", that is, short-term borrowing and long-term lending. According to our research, Japanese banks accept this transaction as one of the functions of banks but remain rather wary of it.

It should be noted that this maturity structure relates only to loans, not all assets. Complete data was not available, but we were able to ascertain the maturity structure of all assets and liabilities of the Japanese branches in London. According to the *Quarterly Bulletin* (Bank of England), long-term assets and long-term liabilities as a percentage of all assets and liabilities in 1978 was about 15% and 27% respectively. We may therefore conclude that Japanese banks carry out a moderate number of maturity transformations.

We were unable to discover the proportion of loans to non-residents in foreign currency to total loans to non-residents. However, as Table 10 indicates, 80% of all long-term loans to non-residents are in foreign currency, and about 90% of all short-term assets are in foreign currency. It is therefore reasonable to assume that the proportion of both short and long-term loans to non-residents in foreign currency to all loans to non-residents is over 80%.

All banks are interested not only in trade finance and loans to non-residents but also in other related business, such as merchant banking, securities business, leasing, credit cards and so on. Among these, securities business and merchant banking are

particularly important. Almost all banks express a strong interest in securities business, due not only to its inherent attractiveness, but also to a disadvantage (namely, Japanese financial law which prevents Japanese banks from carrying out securities business other than by owing affiliated local banks) which Japanese banks have in comparison with other banks in internationalizing their business. In addition, as complicated business such as syndicate loans and project finance becomes more important, so too do the knowledge and know-how of merchant banking. Japanese banks want not only to provide funds for syndicate loans, but also to initiate, arrange and manage loans projects.

We now turn to some issues related to international banking business. As mentioned previously, the Euro-dollar market is very important to international banking, especially for fund raising. It is sometimes asserted that the market should be controlled by an authorized body, whose function would be to ensure stability. This reflects the fact that the Euro-dollar market has no lender who can be turned to in the last resort, and at times the market faces the risk of the collapse of market confidence. Almost all banks, however, are against this idea, believing that the main advantage of the Euro-dollar market is its freedom from control by monetary authorities, which promotes the rapid development of the market. Some banks, however, think that some international institution, or the monetary authorities of each country, should regulate and control banks so that an orderly market can be maintained if credit crises occur.

The adjustable peg system was changed to the managed float system in 1972. Did the change affect the internationalization of banking? Our research indicates that all Japanese banks either think the managed float system is preferable, or feel that the systems do not differ greatly. Many banks believe that the managed float system helps avoid drastic changes in exchange rates and helps establish stable exchange rates in accordance with market conditions. Two thirds of banks believe that, under some circumstances, it is not necessary to maintain a 'square' exchange position, while one third believe it is essential that it be maintained. It seems, therefore, that there is some flexibility in banks' attitude toward the exchange position.

To summarise the typical features of Japanese international banking which we have discussed so far,

1. Almost all funds for overseas operations are in foreign currencies, and are raised in Europe, especially London, and North America. Funds are mostly short-term.
2. Trading finance used to be overwhelmingly important in the accommodation of credit, but, as Japanese companies and banks internationalize, loans to non-residents are becoming increasingly important.
3. Japanese banks make about 50% of their loans to developed countries, 40% to developing countries and 10% to socialist countries. Although some banks have reservations due to the associated risks, on the whole, banks have a positive attitude towards developing countries.
4. Loans to non-Japanese companies slightly outweigh those to Japanese affiliated

companies. Although, in principle, Japanese banks consider domestic transactions more important, they also want to acquire new customers through internationalization.

5. The ratio of long-term loans in the maturity structure is about 50%. Japanese banks engage in maturity transformations, that is, short-term borrowing and long-term lending, and almost all the foreign assets of banks are in foreign currency. Combining this with the factors listed in 1, we may say that Japanese banks conduct their international business by using foreign currencies.
6. Japanese banks are interested in fringe business, such as securities business and merchant banking, as well as in banking itself.
7. Japanese banks establish overseas bases in order to conduct various international business. Europe, especially the London branch, is the centre of fund-raising business, with New York and other branches conducting mainly trading finance and loans operations.
8. From the features listed above, we can estimate that in the late 1970s, Japanese banking had reached the third phase of internationalization.
9. A description of the activities of a typical Japanese international operation would be that short-term funds in foreign currency are raised through the London branches, while credit in the form of short-term trading finance and long-term loans in foreign currency to non-Japanese as well as Japanese affiliate companies are accommodated through the other branches.

VI The Performance of Internationalization

In this section, we examine the performance of internationalization in Japanese banking. Figure 4 shows the actual proportion of total bank profits which comes from international business. Five banks give a figure of 11–15%, three banks 0–10%, one bank 16–20% and one bank above 51%. On average, the proportion seems to be 10–15%. This figure is about equal to the proportion of staff in the international section to total bank staff. Comparing this actual figure with the feasible targets for profits shown in Figure 4, the feasible target exceeds the current figure by 5–10%. The difference between the actual and feasible value of upper rank banks is higher than that for middle and lower rank banks (10% as opposed to 5%). This may suggest that the upper rank banks are more willing to internationalize.

As discussed in the previous section, Japanese banks are currently in the third phase of internationalization. We will now compare this with other advanced countries' foreign banks. The proportion of profits from the international section to all profits of ten major American banks was 50.9% in 1979 and 45.7% in 1978. The figures for City-corp were 82.2% and 71.8% respectively. The figures for 1977 for representative British banks (Barclays, National Westminster and Lloyds) were 38%, 30% and 22% respectively. Those for Deutsche, Dresdner and Commerz in West Germany were 35%, 30% and 33% respectively in 1977. It will be noted that, with

Table 12. Foreign Banks in Major Markets

1. Foreign Banks in Japan

	Banks	Branches	Representative Offices
U.S.A.	22	32	13
U.K.	7	9	10
France	6	7	8
West Germany	5	5	5
Singapore	4	4	0
Korea	3	4	7
Switzerland	3	3	4
Others	11	17	42
Total	61	81	89

2. Foreign Banks in West Germany

	Banks	Branches	Representative Offices	Local Banks
U.S.A.	13	27	14	5
Japan	10	12	8	2
France	4	16	5	0
U.K.	4	11	7	0
Others	21	27	90	2
Total	52	93	124	9

3. Foreign Banks in New York

	Banks	Branches	Agencies	Representative Offices	Local Banks
Japan	24	16	6	2	4
Italy	14	6	0	8	1
West Germany	11	9	0	2	0
France	11	6	0	4	4
Spain	11	0	8	3	0
UK	9	6	2	1	4
Canada	8	0	6	0	5
Others	73	16	30	9	8
Total	161	59	52	29	26

4. Foreign Banks in London

	Banks	Branches	Representative Offices	Local Banks
U.S.A.	65	41	22	14
Japan	23	22	1	1
Italy	18	4	14	0
France	15	6	6	3
Spain	14	6	6	2
Switzerland	11	9	1	1
Australia	11	9	2	0
West Germany	10	8	2	0
Others	101	62	38	3
Total	268	167	92	24

Source: Kinku Mondai Kenkyu Kai, op. cit.

one exception, the figure for Japanese banks is considerably lower than that for these banks.

Our research shows that almost all Japanese banks are aware of their relatively less developed internationalization. The main ways in which Japanese banks regard themselves as less developed are the network of overseas bases, the ability to collect information and accumulate 'know-how', and the ability to raise funds, to diversify international business such as securities business, to localise banking business and to employ sufficient competent staff.

However, too much emphasis should not be given to the less developed nature of internationalization of Japanese banks because, if the degree of development is measured in terms of the number of branches or the volume of loans, rather than the ratio of international to total profits, Japanese banks are not much less advanced than other banks, with the exception of the major American banks. Table 12 shows the number of overseas bases that banks from various countries have in New York, London, West Germany and Japan. As a whole, Japanese banks are second only to American banks in number of overseas branches. Table 13 lists the fifty banks which fall into the category of 'lead managers', in terms of international syndicate loans and the issue of bonds in the international finance market. Column I of the table shows the syndicate loans, and Column II shows syndicate loans together with the issue of bonds. In Column I, it can be seen that Japanese banks as a whole rank higher than British and West German banks, and individual Japanese banks are not far inferior to European and Canadian banks, though they are considerably below American ones. In Column II, on the other hand, West German banks rank higher, and Japan

Table 13. Achievements of Leading Managers of Banks in Terms of Country with Syndicate Loans and Issue of Securities in 1978

	Order 1–10		Order 11–25		Order 26–50		Order 1–50		Share of Achievements of Leadiig Managers	
	I[a]	II[b]	I[a]	II[b]	I[a]	II[b]	I[a]	II[b]	I[a]	II[b]
U.S.A.	6	5	1	3	4	4	11	12	42.7	38.6
Canada	1	1	4	3	2	3	7	7	14.9	12.4
Japan	1	0	3	4(3)[c]	3	4(3)[c]	7	8(6)	10.9	11.2(9.1)[c]
West Germany	1	2	2	1	2	1	5	4	8.3	12.6
U.K.	1	1	1	1	3	3	5	5	8.7	7.9
France					4	4	4	4	3.5	3.7
Netherlands			1	1	1	1	2	2	2.1	2.5
Switzerland			1	1	1	1	1	2	2.1	3.4
Belgium					1	1	1	1	0.5	0.7
Consosium		1	2	1	5	3	7	5	6.2	6.9
Total	10	10	15	15	25	25	50	50	100	100

a Achievements of leading managers with syndicate loans

b Achievements of leading managers with syndicate loans and issue of securities

c The figure in the bracket means figure of banks except securities companies

Source: Kinyu Mondai Kenkyu Kai, op. cit.

follows the USA, West Germany and Canada, with a figure of 10.9%. This figure takes account of the activities of Japanese securities companies, however. If these are excluded, the figure for the six Japanese banks falls to 9.1%, while West Germany's 12.4% is achieved by only four banks. This relative rise of West German and fall of Japanese banks compared with that of foreign banks may be described as follows.

1. In terms of the degree of internationalization measured by the proportion of total profits obtained from international dealings, Japanese banks are considerably less developed than major American banks and other advanced countries' banks.
2. Japanese banks are less developed than major American banks, in general and individually, in all the areas described above—number of branches, volume of loans, and proportion of total profits obtained from international profits.
3. In comparison with West German and other advanced banks, Japanese banks, both individually and as a whole, are not so inferior in terms of loans activities and number of branches. However, because Japanese banks cannot conduct securities business, they are not competing with West German banks in this area. This may be a reflection of the less developed degree of internationalization in Japanese banking.

VII Difficulties and Limitations in the Internationalization of Japanese Banking

We have examined the internationalization of Japanese banking, especially with regard to city banks, long-term credit banks and a specialized foreign exchange bank, in terms of aims and motives, the establishing of overseas bases, overseas banking business and the performance of internationalization. We have made it clear that the level of internationalization of Japanese banking is lower than that of American and European banks. In this section, we will examine the difficulties and limitations in the process of internationalization, and discuss some of the problems in promoting it further.

There are two types of limitations in the process of internationalization of banking—internal and external. Internal limitations are basically management problems while external limitations arise from general economic conditions and various regulations imposed on banks. According to our research, the main internal limitations as perceived by the banks are, in order of priority, the shortage of staff competent to carry out internationalization, the inability to collect adequate information and know-how and the lack of an adequate system of operations for internationalized banking business.

The shortage of competent staff causes bankers greatest concern. As mentioned earlier, as internationalization progresses, the content of the international banking operation becomes more complicated, moving from mainly foreign exchange and trade finance business to loans to non-residents and to syndicated loans business. For example, in any project involving the development of resources, finance is extremely

important, and banks must play an important role. This extends from the funding of the project through to playing a role in its formation, promotion and programing, as well as supervising its progress. It is thus necessary for banks to have staff competent in the fields of economics, finance, tax, law, information collection, research and investigation, and business administration. Many banks feel that acquiring staff with expertise in these areas is a matter of urgency.

As is generally known, a system of 'life-time' employment prevails in Japan. It is thus quite difficult for banks to acquire competent staff from 'outside', with the exception of some senior staff from monetary authorities. Consequently, it is unavoidable for most banks to train their own staff by sponsoring their study at overseas universities, training them in overseas banks or providing in-house training. It takes considerable time, therefore, for a bank to acquire staff with a high level of expertise in international banking. Although this may put Japanese banks at a disadvantage in terms of promoting rapid internationalization, it is possibly to their long-term advantage because the trained staff are likely to remain with the bank and contribute to its international activities over many years.

Information and know-how on international business are extremely important in terms of the development of international banking operations and in assessing and avoiding associated risks. The perceived lack of such knowledge within their operations is causing banks concern. As mentioned earlier, Japanese banks make use of foreign currency in their international operations. This gives rise to, *inter alia*, exchange risk and availability risk. In addition, with the increase of non-Japanese firms (including foreign governments) as customers, the rising loans to developing countries and the increase of long-term and large-scale loans to resource dvelopers, it has become increasingly necessary for banks to collect information and analyse both the individual risk associated with the business and the risk of the country concerned. It is therefore necessary for banks to have a current, comprehensive collection of information on the politics and economy of each country as well as on the individual customers. It may be necessary to organize small research groups to study the country risk objectively, separately from the private banks. In any event, prediction of the future is a most difficult problem, and is seen as one of the main current limitations on the future development of internationalization.

The third internal limitation perceived by banks was the lack of an adequate system of operation for internationalized banking business. Japanese banks intend to overcome this problem through localization of the banking operation—that is, ensuring that the operation conforms with the culture, national character, economic practices and law of each country, and providing clear-cut definitions and the assignment of broad powers to the local staff in charge.

There are also three external limitations on the internationalization of banking, according to our research—namely, general world economic conditions which are reflected in the economic growth rate, price level, exchange rate, interest rate and so on of individual countries and the international market; the Japanese economic

situation, which is reflected in the position of the Japanese economy in the world economy; and the regulations and administrative guidelines from Japanese and overseas authorities on international banking operations.

In the 1970s when the internationalization of Japanese banking was increasing rapidly, the world economic situation was not as good as it had been in the 1960s. It was characterized by turbulence of the international monetary system, the introduction of the floating exchange rate system, the oil crisis and sky-rocketing oil prices, unrest in the financial system due to the bankruptcy of the Herstatt Bank, high interest rates and the co-existence of high inflation rates and increased unemployment. The general economic situation had effects on both developed and developing countries, especially the latter, with countries like North Korea, Turkey and Peru having difficulties with debt repayment. The prospect for the 1980s is not particularly optimistic, which may be disadvantageous for the internationalization of finance activities, with economic depression making it more difficult to measure country risk.

Japan was no exception in experiencing the difficulties of the world economy. The oil crisis at the end of 1973 and the failure of economic management caused the Japanese economy to get into difficulties, negative economic growth and skyrocketing prices. However, the Japanese economy fared reasonably well in the 1970s, compared with other developed countries, with her ranking based on GNP, trade and capital exports rising. As mentioned earlier, the internationalization of Japanese banking was promoted by the internationalization of the Japanese economy. However, it is not certain whether this pattern can continue in the 1980s. The growth of the Japanese economy in the midst of the stagnation of the world economy, which formed the background for the internationalization of Japanese banking, depended on overseas rather than domestic demand. For this reason, it is said that Japan's pattern of economic growth and the so-called 'closed market' have produced considerable friction between Japan and other developed countries. If the Japanese economy must in future depend much more on the domestic market and less on overseas markets, the incentive for internationalization of Japanese banking from the economy will weaken. However, it may be that the problem of friction over trading issues will be settled through the increase of overseas investment, and that the incentive will continue to work. Even so, it will be necessary for Japanese banks to find ways of diversifying their business with non-Japanese firms in order to develop the internationalization.

Besides the economic conditions surrounding Japanese banks, financial conditions, especially the internationalization of the yen, are very important in considering the internationalization of Japanese banking. As mentioned previously, one of the features of the internationalization is that Japanese banks have promoted it through making use of foreign currency, without any significant internationalization of the yen. This pattern of internationalization places Japan at a disadvantage compared with American banks, in that the latter can use its domestic currency as international currency, which is not possible for Japan. According to our research, almost all bankers think the internationalization of the yen, and thus the internationalization of the

money and capital market, is extremely important as it will enable them to enjoy the same advantages (easiness, stability and efficiency in the use and raising of funds) as the American banks. It should be noted, however, that some banks (for example the specialized foreign exchange bank) have attained a similar level of internationalization as American banks without the internationalization of the yen, demonstrating that it cannot be regarded as a pre-requisite for the internationalization of Japanese banking. In addition, it would be simplistic to discuss the internationalization of the yen solely in terms of the internationalization of Japanese banking, as the former would have widespread effects on the balance of payments, monetary conditions and the financial market, and the management of monetary policy in Japan. Viewed in this light, it is possible to understand the argument of some banks that the internationalization of the yen is a different problem from the internationalization of banking. However, in general terms, it seems that, for the reasons mentioned above, the former does promote the latter.

The third external limitation on internationalization is the various regulations and guidelines imposed on Japanese banks. Almost all banks think that regulations on foreign exchange operations, the establishing of overseas bases and other international banking operations constitute a significant limitation. In particular, many banks are greatly concerned at the regulation of the establishing of overseas bases, because this is the way they have pursued their internationalization.

According to our research, almost all banks (eleven banks) agree that the present licensing policy of the Japanese monetary authorities regarding the establishing of new overseas branches (the so-called 'one new branch every three years' license) should be liberalized. One bank regards the present policy as good, while another thinks it should be strengthened because of the undue competition between Japanese banks, which was reflected in the Japan rate in the Euro-dollar market in 1974, and the low-interest lending rates in the American market in the late 70s. It is natural that some banks are concerned about the market disorder brought about by such behaviour, and this illustrates one of the features of Japanese banks' behaviour—*yoko-narabi ishiki*, worrying about comparison with other banks. However, even if such undue competition does exist, it is by no means certain that the cost of competition exceeds the benefit, or that strengthening controls on establishing branches would solve the problem. One of the important factors for the development of the international finance market is that it is a 'free' market, regulated not by controls, but by rational and prudent management on the part of the banks themselves.

The second aspect of regulation of internationalization is exchange control. As mentioned previously, control of foreign exchange was liberalized during the 60s and 70s. However, this liberalization was not based on the amendment of the foreign exchange law, whose spirit is 'the prohibition of dealing in foreign exchange in principle', but on the liberalization of the application of the law by the monetary authorities. It was thus only a partial liberalization. From the banks' viewpoint, internationalization based on their own long-term aims has been hindered by regulations, on

for example, the exchange position, long-term non-resident loans and the taking in of private, untied loans. Many banks are particularly concerned about the control of the exchange position (the difference between foreign assets and foreign debts). The aim of this control is to check speculation in foreign exchange, and to regulate the flow of funds in yen and foreign currencies. Initially, the authorities demanded that the exchange position be in equilibrium; then, with the liberalization of foreign exchange, a limited overselling was permitted. These regulations prevented Japanese banks from improving their internationalization. In December 1979, however, the foreign exchange law was revised, leading to 'free foreign exchange dealing in principle.' Although regulation of the exchange position remains in the amended law, it permits banks to take in united loans and liberalizes long-term loans to non-residents. This therefore makes it possible to further promote international banking operations through its effects on the internationalization of the yen and of the money and capital markets[8].

A further guideline relates to securities. The present laws prohibit bankers from issuing or accepting securities, and this principle is also applied to overseas banking[9]. Japanese banks cannot do business except through local finance companies, even if the monetary authorities in the foreign country ate willing to permit it. Due to this guideline, Japanese banks are at a disadvantage compared with foreign banks, which can issue both debentures and syndicate loans, and usually offer customers a choice. The reason for this guideline is the separation of securities dealing and banking; the application of the domestic finance system to the overseas market results in a conflict with standard international banking procedures. The fact that maintenance of the domestic financial order has taken precedence over the development of international banking is a source of concern to bankers.

VIII Some Conclusions

The main points of this paper can be summarized as follows.

1. The internationalization of Japanese banking has developed primarily due to the development and internationalization of the Japanese economy itself, although there are some aspects in which the banks have taken the initiative towards internationalization.
2. A feature of the internationalization of Japanese banking is that it has not been accompanied by internationalization of the yen or the money and capital market.
3. The development of internationalization of Japanese banks has been based on the

8) The features of the New Foreign Exchange Law are explained clearly in the following paper; Hiroo Fukui, "Gaikoku Kawase oyobi Gaikoku Boeki Kanriho no Kaisei ni Tsuite", *Finance*, Vol. 15, No. 11, February 1980. Kaname Seki, "Atarashii Kawase Kanri no Arikata", *Finance*, Vol. 16, No. 11, February 1981.

9) However, long-term credit banks and specialised foreign exchange banks are permitted to issue bank bonds.

establishing of overseas branches, representative offices and local banks. Generally, they raise funds in foreign currencies through the international market, especially London branches, and lend funds to Japanese and non-Japanese firms overseas through other branches, especially in New York.

4. The present phase of the internationalization of Japanese banking is the third phase, in which banks enlarge the number of their customers to include both Japanese and non-Japanese firms, and to diversify their business to include merchant banking etc. By strengthening their branches and representative offices, they seek to globalize their profits by improving and extending capital participation, business affiliations, fund-raising and so on. The ratio of international business to total banking business for Japanese banks is considerably lower than that for major American and European banks, although the size of the international business carried out by Japanese and major European banks is similar.
5. There have been and will continue to be some limitations and problems facing the development of the internationalization of Japanese banking. Some of these are listed below. Firstly, it will be necessary to train competent staff and establish an operational system to cope with increasingly diverse and complex international business. Secondly, the economic circumstances which fostered the development of the internationalization of Japanese banking will change, providing a bleaker environment with the prospect of problems such as friction over trade issues and increasing protectionism. Thirdly, despite the liberalising of previous controls on international banking which should stimulate the internationalization of the yen, the Japanese money and capital market and, consequently, Japanese banking, problems may arise as banks have to practise self-regulation. Fourthly, despite liberalization, there are still some areas (such as the securities business) in which the domestic finance system takes precedence over standard international banking practice.

In summary, Japanese banks will face intense competition in international banking business in an economic environment which is at once more harsh and more liberalized. In order to survive in these conditions, Japanese banks will need to be self-reliant, which depends on their ability to acquire competent staff and establish an effective system of international operations.

A SYNTHESIS OF SIMULTANEOUS EQUATIONS ESTIMATORS

Hiroshi SADAMICHI

The derived-form least squares method is defined as the classical least squares method applied to such a transform of the model-equation in question that the classical least squares assumptions may hold asymptotically. Then it will be shown that most of the available estimation methods can be synthesized by this method through a proper choice of transformation matrices. The extended instrumental-variable method and the generalized instrumental-variable method will be defined and examined.

I Introduction

Quite a number of estimation methods have so far been proposed for estimation of the simultaneous-equation model and several authors provided some very interesting technique of grouping different estimators into a family of estimators. Theil (1958) proposed the k-class estimators of which the direct least squares, the two stage least squares (2SLS) and the limited information maximum likelihood (LIML) estimators are members. Chow (1964) presented the constrained minimum generalized residual variance estimators of which the 2SLS, the LIML, the k-class, the three stage least squares (3SLS) and the full information maximum likelihood (FIML) estimators are members. In this paper we will define the derived-form least squares (DFLS) method as the classical least squares method applied to such a transform of the model-equation that the classical least squares assumptions may hold asymptotically, and show that not only the indirect, the two-stage, and the three-stage least squares methods but also most of the available estimation methods can be synthesized by this derived-form classical least squares principle through a proper choice of transformation matrices. An identity among various estimators can be established by the same transformation matrix.

II Model and Assumptions

The model (A) is linear, with G equations, and contains as variables $y_1 \ldots y_G$, $z_1 \ldots z_k$, $u_1 \ldots u_G$, each of which is a column vector of T components.

$$\text{(A)} \qquad \boldsymbol{YB} = \boldsymbol{Z\Gamma} + \boldsymbol{U}$$

$$\boldsymbol{Y} = (y_{tg}), \quad \boldsymbol{Z} = (z_{tk}), \quad B = (\beta_{hg}), \quad \Gamma = (\gamma_{kg}), \quad \boldsymbol{U} = (u_{tg})$$

The y's are the jointly dependent variables, the z's are predetermined and linearly

independent, and the u's are the error terms with zero mean. Each component of any variable is defined as the observed value or its equivalent divided[1] by the square root of T. The β's and γ's are constant parameters. Some of them are specified a priori to be zero and B is nonsingular. All model-equations are assumed to be identified.

The i-th model-equation (a) contains H jointly dependent variables and J predetermined varaibles, and may be written as an explicit function of the explained variable in terms of N explanatory variables, where $N = H-1+J$.

(a) $$y_i = X_i\,\alpha_i + u_i$$
$$X_i = (Y_i\ Z_i), \qquad \alpha_i = \begin{pmatrix} \beta_i \\ \gamma_i \end{pmatrix}$$
$$Y_i = (y_{i2} \ldots y_{iH}), \qquad Z_i = (z_{i1} \ldots z_{iJ})$$
$$\beta_i' = (-\beta_{i2} \ldots -\beta_{iH}), \qquad \gamma_i' = (\gamma_{i1} \ldots \gamma_{iJ})$$

Or simply

$$y = X\alpha + u, \quad X = (Y, Z), \quad \alpha = \begin{pmatrix} \beta \\ \gamma \end{pmatrix}$$

Rewriting all model-equations in terms of the explained and the explanatory variables by using the a priori identifying restrictions, we can obtain another expression of the moded, which we shall call the system (A').

(A') $$y^* = X^*\,\alpha^* + u^*$$
$$y^* = \begin{pmatrix} y_1 \\ \vdots \\ y_G \end{pmatrix}, \quad X^* = \begin{pmatrix} X_1 & & 0 \\ & \ddots & \\ 0 & & X_G \end{pmatrix}, \quad \alpha^* = \begin{pmatrix} \alpha_1 \\ \vdots \\ \alpha_G \end{pmatrix}$$

The reduced-form is given by

(B) $$\boldsymbol{Y} = \boldsymbol{Z}\pi + \boldsymbol{V}$$
$$\pi = \Gamma B^{-1}, \qquad \boldsymbol{V} = \boldsymbol{U}B^{-1} = (v+g)$$

The i-th reduced-form equation may be written as

(b) $$y_i = \boldsymbol{Z}\pi_i + v_i$$

Or simply

$$y = \boldsymbol{Z}\pi + v$$

The error terms of the model are contemporaneously dependent and have a positive-definite covariance matrix which is assumed to be the same through time.

(C) $$E\,\boldsymbol{u}_t\,\boldsymbol{u}_t' = T^{-1}\cdot\sum$$
$$\boldsymbol{u}_t' = (u_{t1} \ldots u_{tg}), \qquad \sum = (\sigma_{ij})$$

The covariance matrix of the error terms of the reduced form is given by

$$E\,\boldsymbol{v}_t\,\boldsymbol{v}_t' = T^{-1}B^{-1}\sum B'^{-1} = T^{-1}\Lambda$$
$$\boldsymbol{v}_t' = (v_{t1} \ldots v_{tg}), \qquad \Lambda = B^{-1}\sum B'^{-1} = (\lambda_{ij})$$

Each error term is wholly independent of another except contemporaneously.

(D) $$E\,u_i\,u_j' = T^{-1}\cdot\sigma_{ij}\,I_T, \qquad E\,v_i\,v_j' = T^{-1}\cdot\lambda_{ij}\,I_T$$

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1) The same treatment of variables is done by Basmann (1957).

where I_T is the identity matrix of order T.
In some cases we assume that the error terms are temporally dependent in the same way.

(d) $E\,u_i\,u_i' = T^{-1}\cdot\sigma_{ii}\Omega, \quad E\,v_i\,v_i' = T^{-1}\cdot\lambda_{ii}\Omega, \quad \Omega = (\omega_{st})$

The z's are predetermined.

(E) $E\,z_{sk}\,u_{tg} = 0 \qquad s \leqq t;\ k, g$

In some cases we assume that all z's are exogenous.

(e) $E\,z_{sk}\,u_{tg} = 0 \qquad s, t, k, g$

The moment matrix of all predetermined variables is assumed to be well-behaved in the limit[2].

(F) $\lim E\,\boldsymbol{Z}'\boldsymbol{Z} = \operatorname{plim} \boldsymbol{Z}'\boldsymbol{Z} = M, \quad |M| \neq 0$

Both limits exist and converge to the same constant nonsingular matrix M which is independent of T.

III Derived-form Least Squares Method

Let us consider a model-equation.

$$y = X\alpha + u$$

where X is a $(T\times N)$ matrix of rank N. If X is exogenous and u is serially independent and homoskedastic with zero mean, the classical least squares (CLS) estimators are the best linear unbiased estimators. However the model-equation generally does not satisfy the CLS assumptions. The derived-form least squares (DFLS) method may be defined as the CLS method applied to such a transform of the model-equation that the CLS assumptions may hold asymptotically. Now we find such a transformation matrix, W^* and operate with it on the model-equation to obtain the derived form.

$$W^{*\prime}y = W^{*\prime}X\alpha + W^{*\prime}u$$

Or

$$y^* = X^*\alpha + u^*$$

Applying the CLS method to this derived form we can obtain the DFLS estimators of α.

$$\alpha^* = (X^{*\prime}X^*)^{-1}X^{*\prime}y^*$$

There could be various transformation matrices to be found in correspondence with the assumptions about X, u, $\sum$ and Ω. The properties of any estimator depend on the matrix chosen. A transformation matrix W^* is generally constructed as the product of three matrices described below.

$$W^* = W^+\,W\,W^{++}$$

W^+ is either the identity or a diagonalizing matrix of the covariance matrix of the

2) See Christ (1966) pp. 354–355.

error term. In the latter case we can operate with W^+ on the model equation so that the covariance matrix may be diagonalized (asymptotically).

$$W^{+\prime}y = W^{+\prime}X\alpha + W^{+\prime}u$$

Or

$$y^+ = X^+\alpha + u^+, \qquad E\,u^+ u^{+\prime} \cong T^{-1}\cdot\sigma^2 I$$

W is such a $(T\times L)$ matrix of rank L not less than the rank of X that the transformed explanatory variables may be uncorrelated with the transformed error term in the limit.

$$W'y^+ = W'X^+\alpha + W'u^+$$

Or

$$y^{++} = X^{++}\alpha + u^{++}$$

Generally the resulting errors are serially dependent and their covariance matrix may be expressed as

$$E\,u^{++}\,u^{++\prime} \cong T^{-1}.\sigma^2\Omega^{++}$$

W^{++} is then defined as such a nonsingular matrix that

$$W^{++} = \Omega^{++\ -1/2},\ E\,(W^{++\prime}u^{++})\,(W^{++\prime}u^{++})' \cong T^{-1}\cdot\sigma^2 I$$

It is required that any transformation matrix thus constructed should satisfy the following conditions:

(1) it be of full rank at least equal to the rank of X,

(2) it be uncorrelated with the error term in the limit such that

$$\lim E\,W^{*\prime}u = 0 \quad \text{and} \quad \lim T\,E\,(W^{*\prime}u)\,(W^{*\prime}u)' = \sigma^2 I$$

(3) the transformed explanatory variables be uncorrelated with the transformed errors in the limit:

Table 1. Comparison between Classical Least Squares and Derived Form Least Squares

Methods	Classical Least Squares	Derived Form Least Squares
Model Equation	$y = X\alpha+u$	$y = X\alpha+u$
Transformation Matrix	I	W^*
Derived Form	$y = X\alpha+u$	$W^{*\prime}\,y = W^{*\prime}\,X\alpha+W^{*\prime}\,u$ or in new notation $y^* = X^*\alpha+u^*$
Assumptions	$Eu = 0$ $TEuu' = 6^2\mathrm{I}$ $EX'u = 0$ $plim\ X'u = 0$ X: well-behaved in the limit	$\lim Eu^* = 0$ $\lim TEu^*u^{*\prime} = 6^2\mathrm{I}$ $\lim EX^{*\prime}u^* = 0$ $\mathrm{plim}\ X^{*\prime}u^* = 0$ X^*: well-behaved in the limit
Estimators	$\hat{\alpha} = (X'X)^{-1}X'y$	$\alpha^* = (X^{*\prime}X^*)^{-1}X^{*\prime}y^*$
Properties	best unbiased consistent asymptotically efficient	asymptotically unbiased consistent asymptotically efficient in certain cases

Table 2. A Family of Derived from Least Squares

	Estimation Method	Reduced Form or Model	Number of Equations	Temoral Covariance	DFLS Transfolmation	Remark
1	CLS	RF	ONE	I	I	
2	GLS	RF	ONE	Ω	$\Omega^{-1/2}$	
3	Hannan	RF	ONE	Ω	$FW\Delta^{-1/2}$	
4	EIV	M	—	Ω	$W(W'\Omega W)^{-1/2}$	
5	IV	M	ONE	I	$W(W'W)^{-1/2}$	
6	k-class	M	ONE	I	$\hat{X}_{(k)}(\hat{X}_{(k)}'\hat{X}_{(k)})^{-1/2}$	$\hat{X}_{(k)} = (Y - {}_k\hat{V}, Z)$
7	Sargan IV	M	ONE	I	$W(W'W)^{-1/2}$	
8	2SLS	M	ONE	I	$Z(Z'Z)^{-1/2}$	
9	EILS	M	ONE	I	$Z(Z'Z)^{-1/2}$	
10	ILS	M	ONE	I	$Z(Z'Z)^{-1/2}$	
11	3SLS	M	ALL	I	$Z^\sharp(Z^{\sharp\prime}\hat{\Sigma}^\sharp Z^\sharp)^{-1/2}$	$\hat{\Sigma}^\sharp = \hat{\Sigma} \otimes I$
12	GIV	M	—	Ω	$\Omega^{-1}W(W'\Omega^{-1}W)^{-1/2}$	
13	G2SLS	M	ONE	Ω	$\Omega^{-1}Z(Z'\Omega^{-1}Z)^{-1/2}$	
14	Durbin 3SLS	M	ALL	I	$\hat{\Sigma}^{-1\sharp}\hat{X}^\sharp(\hat{X}^{\sharp\prime}\hat{\Sigma}^{-\sharp}\hat{X}^\sharp)^{-1/2}$	
15	FIML	M	ALL	I	$\bar{\Sigma}^{-1\sharp}\bar{X}^\sharp(\bar{X}^{\sharp\prime}\bar{\Sigma}^{-1\sharp}\bar{X}^\sharp)^{-1/2}$	$\bar{\Sigma}^\sharp = \bar{\Sigma} \otimes I$

$$\lim E(W^{*\prime}X)'(W^{*\prime}u) = \text{plim}\,(W^{*\prime}X)'(W^{*\prime}u) = 0$$

(4) the moment matrix of the transformed explanatory variables be well behaved in the limit:

$$\lim E(W^{*\prime}X)'(W^{*\prime}X) = \text{plim}\,(W^{*\prime}X)'(W^{*\prime}X) = M^*, \quad |M^*| \neq 0$$

How the DFLS method is related to the CLS method is summarized in Table I. Table II shows that most of the available estimators are members of the DFLS estimators through different choices of W^*.

IV Generalized Least Squares Method

We shall consider the reduced-form equation under the assumptions d, e and F.

$$y = Z\pi + v, \qquad E\,v\,v' = T^{-1}\cdot\lambda^2\,\Omega$$

If Ω is known or its consistent estimate is available, the DFLS estimators with use of $W^* = \Omega^{-1/2}$ are Aitken estimators. If Ω is not known but v is stationary, Fourier transformation can change the time-series into the frequency-band model and the resulting error term will have the diagonal covariance matrix in the limit.
Operating with such a matrix that

$$F = [(2\pi T)^{-1/2}\, e^{it\theta_k}], \quad t = 1 \ldots T;\ k = 0 \ldots (T-1)$$
$$\theta_k = 2\pi k/T$$

we obtain the complex-valued stochastic equation.

$$F'y = F'Z\pi + F'v$$

The covariance matrix of $F'v$ is asymptotically[3]

$$E(F'v)\overline{(F'v)}' \cong T^{-1}\cdot\Delta$$

$$\Delta = \begin{pmatrix} fvv(\theta_0) & & 0 \\ & \ddots & \\ 0 & & fvv(\theta_{T-1}) \end{pmatrix}$$

where—denotes the conjugate and $fvv(\theta)$ is the spectral density of v.

Next, let us examine the moment matrix of the explanatory variables. Since periodograms and cross-periodograms have some well known drawbacks—serious leakage and inconsistency, we shall form such a weighting matrix W that the moment matrix of $W'F'Z$ may be well behaved and the covariance matrix of $W'F'v$ equal to $T^{-1}\cdot\Delta$ in the limit[4]. Choosing as a transformation matrix

$$W^* = FW\Delta^{-1/2}$$

the DFLS estimators which minimize $\overline{(W^{*\prime}v)}'(W^{*\prime}v)$ will be equivalent to Hannan estimators[5] and be given as

$$\pi = [\overline{(W'F'Z)}'\Delta^{-1}(W'F'Z)]^{-1}\,\overline{(W'F'Z)}'\Delta^{-1}(W'F'y)$$

$$= [\sum_k \hat{f}z_iz_j(\theta_k)\cdot fvv^{-1}(\theta_k)]^{-1}[\sum_k \hat{f}z_iy(\theta_k)\cdot fvv^{-1}(\theta_k)]$$

where $\hat{f}z_iz_j(\theta)$ are estimates of the cross-spectral densities of z_i and z_j.

V Extended Instrumental-Variable Method

Consider the model-equation under the assumptions d, E and F.

$$y = X\alpha + u; \quad Euu' = T^{-1}\cdot\sigma^2\Omega$$

We choose a $(T\times L)$ instrumental-variable matrix[6] of rank L denoted by W, i.e., which satisfies (i) plim $W'u = \lim EW'u = 0$ (ii) plim $W'X$ and $\lim EW'X$ exist, both are equal and of full rank N, and (iii) $W'X$ is of full rank N, where N is the rank of X. Operating with it on the model-equation we have

$$W'y = W'X\alpha + W'u$$

It will be easily shown from the definition of W that the transformed equation satisfies all the CLS assumptions asymptotically except serial independence. Then the extended instrumental variable (EIV) method may be defined as the generalized least squares method applied to this transformed equation[7]. If W contains some lagged dependent variables the covariance matrix of the transformed error term may be estimated under the assumption that W is given. The EIV estimators are therefore given by

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3) For the proof see Amemiya and Fuller (1967) pp. 527–528.

4) W may be approximated by Bingham-Godfrey-Tukey weights, for instance.

5) Hannan (1963)

6) Any matrix that satisfies these three conditions will be called an instrumental-variable matrix in the text.

7) If all that matters is consistency only, not efficiency, then we have only to disregard the error-term and to choose N equations arbitrarily to solve for α.

$$\hat{\alpha}_{EIV} = [X'W(W'\Omega W)^{-1}W'X]^{-1}X'W(W'\Omega W)^{-1}W'y$$

The EIV estimators are consistent provided that plim $(W'\Omega W)$ exists.

Let us examine the peroperties of EIV estimators in detail. In what follows we shall consider those cases where it is assumed that

(vi) $$\lim T E(W'u)(W'u)' = \sigma^2 \operatorname{plim}(W'\Omega W)$$

where, plim $(W'\Omega W)$ exists and is nonsingular.

[Theorem 5.1] The EIV estimators are instrumental-variable (IV) estimators and are the best[8] among all the instrumental-variable estimators using the same matrix W.[9]

(Proof) The instrumental-variable estimators using W may be defined as:

$$\hat{\alpha}_{IV} = (S'X)^{-1}S'y = (C'W'X)^{-1}C'W'y$$

where $S = WC$, $S'X$ is nonsingular, and C is a $(L \times N)$ matrix of rank N such that plim C exists. Take $C = (W'\Omega W)^{-1}W'X$.

Then the existence of plim C is shown directly from the assumptions and we have

$$\hat{\alpha}_{EIV} = (C'W'X)^{-1}C'W'y = \hat{\alpha}_{IV}$$

Thus the EIV estimators are IV estimators. The asymptotic covariance materices of $\hat{\alpha}_{IV}$ and $\hat{\alpha}_{EIV}$ are given by

$$\tilde{V}(\hat{\alpha}_{IV}) = \operatorname{plim}[X'WC(C'W'\Omega WC)^{-1}C'W'X]^{-1}$$

$$\tilde{V}(\hat{\alpha}_{EIV}) = \operatorname{plim}[X'W(W'\Omega W)^{-1}W'X]^{-1}$$

In order to prove that $(\tilde{V}(\hat{\alpha}_{EIV}) - \tilde{V}(\hat{\alpha}_{IV}))$ is seminegative definite[10] it is sufficient to show that

$$R = X'W(W'\Omega W)^{-1}W'X - X'WC(C'W'\Omega WC)^{-1}C'W'X$$

is semi-positive definite and that each term is positive definite. Since W, WC are of full rank and Ω is positive definite, $W'\Omega W$ and $C'W'\Omega WC$ are positive definite. Therefore each term is also positive definite because the inverse of a positive-definite matrix is positive definite and both $W'X$ and $C'W'X$ are full rank. There exists a nonsingular matrix Q such that $Q'Q = W'\Omega W$. Let $D = Q'^{-1}W'X$ and $E = QC$. Then R may be expressed as

$$R = D'D - D'E(E'E)^{-1}E'D = D'[I - E(E'E)^{-1}E']D = P'P$$

where $P = [I - E(E'E)^{-1}E']D$. Thus R is semi-positive definite, which completes the proof.

[Corollary 5.1] The EIV estimators are Sargan estimators[11] when W is predeter-

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8) A consistent estimator $\hat{\theta}_0$ is the best if, for any contstant vector λ, the asymptotic variance of $\lambda'\hat{\theta}_0$is not greater than that of $\lambda'\hat{\theta}$, where $\hat{\theta}$ is any other consistent estimator, i.e., the difference between the asymptotic covariance matrices of $\hat{\theta}_0$ and $\hat{\theta}$ is seminegative definite.

9) Z is shown to be an instrumental-variable matrix under the assumptions D, E and F. If we take $W = Z$, the EIV estiamtors are the 2SLS estimators, which are the best among all the instrumental-variable estimators using Z.

10) Goldberger(1964) p. 38.

11) Sargan (1958) p. 399.

mined[12] and u is serially independent and homoskedastic.

(Proof) Under the stated assumptions the asymptotic covariance matrix is given by

$$\lim T E(W'u)(W'u)' = \sigma^2 \operatorname{plim} W'W$$

Using the estimated covariance matrix $T^{-1}\cdot\sigma^2 W'W$, we obtain the EIV estimators

$$\hat{\alpha} = [X'W(W'W)^{-1}W'X]^{-1}X'W(W'W)^{-1}W'y$$

which are Sargan estimators.

As an example of EIV estimators let us take $W = \boldsymbol{Z}(\boldsymbol{Z}'\boldsymbol{Z})^{-1}$. It can be shown below that W satisfies the properties of instrumental-variables matrices under the assumptions D, E and F. Noting that $E\,\boldsymbol{Z}'u = 0$ and $\operatorname{plim} \boldsymbol{Z}'u = 0$

$$\begin{aligned}
&\lim E\,W'u = \operatorname{plim}(\boldsymbol{Z}'\boldsymbol{Z})^{-1}\cdot \lim E\,\boldsymbol{Z}'u = 0\\
&\operatorname{plim} W'u = \operatorname{plim}(\boldsymbol{Z}'\boldsymbol{Z})^{-1}\cdot \operatorname{plim}\boldsymbol{Z}'u = 0\\
&\operatorname{plim} W'X = \operatorname{plim}(\boldsymbol{Z}'\boldsymbol{Z})^{-1}\boldsymbol{Z}'(Y, Z)\\
&\qquad = \operatorname{plim}\left[\hat{\pi}_1, \begin{pmatrix} I_J \\ 0 \end{pmatrix}\right]\\
&\qquad = \left[\pi_1, \begin{pmatrix} I_J \\ 0 \end{pmatrix}\right]
\end{aligned}$$

where π_1 is the $(k\times(H-1))$ matrix of the coefficients of the reduced-form equations corresponding to Y and $\hat{\pi}_1$ is the least squares estimates of π_1. The model-equation to be estimated is identified, so that the last expression is of full rank. Thus we have shown that W is an instrumental-variable matrix. The asymptotic covariance matrix of $W'u$ is then given by

$$\lim T E(W'u)(W'u)' = \sigma^2 \operatorname{plim}(\boldsymbol{Z}'\boldsymbol{Z})^{-1}$$

Using the estimated covariance matrix $T^{-1}\cdot\sigma^2(\boldsymbol{Z}'\boldsymbol{Z})^{-1}$, we have the EIV estimators.

$$\hat{\alpha} = \left[\left(\hat{\pi}_1, \begin{pmatrix} I_J \\ 0 \end{pmatrix}\right)'(\boldsymbol{Z}'\boldsymbol{Z})\left(\hat{\pi}_1, \begin{pmatrix} I_J \\ 0 \end{pmatrix}\right)\right]^{-1}\left(\hat{\pi}_1, \begin{pmatrix} I_J \\ 0 \end{pmatrix}\right)'(\boldsymbol{Z}'\boldsymbol{Z})\hat{\pi}_1$$

where $\hat{\pi}_1$ is the $(K\times 1)$ vector of the least squares estimates of the reduced-form coefficients for y. We shall call them the extended indirect least squares (EILS) estimators. However these are the same as the 2SLS estimators. When $W'X$ is nonsingular the EIV estimators may be simply written as

$$\hat{\alpha} = (W'X)^{-1}W'y = \left[\hat{\pi}_1, \begin{pmatrix} I_J \\ 0 \end{pmatrix}\right]^{-1}\hat{\pi}_1$$

These are identical with the indirect least squares (ILS) estimators.

[Theorem 5.2] Suppose we have two instrumental variable matrices, W_1 and W_2, such that $W_2 = W_1F$, where F is of full rank[13]. Then EIV estimators using W_1 are more efficient than those using W_2. When F is nonsingular two estimators are identical.

(Proof) The asymptotic covariance matrices are

12) W is predetermined in the sense that $E\,w_{tl}u_s = 0$ for $t \leqq s$.

13) For example, W_2 consists of some of the principlal components of W_1.

$$\tilde{V}(\hat{\alpha}_1) = \sigma^2 \operatorname{plim} [X'W_1 (W_1'\Omega W_1)^{-1} W_1'X]^{-1}$$
$$\tilde{V}(\hat{\alpha}_2) = \sigma^2 \operatorname{plim} [X'W_2 (W_2'\Omega W_2)^{-1} W_2'X]^{-1}$$
$$= \sigma^2 \operatorname{plim} [X'W_1F(F'W_1'\Omega W_1F)^{-1}F'W'X]^{-1}$$

In order to prove that $\hat{\alpha}_1$ is more efficient than $\hat{\alpha}_2$ we have to show $\tilde{V}(\hat{\alpha}_1) - \tilde{V}(\hat{\alpha}_2)$ is seminegative definite. Then proof can be done following the latter half of the proof of Theorem 5.1, where C should be read as F. The identity between two estimators is derived by noting that $(F'W_1'\Omega W_1F)^{-1} = F^{-1}(W_1'\Omega W_1)^{-1}F'^{-1}$.

[Corollary 5.2] If W_2 consits of a subset of column vectors of W_1, the EIV estimators using W_1 are more efficient than those using W_2.

(Proof) This is so from the theorem 5.2 because F may be written as $\begin{pmatrix} I_{L_2} \\ 0 \end{pmatrix}$, where W_1 is $(T \times L_1)$ and $L_2 \leqq L_1$.

As an example of this corollary we consider the following distributed lag model.

$$y = \alpha x + \beta y_{-1} + u$$
$$u = e - \beta e_{-1}, \qquad |\beta| < 1$$

y and x are $(T \times 1)$ vectors of the dependent and the exogenous variables. u and e are $(T \times 1)$ vectors of the error terms such that

$$Ee = 0, \quad Eee' = T^{-1} \cdot \sigma_e^2 I$$
$$Eu = 0, \quad Euu' = T^{-1} \cdot \sigma_u^2 V, \quad V = \begin{pmatrix} 1 & \rho & 0 \\ & \ddots & \\ \rho & & \rho \\ & \ddots & \\ 0 & \rho & 1 \end{pmatrix}$$

y_{-1} and e_{-1} are one-period lagged vectors of the dependent variable and the error term respectively. Then the EIV estimators using $W_1 = (x, x_{-1}, x_{-2})$

$$\begin{pmatrix} \hat{\alpha} \\ \hat{\beta} \end{pmatrix}_1 = [(x, y_{-1})' W_1 (W_1'VW_1)^{-1} W_1'(x, y_{-1})]^{-1}$$
$$(x, y_{-1})' W_1 (W_1'VW_1)^{-1} W_1'y$$

are more efficient[14] than those using $W_2 = (x, x_{-1})$

$$\begin{pmatrix} \hat{\alpha} \\ \hat{\beta} \end{pmatrix}_2 = \begin{pmatrix} x'x & x'y_{-1} \\ x_{-1}'x & x_{-1}'y_{-1} \end{pmatrix}^{-1} \begin{pmatrix} x'y \\ x_{-1}y \end{pmatrix}$$

As we have just seen in the example, when $W'X$ is nonsingular, the EIV estimators may be simply written as

$$\hat{\alpha}_{EIV} = (W'X)^{-1}W'y$$

where the covariance matrix of $W'u$ disappears. Take $W = (Y - k\hat{V}, Z)$ for example, where $\hat{V}$ is the least squares estimates of the reduced-form disturbances of Y and k is

14) This was also confirmed in small samples by the monte-carlo experiments, which showed, however, that the EIV estimators using $W_3 = (x, x_{-1}, y_{-2})$ were better than any of the other two. Note that the explanatory variables of y_{-1}, (x_{-1}, y_{-2}), are chosen as instrumental variables for y_{-1} and that $E\, W_3'u = plim\ W_3'u = 0$. See Sadamichi (1970), Chapt. VI.

such a scalar that plim $K = 1$. Then it can be shown under the assumptions D, E and F that W is an instrumental-variable matrix. In this case the EIV estimators are of a simple form and equivalent to the k-class estimators.

If we define a transformation matrix

$$W^* = W(W'\Omega W)^{-1/2}$$

then we can show from the definition of W that the derived form of the model-equation obtained by using this transformation matrix satisfied all the classical assumptions and that the DFLS estimators are identical with the EIV estimators using W.

VI Generalized Instrumental-Variable Method

The covariance matrix of the error term does disappear from EIV estimators when $W'X$ is nonsingular. This is because we have not specified explicity what W looks like. There we assumed implicitly that W did not contain the covariance matrix of the error term and would probably be a function of predetermined variables. However there could be another instrumental-variable matrix such that $W = \Omega^{-1}W_0$, where W_0 is a matrix of full rank not less than the rank of X. The egeneralized instrumental-variable (GIV) method may be defined as the EIV method with use of $\Omega^{-1}W_0$ as an instrumental-variable matrix. The GIV estimators given by

$$\hat{\alpha}_{GIV} = [X'\Omega^{-1}W_0(W_0'\Omega^{-1}W_0)^{-1}W_0'\Omega^{-1}X]^{-1}X'\Omega^{-1}W_0 (W_0'\Omega^{-1}W_0)^{-1}W_0'\Omega^{-1}y$$

All GIV estimators are DFLS estimators if we take

$$W^* = \Omega^{-1}W_0(W_0'\Omega^{-1}W_0)^{-1/2}$$

In a special case where there are just as many instrumental variables as explanatory variables the GIV estimators can be simply written as

$$\hat{\alpha}_{GIV} = (W_0'\Omega^{-1}X)^{-1}W_0'\Omega^{-1}y$$

This is the generalization of the conventional instrumental-variables method. Notice that Ω is present in this case.

Under the assumption d, the good-behavior assumption should be modified in such a way that

(G) $$\text{plim } \boldsymbol{Z}'\Omega^{-1}\boldsymbol{Z} = \lim E\,\boldsymbol{Z}'\Omega^{-1}\boldsymbol{Z} = M_0\ , \quad |M_0| \neq 0$$

where both limits exist and M_0 is a nonsingular constant matrix. Then a simple choice of all predetermined variables in the model to form W_0 leads to the generalized 2SLS estimators.

Let us consider a simultaneous estimation of all model-equations under the assumption A', C, D, e and F.

$$y^\sharp = X^\sharp\alpha^\sharp + u^\sharp$$

$$Eu^\sharp = 0, \quad Eu^\sharp u^{\sharp\prime} = T^{-1}\cdot\sum^\sharp, \quad \sum^\sharp = \sum \otimes I$$

If we define $\boldsymbol{Z}^\sharp$ as the block-diagonal matrix of G $\boldsymbol{Z}$'s

$$Z^\sharp = \begin{pmatrix} Z & & 0 \\ & \ddots & \\ 0 & & Z \end{pmatrix}$$

then $Z^\sharp$ and $\sum^{-1}_\sharp Z^\sharp$ are shown to be instrumental-variable matrices. The EIV estimators using $Z^\sharp$ are nothing but the 3SLS estimators, while the GIV estimators given by

$$\hat{\alpha}^\sharp = [X^{\sharp\prime} \sum^{-1}_\sharp Z^\sharp (Z^{\sharp\prime} \sum^{-1}_\sharp Z^\sharp)^{-1} Z^{\sharp\prime} \sum^{-1}_\sharp X^\sharp]^{-1} X^{\sharp\prime} \sum^{-1}_\sharp Z^\sharp$$
$$(Z^{\sharp\prime} \sum^{-1}_\sharp Z^\sharp)^{-1} Z^{\sharp\prime} \sum^{-1}_\sharp y^\sharp$$

turn out to be also the same as the 3SLS estimators in this particular case.
Define

$$\hat{X}^\sharp = \begin{pmatrix} \hat{X}_1 & & 0 \\ & \ddots & \\ 0 & & \hat{X}_G \end{pmatrix}, \quad \hat{X}_i = (\hat{Y}_i, \ Z_i)$$

where $\hat{Y}_i$ are estimates of Y_i computed from the reduced form given consistent estimators of $\alpha^\sharp$, say 2SLS estimators $\hat{B}$ and $\hat{\Gamma}$.

$$\hat{Y} = Z \hat{\Gamma} \hat{B}^{-1}$$

Then it will be shown that $\sum^{-1}_\sharp \hat{X}^\sharp$ satisfies all properties of instrumental variables. Noting that $\lim E \hat{X}_i' u_j = \text{plim } \hat{X}_i' u_j = 0$.

$$\lim E \hat{X}^{\sharp\prime} \sum^{-1}_\sharp u^\sharp = \lim E [\sum_{j=1}^{G} \sigma_{ij} \hat{X}_i' u_j] = 0$$

$$\text{plim } \hat{X}^{\sharp\prime} \sum^{-1}_\sharp u^\sharp = \text{plim } [\sum_{i=1}^{G} \sigma_{ij} \hat{X}_i' u_j] = 0$$

where $\sum^{-1} = (\sigma^{ij})$. From the assumptions D, e and F, $\text{plim } \hat{X}_i' X_j = \lim E \hat{X}_i' X_j$. Therefore

$$\text{plim } \hat{X}^{\sharp\prime} \sum^{-1}_\sharp X^\sharp = \lim E \hat{X}^{\sharp\prime} \sum^{-1}_\sharp X^\sharp$$

The covariance matrix may be estimated by

$$\hat{\sum} = (Y\hat{B} - Z\hat{\Gamma})' (Y\hat{B} - Z\hat{\Gamma}), \quad \hat{\sum}^\sharp = \hat{\sum} \otimes I$$

Thus, the GIV estimators are given by

$$\hat{\alpha}^\sharp = (\hat{X}^{\sharp\prime} \hat{\sum}^{-1}_\sharp X^\sharp)^{-1} \hat{X}^{\sharp\prime} \hat{\sum}^{-1}_\sharp y^\sharp$$

If the estimation process is iterated successively by using the resulting estimators as next input, we obtain the full information maximum likelihood (FIML) estimators as the limit value provided that the sequence coverges[15]. Let $\bar{B}$ and $\bar{\Gamma}$ be the FIML estimators. Then the FIML estimators may be expressed as

$$\bar{\alpha}^\sharp = (\bar{X}^{\sharp\prime} \bar{\sum}^{-1}_\sharp X^\sharp)^{-1} \bar{X}^{\sharp\prime} \bar{\sum}^{-1}_\sharp y^\sharp$$

where $\bar{X}^\sharp$ and $\bar{\sum}^\sharp$ are computed by using $\bar{B}$ and $\bar{\Gamma}$ in place of $\hat{B}$ and $\hat{\Gamma}$.

If $\hat{Y}_i$ are taken to be the least-squares estimates of computed from the reduced form

15) Durbin (1963).

$$\hat{Y} = Z\pi, \quad \pi = (Z'Z)^{-1}Z'\,Y$$

then the GIV estimators are Durbin's 3SLS (D3SLS) estimators. Since GIV estimators are DFLS estimators, so are FIML and D3SLS estimators.

VII Conclusion

In this paper we have concerned ourselves with various estimation methods proposed for a model-equation which does not satisfy all the classical assumptions and have shown that, by the derived-form least-squares principle which applies the least-squares method to the model-equation transformed by such a matrix that the resulting transformed equation may satisfy all the classical assumptions asymptotically, most of the available estimation methods, as listed in Table II, can be synthesized through a proper choice of DFLS transformation matrices. It has also been noted that the extended or the generalized instrumental-variable method, which is member of the DFLS family, provides the best estimators among a class of instrumental-variable estimators obtained by using a particular set of instrumental variables under certain conditions.

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A DATABASE SYSTEM OF ECONOMIC TIME SERIES

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Abstract

Economic time series files are quite different in structure from cross-sectional ones. Database systems of the former are structured in a simple form, each record consisting of a single time series being independent of another, while those of the latter are generally organized in a complicated form, each record containing a number of tiems being interrelated with another. However, some complexities exist which are proper to the time series. Associated with each economic item are 20 time series depending on terms of value (current or constant), unit of time (monthly, quarterly, etc) and seasonal adjustment.

Though the database systems of economic time series seem to be simple in their structure, yet they have to be such as to handle these relationships associated with the time series. In this paper we present one such database system,which is built in the STEPS system.

I Introduction

A great deal of research has been made on the database systems of cross-sectional data such as personnel or questionnaire data and various types of database systems have so far been developed. Typical examples are IMS in the tree type, TOTAL in the chain type and ADABAS in the relational type. On the other hand, much attention has not been paid to the database systems of economic time series data, partly because they are very simple in structure and do not attract academic interest in the field of computer science.

However, time series are not so easy to handle as they seem to be. A single economic item may be expressed in many different ways depending on terms of value, unit of time and seasonal adjustment.

(1) Time series are measured either in current terms or in constant terms. With each time series in constant terms a specific deflator is associate.

(2) Time series are aggregated over different units of time—monthly, quarterly, semiannual, fiscally semiannual, annual or fiscally annual.

(3) Time series are seasonally unadjusted or adjusted. Associated with each economic item are 10 time series in current terms (6 for unadjusted, 4 for adjusted), 10 time series in constant terms and 10 corresponding series of deflators. All in all, 30 time series are associated with a simple economic item.

We will presest the database system of economic time series, which is built in the STEPS system, in order to show how it deals with the abovementioned relationships associated with the time series.

STEPS (Statistical Techniques for Econometric Planning and Simulation) is a computer software designed for statistical and econometric analyses of the economic time series data. It is characteized not only by the computing facility of making a continuous analysis from a simple regression to the final test of nonlinear econometric models of several hundreds equations but also by the database management of about 7,000 SNA (System of National Accounts) and approximately 30,000 IFS (International Financial Statistics) time series data.

II Description of Time Series

An item code is assigned to each economic item and various attribute codes are prefixed to the item code to form the series code which identifies a time series. An item code is expressed by up to 16 letters beginning with an alphabetical letter other than P, Q and ¥. The attribute codes are denoted by P, Q, ¥ and @, P stands for deflators, Q for constant terms, ¥ for fiscal unit of time and @ for seasonal adjustment. Any combination of attribute codes are valid. For example, the series code of private consumption expenditure seasonally adjusted in constant terms is expressed as either Q@YE1 or @QYE1, where YE1 is the item code of private final consumption expenditure.

The series code does not tell anything about the unit of time except fiscal. So, we have to specify both the series cods and the unit of time in order to retrieve a time series. Any time series in the database of STEPS contain its descriptive information as well as its data. The content of the record of a time series is shown in Table 1.

III Organization of the Database of the Time Series

The database of the time series consists of an index component and a data component. The index component is made up of an item table and a series index file. The item table is that of correspondence between an item and the location of the series index of its associated time series. The series index file is the collection of the series indices, each of which shows the correspondence table of all the series associated with an item and the location of their data in the data componest. The data component is the pool of the time series data shown in Table 1. When a time series does not exist in the data component its location is shown to be zero in the series index. (See Table 2)

IV Access to the Database

The following STEPS statements are used to retrieve time series data from the database.

DATE IS MONTH/ QUART/ HALF/ YEAR FROM *the date of origin*

Table 1. Content of Time Series

No.	Field	Type	Remarks
1	Series name	Literal	Flll name of time series
2	Series name	Literal	Retrieval code
3	Intial date	Integer	
4	Latest date	Integer	
5	Unit of time	Integer	1 for yearly, 2 for half yearly 4 for quarterly, 12 for monthly
6	Edit code	Integer	1 for sum, 2 for average, 4 for end of period
7	Decimal place	Integer	
8	Number of data	Integer	
9	Data	Integer	Data for the initial date
10	Data	Integer	Data for the second date
—	—		
—	—		
—	—		

Table 2. Content of Series Index (in case of the SNA database)

Field no.	Time series	Location of its data in the data component
1	Current annual	0
2	Current fiscally annual	0
4	Current quarterly	356
5	Constant annual	0
6	Constant fiscally annual	0
8	Constant quarterly	0
9	Annual deflator	0
10	Fiscally annual deflator	0
12	Quarterly deflator	525
13	Current adjusted quarterly	414
14	Constant adjusted quarterly	418

Table 3. STEPS Program of Using SNA database

```
START, 'RETRIEVE TIME SERIES FROM SNA DATABASE'
DATE IS YEAR FROM 1970
PERIOD IS 1970 TO 1978
GET SNA, GNP = 'YE5', ¥CG = '¥YE2'
SET SCALAR, BASE = VALUE (¥CG, 1975)
COMPUTE, ¥CGINDEX = ¥CG/BASE * 100
PRINT, ¥CGINDEX
PERIOD IS 1971 TO 1978
COMPUTE, GROWTH = (GNP/GNP>-1<-1) * 100
PLOT, GROWTH
END
```

RERIOD IS *the first date of the period* TO *the last date of the period*
GET SNA/ IFS, T1 = '*series code*' ... T20 = '*series code*'

The unit of time for all the time series to be used in STEPS is determined by DATE statement, which also tells the date of origin for the first elements of all the time series variables. In STEPS the time series variables are defined to be one-dimensional arrays with the common date of origin and the same unit of time. DATE statement is therefore used, once and for all, at the top of STEPS program. PERIOD statement indicates the period of time for time series data to be used and anaylzed by the statements that follow. GET SNA or GET IFS statements are those of retrieving the time series data corresponding to the series codes from the SNA or IFS database and storing them into the respective time series variables denoted by T1, ..., T20.

How to retrieve the desired time series data from the database? A series code is first decomposed into the attribute code and the item code. Next, the location of the series index corresponding to the item code is searched for in the item table. The series index tells us the location of the time series data for the series code in the data component. Finally, the series data are extracted and edited according to the atribute code, the unit of time and the period of time.

If the item code does not exist in the item table, the search process is terminated and the appropriate messages are printed. If the item code exists, search is carried further. If the location of the data for the specified series code is missing in the series index, it is checked whether the data to be desired can edited by using other time series data. Let us consider a rather complicated case of retrieving the fiscally annual series in constant terms from the SNA database where no such data exist. First, the location of the data for the fiscal, annual and constant series is looked for. It does not exist. So, it is checked whether the data for the current, annual series and its deflator both exist. If they both exist, the fiscal, annual and constant series data are edited. If not, further check is proceeded to see if there exist the constant quarterly series data. If they exist, the data to be desired are edited according to the edit code. If not, the checking process continuous.

All time series data are stored in integer mode in the database but the data retrieved are all transformed to single-precision floating numbers in the STEPS programs.

V Examples of a STEPS Program Using the SNA Database

Let us show one example of the STEPS program to see how time series data are extracted from the database and transformed in various ways.

Suppose we will extract the current, annual data of Gross National Product and the current, fiscally annual data of Government Final Consumption Expenditure for the period from 1970 through 1978, work out the chart of the annual growth rate of GNP and print the indices (fiscal bases year 1975 = 100) of Government Expenditure. (See Table 3)

DATE statement tells that the unit of time is year but does not tell whether it is calendar year or fiscal year. Each researcher should distinguish them, for example, by attaching ¥ to the first letter of the time series variable name to indicate the fiscal yearly data. In GET SNA statement, GNP is the variable in calendar year and ¥CG in fiscal year. SET SCALAR statement is that of computing the built-in STEPS function giving a scalar value. BASE is a scalar variable, which is different from the series variables such as GNP, ¥CG, etc. VALUE is the name of STEPS function which picks up the scalar value for designated data from a time series variable. The value for 1975 of ¥CG is stored in the scalar variable BASE.

COMPUTE statement is that of computing arithmetic expression and giving time series data to be stored in a time series variable. Computation is carried out for the whole period of time indicated by the newest PERIOD statement. In order to calculate the annual growth of GNP the period of time to be analyzed has to be changed to that from 1971 through 1978 since the rate for 1970 can not be obtained. The subscript of a time series variable signifies the time lag of the variable. Thus, GNP$<-1>$ means one-period lagged GNP.

Print statement gives the printouts and PLOT statement draws the dotted charts of time series variables.

VI Summary and Conclusion

We have shown a database system of economic time series, which can handle the interrelationships proper to the time series by introducing the attribute codes into the retrival codes in the database. In our database all the time series associated with a single economic item, as is shown in Table 2, are treated in such a systematic way that even a time series not existing in the database may, if possible, be generated automatically from other time series data.

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RESEARCH INSTITUTE FOR ECONOMICS AND BUSINESS ADMINISTRATION, KOBE UNIVERSITY

HISTORICAL SKETCH

In 1919, a research organization named the Institute for Commerce was founded in Kobe Higher Commercial School, one of the chief predecessors of Kobe University, with a gift made by F. Kanematsu & Company, a leading mercantile firm in Kobe. The organization was designed to carry on and facilitate integrated research on business and commerce and to formulate and publish the results of these studies and investigations in such form as to make them available to the business community.

With the founding of Kobe University of Commerce, successor of Kobe Higher Commercial School, in 1929, the Institute extended its research activities by adding several divisions. One was the famous Latin-American Library, which soon became the center of research in this field in Japan. A room for statistics equipped with various computing machines was established and began publication of *Jūyō Tōkei Keizai* monthly and *Sekai Bōeki Tōkei* annually. A filing room was prepared to deposit press clipping files systematically arranged by topics and dates. Another room was designed to become the center of all possible original records and data having to do with the beginning and progress of Japanese business.

On the campus of Kobe University of Commerce, another organization named the Institute for Business Mechanization was founded in 1941 utilizing business machines donated by the IBM Corporation and others. With Professor Yasutaro Hirai as its head a broad and forward-looking plan for business mechanization in Japan was developed.

In 1944, Kobe University of Commerce changed its name to Kobe University of

Economics. After the War, however, the University was consolidated with three other colleges in Hyōgo Prefecture to become Kobe University. With this development, the two Institutes were also amalgamated into the Research Institute for Economics and Business Administration, Kobe University. At present, the Institute, with its twenty four full-time professional staff members, carries on studies and investigations in international economy, business administration, and information systems in Japan.

LOCATION AND BUILDINGS

The Research Institute for Economics and Business Administration is located on the campus of Kobe University, Rokko, Kobe. It consists of two three-storied buildings. One is named the Kanematsu Kinenkan and has a floor space of about 2,900 square meters, which includes a president's room, forty-one offices, six rooms used as a library, a room for statistics, etc. Another is built in 1964. It has a floor space of about 1,900 square meters, which is chiefly used as the Documentation Center for Business Analysis, a library and a conference room.

ORGANIZATION

Under the directorship of the president, the Institute operates with two research groups. Each research group and its sections are as follows:

A Group of International Economy

(1) International Trade
(2) International Finance
(3) Maritime Economy
(4) Latin-American Economy
(5) Oceanian Economy
(6) International Labour Relations

B Group of Business Administration

(1) International Management
(2) Business Administration and Information Systems
(3) Accounting
(4) Business Statistics

Besides the regular work of the Institute, research committees may be created to carry on any special work requiring the joint study of academic and business circles. At present, there are five standing research committees, as follows: Experts Group on the World Trade Structure, Committee of International Finance, Committee of Information Systems, Committee of Oceanian Economy and Committee of Maritime Labour.

For convenience and greater efficiency in carrying out its research activities, the Institute has a general office which is responsible for 1) the collection and preservation of a comprehensive collection of books, periodicals, pamphlets, and original records and data of finance, trade, commerce, industry and business generally; 2) the classifica-

tion, cataloguing, indexing arranging, annotation and compilation of these research materials; and 3) the formulation and publication of the results of the investigations and studies accomplished by the professional staff members of the Institute.

As an affiliated institute, the Documentation Center for Business Analysis has been established in 1964. It is the first systematic information facilities in the field of business administration in Japan that has been recognized and authorized by the Ministry of Education. The purpose is to collect and to make intensive control of all kinds of materials on business administration and to make them available to scholars, universities, governments, and business world with the aid of modern documentation techniques.

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