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Corporate financial structure of South Korea after Asian financial crisis: the *chaebol* experience

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Abstract

The *chaebol*, a South Korean form of business conglomerate, has been a key factor in the country's economic growth. In this study, the *chaebol* sector is added to the asset–liability matrix derived from a flow-of-funds analysis in order to explain the role of the *chaebol* in the Korean financial system. We find that the power-of-dispersion indices in the asset-oriented system differ between the *chaebol* and other private corporations. Between 1987 and 2002, the former has increased while the latter has declined. In the case of the *chaebol*, excess liabilities were reduced, while investments in financial assets were increased. This tendency led to an increase in the power-of-dispersion index in this asset-oriented system. Our previous research found a decrease in this index for the private sector in Korea. However, the index increased for *chaebol* when the private sector is divided into the *chaebol* and small-/medium-sized corporations in this paper. These results point to a greater concentration of economic power in the *chaebol* in the Korean financial market.

Keywords: Flow-of-funds analysis, Asset–liability matrix, Financial conglomerates (*chaebol*)

JEL Classification: G30, O16, C67, O53, N25

1 Background

The *chaebol*, a South Korean form of business conglomerate, has been a key factor in the country's economic growth. In general, a group of large-scale, family-run management enterprises is referred to as a *chaebol*. Jones and Sakong (1980) defined a *chaebol* as the Korean term for a conglomerate of many companies clustered and managed by one family-centered parent company. The characteristics of a *chaebol* are similar to those of the *zaibatsu* of pre-war Japan. According to Kim (2000), the ratio of capital to bank loans of *chaebol* is higher than that of the pre-war *zaibatsu*.

The birth of the *chaebol* dates back to the 1950s or earlier in Korea. However, it was not until the early 1980s that they emerged as entities that enjoyed a monopolistic concentration of capital. Many firms appeared in Korea in the 1950s, with some of them accumulating a huge influx of wealth. The *chaebol* were formed during the rule of Syngman Rhee, supported by the sale of property formerly owned by the colonial Japanese government, foreign aid, and an import-substitution industrialization policy (Choi 2007). When Park Chung-hee came to power in 1961, a policy of industrialization and

financial support contributed to the advancement of the Korean *chaebol* system (Amsden 1989). Moreover, in the 1980s, the *chaebol* wanted a more liberal financial system that would allow greater control over capital and investment. At the same time, they also wanted the system to remain protected to the extent that it provided them with cheap credit (Amsden and Euh 1992). According to Lee et al. (2002), the top 30 *chaebol* owned 12 security companies (out of a total of 25), 18 insurance companies (out of a total of 35) and 18 investment trust companies (out of a total of 38) in 1988. The *chaebol* became less dependent on government-controlled commercial banks, while the government lost much of its power to influence the *chaebol*'s investment decisions.

Many researchers have pointed out that the Korean government's policy on interest rates and financial activities led to the concentration of economic power in the *chaebol*. According to (Lee 2002), during the 1980s and 1990s, the top 30 *chaebol* accounted for more than one-third of the nation's industrial output. In particular, they ran non-banking financial companies themselves, using them as a tool to raise capital. This enabled the *chaebol* to raise money on their own in spite of government restrictions on the total amount of loans and credit that a bank could extend to the *chaebol*. Krueger et al. (2002) estimated asset growth rates of the Big 5 and Big 30 *chaebol* and the total manufacturing sector from 1985 to 1999. They argued that the growth of *chaebol* assets has been much more rapid than that of non-*chaebol* firms. However, most research has focused on the financial structure of the *chaebol* or on a comparative analysis of the large and small-/ medium-sized corporations. Unfortunately, some research was not based on logical analysis due to a lack of data. It is difficult to quantify the effects or interactions between the *chaebol* and other sectors in the financial system, such as banks, the government, and households.

This paper analyzes the *chaebol* using flow-of-funds (FOF) accounts. The FOF accounts consist of the balance sheets of all institutional sectors in a country, including the foreign sector. The FOF table shows the interrelations between various institutional sectors. In this analysis, we integrate the *chaebol* into FOF accounts. Applying the input–output analysis method to FOF accounts, Y and Y^* matrices (asset–liability matrix of institutional sector-by-institutional sector) are obtained. Furthermore, using a Leontief inverse matrix, four kinds of indices (the power-of-dispersion index and the sensitivity-of-dispersion index) are estimated. Some previous studies attempted to subdivide the corporate sector of the FOF accounts into various industries. For example, Nishiyama (1991) used the balance sheets and income statements of each industry in Japan to subdivide non-financial corporations in FOF accounts into 37 industries. In this paper, the power indices of 44 institutional sectors are reported. Kim (2016) used this method to disaggregate the Korean FOF accounts into 115 institutional sectors, including 95 types of inter-industries, combined with the *Financial Statement Analysis* data. According to these studies, using balance sheets and income statement data for each industry, it is possible to generate expanded FOF accounts that indicate the financial transactions of each industry. Therefore, if the financial statements of the *chaebol* are obtained, then it will be possible to add the *chaebol* sector to the FOF account. This research aims to find and identify the characteristics and roles of the *chaebol* in the financial system of Korea. This paper consists of four sections. The first section is the introduction. The second section explains the data and the analytical method adopted in this study. The third section

describes the results of our research in three parts. Conclusions are drawn in the last section.

2 Data and research methods

2.1 Data

For the purpose of analysis, the FOF accounts and *chaebol* balance sheets are used. Since the data in the Korean FOF accounts in the 1993 SNA are only available back to 2002, I decided to adopt the FOF accounts in the 1968 SNA, which are composed of nine institutional sectors and available from 1975 to 2005. By using the *chaebol*'s balance sheets, Korean corporations can be classified into two categories: the "*chaebol*" and "other private corporations." The volume of financial transactions by other private corporations is calculated by subtracting *chaebol* entries from the balance sheets. This study uses balance sheets for the top 30 *chaebol* compiled through collaboration with the Institute for Participatory Society and the *Institute of Business and Economic Research* (IBER) of *Inha* University[1] These balance sheets are available from 1987 to 2002. Table 1 shows a list of the top 30 *chaebol* used in this paper. We will focus our analysis on data from the years 1987, 1992, 1997, and 2002. Data for 1998, one year after the Asian financial crisis, were also added to the analysis. Table 1 shows the list of the top 30 *chaebol* for each year.

2.2 Reconstruction of FOF tables

The FOF table shows the interrelations between the various institutional sectors in a systematic and coherent way. The FOF system adopts the quadruple-entry system proposed by Copeland (1952), in which each transaction is recorded with a double entry. While the FOF table, which is published by the Bank of Korea (2001), contains only financial assets and liabilities, the *chaebol* balance sheets include real assets and liabilities as well. By referencing a guide to writing FOF tables and the Bank of Korea Web site, only the items used in FOF accounts are selected from the *chaebol* balance sheets. Based on the selected items, the institutional sector of private corporations in the FOF table is broken down into two sections, eventually creating 10 subsections. We can also reconstruct the FOF table for each year, which is reflected in the *chaebol* balance sheets.

2.3 Methodologies

In this analysis, I will apply the input–output analysis method devised by Tsujimura and Mizoshita (Tsujimura and Masako 2002a, b)[2] to the FOF accounts. The Bank of Korea publishes quarterly and yearly FOF accounts for Korea which contain (1) financial transactions (flows) and (2) financial assets and liabilities (stocks). The asset–liability matrix used in this paper has been compiled from the financial asset and liability tables of the annual FOF accounts.

First, the procedure requires the construction of two tables *E* and *R*. Table *E* is a matrix representing the fund-employment portfolio of each institutional sector, while the table *R* shows the fund-raising of each institutional sector. By applying the method widely used in input–output analysis, it is possible to make two types of square matrices *Y* and

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[1] Refer to Appendix of Lee (2005).

[2] For details, see Tsujimura and Mizoshita (2002a, 2003) in English and Tsujimura and Mizoshita (2002b), pp. 32–43 and pp. 116–129 in Japanese.

Table 1 Top 30 *chaebol*

	1987	1992	1997	1998	2002
1	Hyundai	Hyundai	Hyundai	Hyundai	Samsung
2	Daewoo	Samsung	Samsung	Daewoo	LG
3	LG	Daewoo	Daewoo	Samsung	SK
4	Samsung	LG	LG	LG	Hyundai Motor Group
5	Hanjin	SK	SK	SK	Hanjin
6	Ssangyong	Hanjin	Hanjin	Hanjin	Lotte
7	SK	Ssangyong	Ssangyong	Ssangyong	Hyundai
8	Hanwha	KIA	Hanwha	Hanwha	Kumho
9	Lotte	Hanwha	Kumho	Kumho	Hyundai Heavy Industries Group
10	KIA	Lotte	Donga	Lotte	Hanwha
11	Daelim	Kumho	Lotte	Donga	Doosan
12	Donga	Daelim	Halla	Hansol	Dongbu
13	Hanil	Doosan	Daelim	Doosan	Hyundai Oil
14	Hyosung	Donga	Doosan	Daelim	Hyosung
15	Doosan	Hanil	Hansol	Dongkuk Steel Group	Daelim
16	Dongkuk Steel Group	Hyosung	Hyosung	Dongbu	Kolon
17	Pan Ocean Shipping	Dongkuk Steel Goup	Kohap	Halla	CJ
18	Kolon	Halla	Kolon	Kohap	Dongkuk Steel Group
19	Kumho	Tongyang	Dongkuk Steel Goup	Hyosung	Hanaro Telecom
20	Kukdong E and C	Kolon	Dongbu	Kolon	Hansol
21	Dongbu	Jinro	Anam	Tongyang	Shinsegye
22	Woo Sung Construction	Dongbu	Jinro	Jinro	Tongyang
23	Kohap	Kohap	Tongyang	Anam	Hyundai Department Store
24	Haitai	Kukdong E and C	Haitai	Haitai	Hyundai Development
25	Tongil	Woo Sung Construction	Shinho	Saehan	Youngpoong
26	Daesang	Haitai	Daesang	Kangwon Industry	Daesang
27	Taekwang	Byucksan	Newcore	Daesang	Dongwon
28	Kangwon Industry	Daesang	Geopyeong	CJ Cheiljedang	Taekwang Industrial Co.
29	Samwhan	Anam	Kangwon Industry	Shinho	KCC
30	Shindonga	Hanbo	Saehan	Samyang	Oriental Chemical Industries Group

Y^*, using tables E and R. Table Y is based on a fund-employment portfolio, while Y^* is founded on a fund-raising portfolio.

In the liability-oriented system, matrices B and D are expressed as follows:

$$b_{ij} = r_{ij}/t_j$$

$$d_{ij} = e'_{ij}/t_j^E$$

where t_j vector represents the sum of either assets or liabilities whichever is greater and t_j^E means the sum of assets. In the same manner, matrices B^* and D^* of the asset-oriented system are defined as follows:

$$b_{ij}^* = e_{ij}/t_j$$

$$d_{ij}^* = r_{ij}'/t_j^R$$

where t_j^R means the sum of liabilities. The $m \times m$ (m: number of institutional sectors) coefficient matrices C and C^* are estimated using the institutional sector portfolio assumption.

$$C = DB$$

$$C^* = D^*B^*$$

Each element of the transaction quantity matrices Y and Y^* is then obtained as follows:

$$y_{ij} = c_{ij}t_j$$

$$y_{ij}^* = c_{ij}^*t_j$$

y_{ij} is the amount of funds provided from the ith to jth institutional sector, and y_{ij}^* is the amount of funds from the jth to ith institutional sector.

Next, we apply the Leontief Inverse to obtain the indices of the power and the sensitivity of dispersion to the asset–liability matrix. Table Y can be represented in matrix terms as follows, where ε^Y means excess liabilities.

$$CT^Y + \varepsilon^Y = T^Y$$

Solving each equation for T^Y yields

$$T^Y = (I - C)^{-1}\varepsilon^Y$$

$$T^Y = I\varepsilon^Y + C\varepsilon^Y + C^2\varepsilon^Y + C^3\varepsilon^Y + \cdots$$

where I denotes the $m \times m$ unit matrix and $(I - C)^{-1}$ is Leontief inverse matrix. Matrix Γ is expressed as follows:

$$\Gamma = (I - C)^{-1} = \begin{bmatrix} \gamma_{11} & \gamma_{12} & \cdots & \gamma_{1m} \\ \gamma_{21} & \gamma_{22} & \cdots & \gamma_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ \gamma_{m1} & \gamma_{m2} & \cdots & \gamma_{mm} \end{bmatrix}$$

Using γ_{ij}, it is possible to calculate indices for both power-of-dispersion and sensitivity-of-dispersion in the liability-oriented system. The power-of-dispersion index ω_j^Y and the sensitivity-of-dispersion index z_i^Y are defined as follows.

$$\omega_j^Y = \frac{\sum_{i=1}^m \gamma_{ij}}{\frac{1}{m}\sum_{j=1}^m \sum_{i=1}^m \gamma_{ij}}$$

$$z_i^Y = \frac{\sum_{j=1}^m \gamma_{ij}}{\frac{1}{m}\sum_{i=1}^m \sum_{j=1}^m \gamma_{ij}}$$

Using the same method as in Y^*, we can also estimate the power-of-dispersion index $\omega_j^{Y^*}$ and the sensitivity-of-dispersion index $z_i^{Y^*}$ in the asset-oriented system.

The power-of-dispersion index in the liability-oriented system describes the relative extent to which a unit increase in demand for capital of a given institutional sector is dispersed throughout the financial system. The power-of-dispersion index in the asset-oriented system measures the increase in the final supply to the system of industries in general as driven by a unit increase in the capital supply of a given institutional sector. The sensitivity-of-dispersion index in the liability-oriented system measures the amount of funds which can be raised in a given institutional sector, directly or indirectly driven by a unit increase in the final borrowing for all institutional sectors in the system. Meanwhile, the sensitivity-of-dispersion index in the asset-oriented system describes the extent to which money can be supplied to a given institutional sector, directly or indirectly driven by a unit increase in the final lending for all institutional sectors in the system.

3 Results

3.1 Liability portfolios of corporations

First, we begin by using this section to analyze the financial structures of the *chaebol*. Tables 2 and 3 show the liabilities of the top 30 *chaebol*. In Table 2, the total liabilities peaked in 1997 during the Korean economic crisis. The debt ratio of the *chaebol* shown

Table 2 Liabilities of the *chaebol* (using table *R*, in Bil. KRW)

	1987	1992	1997	1998	2002
Securities	15930.9	52049.2	119552.3	157520.3	106441.8
Commercial papers	2530.5	10040.5	19645.4	16393.8	2192.4
Corporate bonds (including current portion)	5570.7	24811.2	71549.6	106803.7	58705.8
Current portion of bonds	1181.5	8260.6	16223.9	23465.7	17380.9
Corporate bonds	4389.2	16550.5	55325.7	83338.1	41324.9
Stocks	7829.8	17197.5	28357.3	34322.8	45543.7
Loans and foreign aid	25839.7	51141.4	147605	116451.4	38105.8
Loans (KRW)	18215.2	35639.9	90371.1	84779.9	25915.2
Short-term loans	9358.8	20458.2	58034.4	48598.1	10062.3
Long-term loans (including current portion)	8856.3	15181.6	32336.6	36181.7	15852.9
Current portion of long-term loans	984.8	2633.5	6842.5	8196.1	4301.7
Long-term loans	7871.5	12548.1	25494.1	27985.6	11551.2
Loans (foreign currency and foreign aid)	7624.5	15501.6	57233.9	31671.5	12190.6
Short-term loans	1025.8	4582.1	19863.5	10733	7742.6
Long-term loans (including current portion)	6327.5	10901.5	37370.4	20746.8	4448
Current portion of long-term loans	1083.8	2187.3	6319.7	4666.8	1574.1
Long-term loans	5243.7	8714.2	31050.7	16080	2873.9
Foreign aid	271.2	18	0	191.7	0
Trade credits	7512	21196.9	50223.5	42709.3	45004.6
Others	5612.2	15816.3	34843.7	33720.2	36339.4
Total	54894.9	140203.8	352224.5	350401.1	225891.6

Table 3 Liabilities of the *chaebol* (in percentage)

	1987 (%)	1992 (%)	1997 (%)	1998 (%)	2002 (%)
Securities	29.0	37.1	33.9	45.0	47.1
Commercial papers	4.6	7.2	5.6	4.7	1.0
Corporate bonds (including current portion)	10.1	17.7	20.3	30.5	26.0
Current portion of bonds	2.2	5.9	4.6	6.7	7.7
Corporate bonds	8.0	11.8	15.7	23.8	18.3
Stocks	14.3	12.3	8.1	9.8	20.2
Loans and foreign aid	47.1	36.5	41.9	33.2	16.9
Loans (KRW)	33.2	25.4	25.7	24.2	11.5
Short-term loans	17.0	14.6	16.5	13.9	4.5
Long-term loans (including current portion)	16.1	10.8	9.2	10.3	7.0
Current portion of long-term loans	1.8	1.9	1.9	2.3	1.9
Long-term loans	14.3	8.9	7.2	8.0	5.1
Loans (foreign currency and foreign aid)	13.9	11.1	16.2	9.0	5.4
Short-term loans	1.9	3.3	5.6	3.1	3.4
Long-term loans (including current portion)	11.5	7.8	10.6	5.9	2.0
Current portion of long-term loans	2.0	1.6	1.8	1.3	0.7
Long-term loans	9.6	6.2	8.8	4.6	1.3
Foreign aid	0.5	0.0	0.0	0.1	0.0
Trade credits	13.7	15.1	14.3	12.2	19.9
Others	10.2	11.3	9.9	9.6	16.1
Total	100.0	100.0	100.0	100.0	100.0

in Table 3 reveals that the ratio of marketable securities they hold rose from 29.0% in 1987 to 47.1% in 2002. This indicates a shift from indirect to direct financing. The ratio of stocks had fallen from 14.3% in 1987 to 8.1% in 1997, a clear indicator that they had difficulty raising money from the stock market during the financial crisis. The ratio of corporate bonds soared from 10.1% in 1997 to 30.5% in 1998. Meanwhile, the ratio of loans, an indirect fund-raising method, fell from 47.1% in 1987 to 16.9% in 2002.
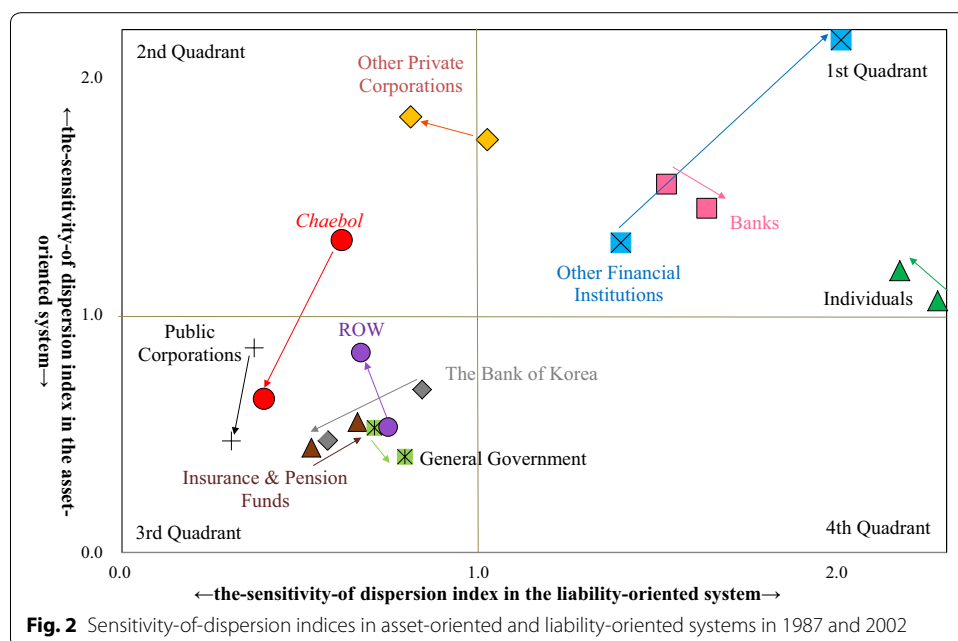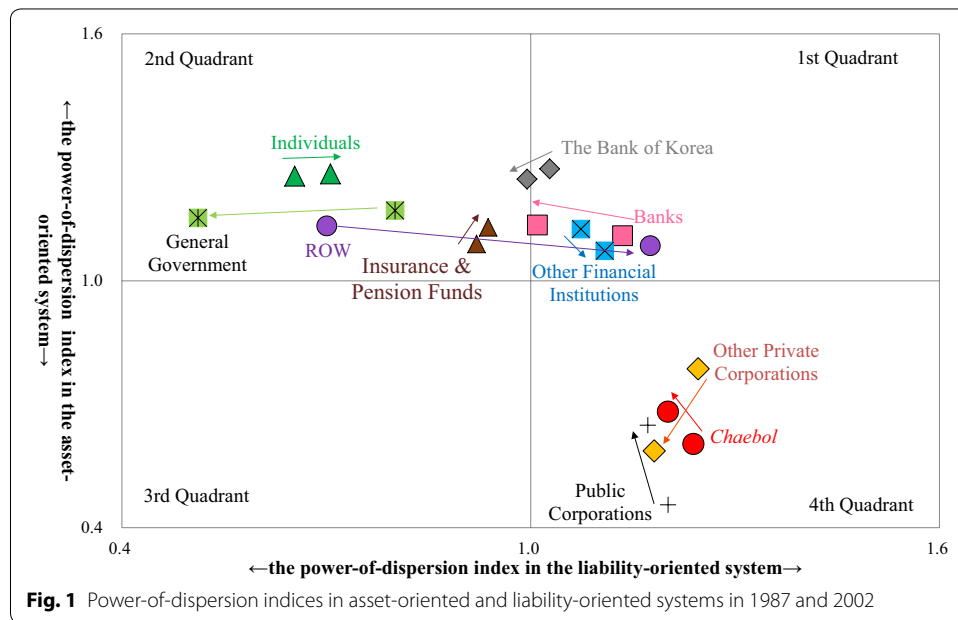
Table 4 shows the liability portfolios of the *chaebol* and other private corporations created using table *Y*. As shown in Table 3, the *chaebol* borrowed 21.9% of their money from other financial institutions and 21.2% from banks in 1987. However, in the 1990s, loans from banks fell to 17.9% while those from other financial institutions rose to 31.7% in 1998. Corporations other than the *chaebol* show a similar trend in financing sources as the *chaebol*. However, we find that the ratio of fund-raising from banks by other private corporations rose to 28.1% in 2002. Another contrast between the two entities can be observed in the way they raise funds through subsidiaries. To overcome the global financial crisis, the *chaebol* increased dependence on their subsidiaries for funding, with these arrangements making up 14.6% of liabilities in 1997 and 12.9% in 1998. This is a trend not observed in other private corporations. It is noteworthy that the *chaebol*'s funding from other private corporations rose to 16.7% in 2002. In the 2000s, the lending of other financial institutions to the *chaebol* fell while the flow of capital from other private corporations to the business conglomerates increased. Such diversification of funding sources is not seen in corporations other than the *chaebol*. Other private corporations showed a reliance on banks and other financial institutions for funding.

Table 4 Liability portfolios of the *chaebol* and other private corporations (using table Y, in percentage)

	1987		1992		1997		1998		2002	
	Chaebol (%)	Others (%)	*Chaebol* (%)	Others (%)	*Chaebol* (%)	Others (%)	*Chaebol* (%)	Others (%)	*Chaebol* (%)	Others (%)
Bank of Korea	2.3	2.8	2.4	1.7	2.1	1.3	1.7	1.4	0.8	0.5
Banks	21.2	20.5	17.5	22.2	18.6	21.0	17.9	21.8	16.9	28.1
Insurance and pension funds	5.1	4.8	6.1	6.9	4.9	5.6	5.1	5.6	7.5	7.5
Other financial institutions	21.9	20.8	28.6	32.4	28.1	31.8	31.7	34.4	26.1	29.3
General government	6.8	6.5	5.0	5.3	4.9	5.3	5.7	6.2	7.8	8.6
Public corporations	2.2	2.4	1.9	1.2	1.7	0.9	1.9	1.1	3.1	1.5
Chaebol	7.8	8.7	11.3	6.4	14.6	5.9	12.9	6.4	7.4	3.5
Other private corporations	12.5	14.0	9.8	6.5	5.1	4.5	4.3	3.5	16.7	6.2
Individuals	10.1	9.9	11.7	10.3	7.1	8.3	8.8	7.8	6.8	5.4
Rest of the world	10.1	9.6	5.6	7.2	12.9	15.5	10.0	11.8	6.9	9.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

3.2 Power-of-dispersion index and sensitivity-of-dispersion index analysis

Figures 1 and 2 show the power-of-dispersion index and the sensitivity-of-dispersion index for the different institutional sectors. The baseline for the index used to measure the extent of dispersion is one. The major benefit of these indices is that they enable identification of the relative position of each institutional sector in the financial market where the institutional sectors are interdependent on one another in a direct or indirect way. The power-of-dispersion index in the liability-oriented system is shown in the rows while the power-of-dispersion index in the asset-oriented system is shown in

Fig. 1 Power-of-dispersion indices in asset-oriented and liability-oriented systems in 1987 and 2002

Fig. 2 Sensitivity-of-dispersion indices in asset-oriented and liability-oriented systems in 1987 and 2002

the columns. Each institutional sector is placed in a four-quadrant graph. For example, households with excess savings are generally located in the second quadrant because they exercise more power over assets and less power over liabilities. Meanwhile, corporations with excess investment are placed in the fourth quadrant because they hold more power over liabilities and less power over assets.

Figure 1 shows the relations between the power-of-dispersion index in the liability-oriented system and the one in the asset-oriented system in 1987 and 2002. In 1987, the Bank of Korea, banks, and other financial institutions were located in the first quadrant. Individuals (most of them households), general government, and insurance and pension funds belonged to the second quadrant. All corporations and the rest of the world (overseas sector) were placed in the fourth quadrant. The Bank of Korea and the overseas sector shifted to the fourth quadrant in 1997 and the first quadrant in 1998.

Figure 2 shows the sensitivity-of-dispersion index in the liability-oriented and asset-oriented systems. Unlike in the case of the power-of-dispersion index, corporations and individuals are expected to be in the second and fourth quadrant, respectively. In 1987, the Bank of Korea, insurance and pension funds, public corporations, and the overseas sector stayed in the third quadrant, showing a neutral trend. Banks, a classic example of a financial intermediary, and other financial institutions are located in the first quadrant while the *chaebol* belong in the second quadrant. One thing to note is that, contrary to expectations, other private corporations and individuals belong to the first quadrant. Based on the data from 2000, Tsujimura and Mizoshita (2002b) demonstrated that Japanese households were located in the first quadrant. This reflects how households, characterized by excess savings, have invested in assets such as houses. We also observe a shift in the sensitivity-of-dispersion index for corporations, when private corporations moved to the second quadrant in the 1990s while the *chaebol* shifted to the third quadrant in 2002.

For corporations, all indices shifted with the exception of the power-of-dispersion index in the liability-oriented system, which stayed at the 1.2 level during this period. Both the *chaebol* and other private corporations show a downward trend in the sensitivity-of-dispersion index in the liability-oriented system. In the power-of-dispersion index in the asset-oriented system, the *chaebol* recorded 0.6 in 1987 with the figure rising to 0.68 in 2002. By contrast, the figure for private corporations fell from 0.79 to 0.59 during the same period. In the sensitivity-of-dispersion index in the asset-oriented system, the *chaebol* remained at 1.3 until the 1990s when the figure fell to 0.65 in 2002. This figure rose to 1.83 in 2002 for other corporations.

3.3 Asset portfolios of corporations

In the previous section, we showed that for *chaebol* the power index in the asset-oriented system rose from 1987 to 2002. In contrast, the index fell for other private corporations during that period. In our previous study, Kim (2013) estimated the power-of-dispersion index of private corporations in Korea and Japan from the 1970s until 2012. According to this comparative analysis, the power index in the asset-oriented system of private corporations has steadily increased in Japan, finally exceeding standards[3] after 2010. In contrast, the power index of private corporations has fallen in Korea.

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[3] The index is standardized by 1.

Going one step further, we divided private corporations between the *chaebol* and other private corporations in Korea. The decreasing tendency of the power index in the asset-oriented system of Korean private corporations is caused by characteristics of other private corporations. The power index of the *chaebol* had grown until 2002. In Japan, we find that private corporations have reduced investment in equipment and focused instead on financial investment, giving rise to the increase in the power index in the asset-oriented system.

Let us put this into perspective by looking at the financial asset ratio of the *chaebol* in Table 5. In 1997, marketable securities accounted for less than 20% of their total assets, but in 2002 this figure had risen to 54.4%. By contrast, trade credits represented more than 40% of assets until the end of the 1990s, falling to 17.4% in 2002. Table 6 shows that the asset portfolios of the *chaebol* shifted dramatically to other financial institutions. A previous study by Lee (2002) concluded that the *chaebol* found it easier to borrow money from banks in the 1980s, in contrast to the past when their major source of capital was the non-banking sector. In our study, we find that they invested more actively in non-banking financial institutions in the 2000s.

On the other hand, the real asset term is obtained by subtracting total financial assets from total liabilities. Real assets are composed of inventories, tangible assets, and intangible assets in *chaebol* data. Finished or semi-finished goods, raw materials, and other inventories are included in these inventories. Land, buildings and structures, machinery and equipment, ship vehicles and transportation equipment, construction in progress,

Table 5 Financial assets of the *chaebol* (using table *E*, in percentage)

	1987 (%)	1992 (%)	1997 (%)	1998 (%)	2002 (%)
Currency	0.3	0.1	0.0	0.0	0.0
Deposits	13.7	16.7	11.6	4.0	0.5
Securities	18.6	19.4	19.7	34.2	54.4
Trade credits	42.8	43.8	47.9	41.3	17.4
Loans	1.2	0.2	0.4	1.3	6.3
Others	23.4	19.9	20.4	19.3	21.3
Total	100.0	100.0	100.0	100.0	100.0

Table 6 Financial asset portfolios of the *chaebol* (using table *Y*, in percentage)

	1987 (%)	1992 (%)	1997 (%)	1998 (%)	2002 (%)
Bank of Korea	2.7	2.5	1.2	2.4	4.6
Banks	14.1	13.0	11.7	7.9	7.2
Insurance and pension funds	1.1	1.3	1.6	1.8	3.1
Other financial institutions	14.6	19.9	17.5	20.6	29.6
General government	1.1	0.8	1.0	1.8	3.9
Public corporations	8.1	6.0	5.5	6.3	5.4
Chaebol	18.4	25.2	30.4	28.1	13.4
Other private corporations	28.1	18.6	16.6	18.4	23.5
Individuals	11.6	12.6	13.9	11.9	7.6
Rest of the world	0.2	0.1	0.6	0.9	1.8
Total	100.0	100.0	100.0	100.0	100.0

and other tangible assets are considered tangible assets. Lastly, intangible assets contain development costs and the like. Table 7 represents the component ratio of real assets. The real asset term is composed of 26.6% inventories, 72.3% tangible assets, and 1.1% intangible assets in 1987. The ratio of inventories had steadily declined, and finally fell to 12.1% in 2002. In contrast, tangible and intangible assets had increased. Especially, growth of land and intangible assets are significant.

4 Concluding remarks

This research examined FOF analysis by adding the *chaebol* sector to asset–liability matrix with the goal of discovering the role of the *chaebol* in the financial system of Korea. Using FOF accounts and the balance sheets of the top 30 *chaebol*, we divided the private corporate sector into *chaebol* and other private corporations. We obtained new asset–liability matrices for the private corporate sector which were then restructured and analyzed in order to discover the characteristics of the *chaebol* and other private corporations during the past 15 years.

The *chaebol* of Korea, which appeared in the 1950s, rapidly accumulated wealth through foreign aid and government property transfers to private ownership. Under Park, who came to power in the 1960s, the *chaebol* dominated the product market of Korea, assisted by heavy and chemical industry policy and an import-substitution industrialization policy. The government intensively supported the *chaebol* in order to raise the competitiveness of Korean corporations in the international market. Furthermore, the financial liberalization policy of the 1980s helped the *chaebol* to enter the financial market. The *chaebol* expanded to the non-banking sector immediately, prompted by deregulation of non-bank depository institutions and the privatization of some government-owned banks. Through financial liberalization and the growth of the stock market, the fund-raising strategy of the *chaebol* changed from indirect to direct. This has been noted in previous research and is also found in the FOF accounts used in this analysis, which are composed of only financial items.

It is no exaggeration to say that the *chaebol* led the rapid economic growth of Korea. However, the concentration of economic power in the *chaebol* deepened in both the product and financial markets. According to Choi (2007), this concentration of economic power appeared not only in the economic sector, but in the non-economic sector as well. For instance, links between politics and big business broke the economic system.

Table 7 Real assets of the *chaebol* (in percentage)

	1987 (%)	1992 (%)	1997 (%)	1998 (%)	2002 (%)
Inventories	26.6	22.4	19.2	14.3	12.1
Tangible assets	72.3	76.9	80.0	84.6	82.6
Land	9.0	12.1	14.2	19.2	19.9
Buildings, structures, construction in progress	27.6	29.0	34.8	28.4	27.9
Machinery	21.0	25.1	21.7	27.4	23.8
Transportation equipment	10.0	6.8	5.2	5.6	7.0
Other tangible assets	4.6	3.9	4.2	4.0	3.9
Intangible assets	1.1	0.7	0.7	1.1	5.4
Total real as sets	100.0	100.0	100.0	100.0	100.0

Though the government imposed restraints on the *chaebol* in the late 1980s, research demonstrating a decrease in the *chaebol*'s concentration of economic power is rare.

In this paper, financial transactions of the institutional sectors (Y and Y^*) are estimated by applying an input–output analysis method. Fund-raising from banks and other financial institutions increased, while fund-raising from the corporate sector decreased for other private corporations. However, in the financial structure of the *chaebol*, we found that fund-raising from other private corporations increased, not that funds from banks decreased. On the other hand, the deposits of other private corporations in asset portfolios grew. Moreover, the fund-employment share to banks and other financial institutions[4] increased. In other words, the financial structure of small- and medium-sized corporations deeply depends on the financial sector. In contrast, for the *chaebol*, the fund-employment share to banks was sharply reduced, while other financial institutions and other private corporations appeared to expand in the *chaebol*'s asset portfolios. In addition, *chaebol* investment in securities increased drastically, accounting for about 50% of the financial assets of the *chaebol* (table E) in 2002. In other words, the *chaebol* carried out not only the corporations' original role of raising funds from other institutional sectors and producing, but also making investments as is done in the financial sector. To sum up, it seems that the *chaebol*'s concentration of economic power in the financial market and their influence on small- and medium-sized corporations were much stronger.

We also examined the four indices using a Leontief inverse matrix. We found that the power-of-dispersion indices in the asset-oriented system differed between the *chaebol* and other private corporations. Between 1987 and 2002, the former increased, while the latter decreased. In the case of the *chaebol*, excess liabilities were reduced, while investments in financial assets rose. This tendency increased the power-of-dispersion index in the asset-oriented system. Our previous research found that this index was decreased in the Korean private corporate sector. However, the index of the *chaebol* was increased when the private corporate sector was divided into the *chaebol* and small-/medium-sized corporations in the paper. Such results appear to explain the *chaebol*'s increased concentration of economic power in the Korean financial market.

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[4] We can speculate that the financial sector requires a secured loan or a compensating balance (an amount a lending institution requires a borrower to leave on deposit during the term of a loan) to small- and medium-sized enterprises.

Publisher's Note

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