THE TREND AND CYCLICAL BEHAVIOR OF THE STOCK PRICE AVERAGE OF 225 ISSUES LISTED ON THE TOKYO STOCK EXCHANGE

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I

This paper presents a summary of the results of our empirical study concerning the trend and cycles of general stock price movements in Japan during the past few decades.

For simplicity the following notations are used.

P........the stock price average of 225 issues listed on the Tokyo Stock Exchange, which is similar in type to the Dow-Jones Industrial Average.

DP ....the daily closing value of *P*.
DP of a specific day is denoted by, for example, *DP* [May 5, 1974].

MP......the simple average of *DP*'s in each calendar month.
MP of a specific month is denoted by, for example, *MP* [May 1974].

3MP ....the simple average of *MP*'s in each set of three successive months.
A specific *3MP* is denoted by, for example, *3MP* [~Feb. 1974], which indicates the average of *MP*'s in Dec. 1973, Jan. 1974 and Feb. 1974.

4MP ....the simple average of *MP*'s in each set of four successive months.
The notation for a specific *4MP* is similar to the case of *3MP*.

5MP ....the simple average of *MP*'s in each set of five successive months.
The notation for a specific *5MP* is similar to the case of *3MP*.

6MP ....the simple average of *MP*'s in each set of six successive months.
The notation for a specific *6MP* is similar to the case of *3MP*.

35*MP*....the simple average of *MP*'s in each set of thirty five successive months.
A specific *35MP* is denoted by, for example, *35MP* [~Nov. 1967], which indicates the average of *MP*'s in the period of 35 months from Jan. 1965 to Nov. 1967.

36MP....the simple average of *MP*'s in each set of thirty six successive months.
The notation for a specific *36MP* is similar to the case of *35MP*.

48MP....the simple average of *MP*'s in each set of forty eight successive months.

60MP....the simple average of *MP*'s in each set of sixty successive months.

E or *E* [~*t*]....the "adjusted" average earnings of the 225 stocks of *P*, calculated so as to match *P*, whose basic data include each issue's earnings per share for its latest accounting period ending in the month *t* or earlier. (As to every stock whose issuing company closes its accounts semiannually, as is generally the case among listed

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Japanese companies, we doubled the earnings per share for the accounting period of six months in order to put it on annual basis.)

To get $E\,[\sim t]$, we adopted the method of multiplying the simple average of those earnings-per-share amounts as mentioned above by the ratio of *DP* at the end of the month t to the simple average price of the 225 issues at the same point of time.

A specific E is denoted by, for example, E [$\sim$ Mar. 1970], which indicates the specific E based on each issue's earnings per share for its latest accounting period ending in Mar. 1970 or earlier.

YE or *YE* $[\sim t]$....the simple average of $E\,[\sim t-6]$ and $E\,[\sim t]$.

For example, *YE* [$\sim$Aug. 1965] is the simple average of E [$\sim$Feb. 1965] and E [$\sim$Aug. 1965].

3YE or *3YE* $[\sim t]$....the simple average of *YE* $[\sim t-24]$, *YE* $[\sim t-12]$ and *YE* $[\sim t]$.

For example, *3YE* [$\sim$Sep. 1971] is the simple average of *YE* [$\sim$Sep. 1969], *YE* [$\sim$Sep. 1970] and *YE* [$\sim$Sep. 1971].

D or $D\,[\sim t]$....the "adjusted" average dividends of the 225 issues of P, calculated in a similar way to the case of E so as to match P.

A specific D is denoted by, for example, D [$\sim$Jul. 1956], which indicates the specific D based on each issue's dividend per share for its latest accounting period ending in Jul. 1956 or earlier.

YD or *YD* $[\sim t]$....the simple average of $D\,[\sim t-6]$ and $D\,[\sim t]$.

3YD or *3YD* $[\sim t]$....the simple average of *YD* $[\sim t-24]$, *YD* $[\sim t-12]$ and *YD* $[\sim t]$.

Our study is an attempt to identify the trend and cycles of general stock price movements and relate them to the trend and cycles of earnings and dividends, using the available data of P as a representative index of general stock price movements in Japan. We will give a summary report of the results of our study in the following sections.

II

To identify the cyclical behavior of P, we have chosen the use of *5MP*, after calculating *4MP*, *5MP* and *6MP* and depicting them on a time-series graph. *4MP* is the most fluctuant of them and seems to be affected by shorter-term swings to a considerable extent. *6MP* has the smoothest behavior among them, but it seems to blur the cyclical peaks and troughs substantially more than *5MP*. Thus we have chosen *5MP* as a representative indicator of P's cyclical behavior.

The cyclical peaks and troughs of P as indicated by the movements of *5MP* are shown in Table 1, which also includes the related peaks and troughs of *DP* as data of reference.

These cyclical peaks and troughs divide the whole period where we can calculate *5MP* from available data into several periods of cyclical upswings and several periods of cyclical downswings as shown in Table 2, which also include the length of each period in terms of months, the ratio of *5MP* at the end of each period to *5MP* at the beginning of the same period, and the *5MP*'s annual rate of change in each period computed on compound interest basis.

Any period in the table has either "a" or "b" in its designation. The letter "a" indicates a period of cyclical upswing, and "b" a period of cyclical downswing.

TABLE 1. CYCLICAL PEAKS AND TROUGHS OF *5MP*

specification of *5MP*	*5MP*	peak or trough	related peaks or troughs of *DP*
~ Jul. 1950	96.01	trough	*DP* [Jul. 6, 1950]=85.25
~ Dec. 1953	420.75	peak	*DP* [Feb. 4, 1953]=474.43, *DP* [Sep. 30, 1953]=450.78
~ Jul. 1954	334.66	trough	*DP* [Mar. 22, 1954]=314.08, *DP* [Nov. 13, 1954]=315.61
~ Apr. 1957	571.19	peak	*DP* [May 4, 1957]=595.46
~ Feb. 1958	509.37	trough	*DP* [Jul. 25, 1957]=472.43, *DP* [Dec. 27, 1957]=471.53
~ Aug. 1961	1691.40	peak	*DP* [Jul. 18, 1961]=1829.74
~ Dec. 1962	1371.98	trough	*DP* [Oct. 29, 1962]=1216.04
~ Jul. 1963	1553.04	peak	*DP* [Apr. 5, 1963]=1634.37
~ Aug. 1965	1118.50	trough	*DP* [Jul. 12, 1965]=1020.49
~ Jul. 1966	1529.96	peak	*DP* [Apr. 1, 1966]=1588.73, *DP* [May 12, 1966]=1582.73
~ Mar. 1968	1317.15	trough	*DP* [Dec. 11, 1967]=1250.14
~ Apr. 1970	2366.68	peak	*DP* [Apr. 6, 1970]=2534.45
~ Jan. 1971	2073.94	trough	*DP* [May 27, 1970]=1929.64, *DP* [Dec. 8, 1970]=1963.40
~ Apr. 1973	5014.57	peak	*DP* [Jan. 24, 1973]=5359.74

TABLE 2. CYCLICAL UPSWINGS AND DOWNSWINGS OF *5MP*

designation of each period	beginning with *5MP* [ ]*	ending with *5MP* [ ]**	length (months)	*5MP* [ ]** / *5MP* [ ]*	annual rate of change (per cent)
period-Ob	(~ Sep. 1949)	~ Jul. 1950	(10)	(.5942)	(△ 46.45)
period-1a	~ Jul. 1950	~ Dec. 1953	41	4.3824	54.11
period-1b	~ Dec. 1953	~ Jul. 1954	7	.7954	△ 32.46
period-2a	~ Jul. 1954	~ Apr. 1957	33	1.7068	21.45
period-2b	~ Apr. 1957	~ Feb. 1958	10	.8918	△ 12.84
period-3a	~ Feb. 1958	~ Aug. 1961	42	3.3206	40.90
period-3b	~ Aug. 1961	~ Dec. 1962	16	.8112	△ 14.53
period-4a	~ Dec. 1962	~ Jul. 1963	7	1.1320	23.68
period-4b	~ Jul. 1963	~ Aug. 1965	25	.7202	△ 14.58
period-5a	~ Aug. 1965	~ Jul. 1966	11	1.3675	40.70
period-5b	~ Jul. 1966	~ Mar. 1968	20	.8609	△ 7.91
period-6a	~ Mar. 1968	~ Apr. 1970	25	1.7968	32.48
period-6b	~ Apr. 1970	~ Jan. 1971	9	.8763	△ 16.14
period-7a	~ Jan. 1971	~ Apr. 1973	27	2.4179	48.05
period-7b	~ Apr. 1973	(?)	(?)	(?)	(?)

Note: Sign △ means minus.

The period-Ob might or might not cover a full downswing, because the Tokyo Stock Exchange was established and began trading in May 1949 and therefore the earliest *5MP* obtainable is *5MP* [~Sep. 1949] standing at 161.57 points. Thus we put in parentheses the related entries in the table except one in the "ending . . . ." column.

The period-7b is indeterminable as to its ending point, because the relevant downswing is now in progress. Hence appeared the entries of question marks in the table.

The other periods include seven periods of upswings (1a~7a) and six periods of downswings (1b~6b). The length of an upswing period ranges from 42 months (3a) to 7 months (4a), having the mean of 26.6 months, while the length of a downswing period ranges from 25 months (4b) to 7 months (1b), having the mean of 14.5 months. If we take into account the period-7b, which has already passed through 19 months, the mean value of a downswing period will be 15.1 months or more.

The length of a cycle, when an "a" period is combined with the next period (being always "b"), ranges from 58 months (3a+3b) to 31 months (5a+5b) among the six full cycles, having the mean of 41 months, that is, three years and five months. On the other hand, the length of a cycle consisting of a "b" period and the next period (being always "a") ranges from 52 months (2b+3a) to 23 months (3b+4a) among the six full cycles, having the mean of 38.7 months, that is, three years and nearly three months. In the former case, if we take into account the period-7b, the average length of a cycle among the seven cycles will be 41.7 months or more. In the latter case, if we take into account the period-Ob, the average length of a cycle among the seven cycles can be regarded as 40.4 months or more.

The annual rate of change in *5MP* in each upswing period ranges from 54.11 per cent (1a) to 21.45 per cent (2a), while that of each downswing period ranges from minus 32.46 per cent (1b) to minus 7.91 per cent (5b), apart from minus 46.45 per cent in the period-Ob. By the way, the annual rate of change in *5MP* from the trough of *5MP* [~Jul. 1950] to the trough of *5MP* [~Jan. 1971] stands at 16.17 per cent.

III

In the attempt to identify the trend which penetrates the successive cycles of *P*, we first calculated *36MP*, *48MP* and *60MP* and depicted them on a time-series graph. Among them *36MP* seems to have the smoothest path and penetrate each of the successive cycles of *5MP* most appropriately. The use of *36MP* for identifying *P*'s trend, however, will require a somewhat arbitrary treatment when comparing *36MP* with *5MP* representing *P*'s cyclical behavior, because the central point of the period covered by each *36MP* does not correspond to that in the case of *5MP*. We have, therefore, decided to use *36MP* as a representative indicator of *P*'s trend except when comparisons with *5MP* are made, and to substitute *35MP* in those comparisons.

Table 3 summarizes the trend of *P* as represented by the behavior of *36MP*. The earliest *36MP* obtainable is *36MP* [~Apr. 1952], the latest being *36MP* [~Nov. 1974]. The whole period where we can calculate *36MP* from available data is divided into three periods (I~III) according to whether *36MP* was rising or falling.

TABLE 3. BEHAVIOR OF *36MP*

period		length (months)	*36MP*[ ]** / *36MP*[ ]*	annual rate of change (per cent)
I	beginning with *36MP* [~ Apr. 1952]*=133.20 ending with *36MP* [~ Nob. 1963]**=1471.73	139	11.0490	23.05
II	beginning with *36MP* [~ Nov. 1963]*=1471.73 ending with *36MP* [~ Jul. 1966]**=1298.69	32	.8824	△ 4.58
III	beginning with *36MP* [~ Jul. 1966]*=1298.69 ending with *36MP* [~ Nov. 1974]**=4225.35	100	3.2535	15.21
the whole period		271	31.7218	16.54

Note: Sign △ means minus.

TABLE 4. BEHAVIOR OF THE RATIO OF *5MP* TO *35 MP*

from [in terms	to of *5MP*]	length (months)	the ratio is	highest (H) or lowest (L)
5MP [~ Dec. 1950]	*5MP* [~ Oct. 1952]	23	<1	L .8132···*5MP* [~ Jan. 1951]
5MP [~ Nov. 1952]	*5MP* [~ Apr. 1954]	18	>1	H 1.2722···*5MP* [~ Mar. 1953]
5MP [~ May 1954]	*5MP* [~ Apr. 1956]	24	<1	L .9006···*5MP* [~ Jul. 1955]
5MP [~ May 1956]	*5MP* [~ Aug. 1957]	16	>1	H 1.1317···*5MP* [~ Apr. 1957]
5MP [~ Sep. 1957]	*5MP* [~ Dec. 1960]	40	<1	L .8809···*5MP* [~ Mar. 1958]
5MP [~ Jan. 1961]	*5MP* [~ Dec. 1961]	12	>1	H 1.2440···*5MP* [~ Aug. 1961]
5MP [~ Jan. 1962]	*5MP* [~ Feb. 1963]	14	<1	L .9447···*5MP* [~ Oct. 1962]
5MP [~ Mar. 1963]	*5MP* [~ Nov. 1963]	9	>1	H 1.1238···*5MP* [~ Jul. 1963]
5MP [~ Dec. 1963]	*5MP* [~ Jan. 1966]	26	<1	L .8521···*5MP* [~ Aug. 1965]
5MP [~ Feb. 1966]	*5MP* [~ Jul. 1967]	18	>1	H 1.1247···*5MP* [~ Jun. 1966]
5MP [~ Aug. 1967]	*5MP* [~ Apr. 1969]	21	<1	L .8562···*5MP* [~ Mar. 1968]
5MP [~ May 1969]	*5MP* [~ Jul. 1970]	15	>1	H 1.1290···*5MP* [~ Apr. 1970]
5MP [~ Aug. 1970]	*5MP* [~ Jul. 1972]	24	<1	L .7940···*5MP* [~ Feb. 1971]
5MP [~ Aug. 1972]	*5MP* [~ Aug. 1973]	13	>1	H 1.2337···*5MP* [~ Mar. 1973]
the whole period		273		
		(172)	<1	L .7940···*5MP* [~ Feb. 1971]
		(101)	>1	H 1.2722···*5MP* [~ Mar. 1953]

Table 4 gives a summary of comparisons between *5MP* and *35MP* by each couple of them having the same central point of the period covered. The earliest couple obtainable is *5MP* [~Dec. 1950]: *35MP* [~Mar. 1952], the latest being *5MP* [~Aug. 1973]: *35MP* [~Nov. 1974]. The table summarizes those comparisons by using the ratio of *5MP* to *35MP* and dividing the whole period into several periods where the ratio continued to be more than unity and several periods where the ratio continued to be less than unity.

The highest of the ratios in each period where the ratio remained more than unity and the lowest of the ratios in each period where the ratio remained less than unity are included in the table to show the cyclical movements of the ratio, "H" indicating each of its cyclical peaks and "L" indicating each of its cyclical troughs. These peaks and troughs coincide six times with those of *5MP* cycles already shown in Table 1, lead the latter four times, and lag behind the latter four times. While four of the seven H's coincide with the peaks of *5MP* and three lead the latter (by a month twice and by nine months once), four of the seven L's lag behind the troughs of *5MP* (by a month twice, by seven months once and by twelve months once), only two coincide with the latter and only one leads the latter by two months.

We may note here that *35MP* grew from its earliest value obtainable, that is, *35MP* [~Mar. 1952] standing at 131.54 points, to *35MP* [~Oct. 1963] standing at 1476.59 points at an annual rate of 23.22 per cent through 139 months, and declined thereafter to 1292.67 points of *35MP* [~Apr. 1966] at an annual rate of minus 5.18 per cent through 30 months, and rose again to 4273.91 points of *35MP* [~Nov. 1974] at an annual rate of 14.95 per cent through 103 months.

IV

In the attempt to identify the trends of *E* and *D*, we calculated *3YE* [~*t*] and *3YD*

[∼*t*], but we found that both of their movements contained many minor fluctuations. To get rid of these disturbances, we have tentatively chosen the way of sketching the trends of *E* and *D* by extracting regularly one out of every six values of *3YE* and of *3YD* and connecting those extracted values to form a trendline respectively. Specifically, the series of extracted *3YE* begins with *3YE* [∼Apr. 1954] which is the earliest *3YE* obtainable from

TABLE 5. TRENDS OF *36MP*, *3YE* AND *3YD*

levels							percentage change					3YD
specification of 36MP	36MP	specification of 3YE, 3YD	3YE	3YD	36MP/3YE	36MP/3YD	36MP	3YE	3YD	36MP/3YE	36MP/3YD	3YE (%)
∼ Oct. 1953	240.25	∼ Apr. 1954	67.767		3.55							
∼ Apr. 1954	282.92	∼ Oct. 1954	60.510	24.970	4.68	11.33	17.76	△10.71		31.83		41.3
∼ Oct. 1954	316.29	∼ Apr. 1955	57.712	25.833	5.48	12.24	11.79	△ 4.62	3.46	17.09	8.03	44.8
∼ Apr. 1955	345.51	∼ Oct. 1955	56.710	26.256	6.09	13.16	9.24	△ 1.74	1.64	11.13	7.52	46.3
∼ Oct. 1955	365.28	∼ Apr. 1956	56.813	26.784	6.43	13.64	5.72	.18	2.01	5.58	3.65	47.1
∼ Apr. 1956	375.10	∼ Oct. 1956	55.937	28.191	6.71	13.31	2.69	△ 1.64	5.25	4.35	△ 2.42	50.4
∼ Oct. 1956	393.09	∼ Apr. 1957	55.942	29.735	7.03	13.22	4.80	.01	5.48	4.77	△ .68	53.2
∼ Apr. 1957	425.37	∼ Oct. 1957	57.735	31.223	7.37	13.62	8.21	3.21	5.00	4.84	3.03	54.1
∼ Oct. 1957	455.72	∼ Apr. 1958	56.987	32.168	8.00	14.17	7.13	△ 1.30	3.03	8.55	4.04	56.4
∼ Apr. 1958	483.22	∼ Oct. 1958	55.335	33.366	8.73	14.48	6.03	△ 2.90	3.72	9.13	2.19	60.3
∼ Oct. 1958	518.19	∼ Apr. 1959	54.027	34.189	9.59	15.16	7.24	△ 2.36	2.47	9.85	4.70	63.3
∼ Apr. 1959	561.66	∼ Oct. 1959	53.530	34.532	10.49	16.26	8.39	△ .92	1.00	9.38	7.26	64.5
∼ Oct. 1959	621.18	∼ Apr. 1960	53.923	35.093	11.52	17.70	10.60	.73	1.62	9.82	8.86	65.1
∼ Apr. 1960	690.85	∼ Oct. 1960	55.200	36.398	12.52	18.98	11.22	2.37	3.72	8.68	7.23	65.9
∼ Oct. 1960	792.05	∼ Apr. 1961	59.938	38.938	13.21	20.34	14.65	8.58	6.98	5.51	7.17	65.0
∼ Apr. 1961	949.04	∼ Oct. 1961	67.355	42.730	14.09	22.21	19.82	12.37	9.74	6.66	9.19	63.4
∼ Oct. 1961	1122.69	∼ Apr. 1962	74.455	46.918	15.08	23.93	18.30	10.54	9.80	7.03	7.74	63.0
∼ Apr. 1962	1245.88	∼ Oct. 1962	79.952	50.593	15.58	24.63	10.97	7.38	7.83	3.32	2.93	63.3
∼ Oct. 1962	1334.92	∼ Apr. 1963	83.453	53.430	16.00	24.98	7.15	4.38	5.61	2.70	1.42	64.0
∼ Apr. 1963	1418.43	∼ Oct. 1963	86.680	56.111	16.36	25.28	6.26	3.87	5.02	2.25	1.20	64.7
∼ Oct. 1963	1471.53	∼ Apr. 1964	90.725	58.292	16.22	25.24	3.74	4.67	3.89	△ .86	△ .16	64.3
∼ Apr. 1964	1438.21	∼ Oct. 1964	92.555	59.528	15.54	24.16	△ 2.26	2.02	2.12	△ 4.19	△ 4.28	64.3
∼ Oct. 1964	1381.85	∼ Apr. 1965	93.130	60.019	14.84	23.02	△ 3.92	.62	.82	△ 4.50	△ 4.72	64.4
∼ Apr. 1965	1344.90	∼ Oct. 1965	94.008	60.046	14.31	22.40	△ 2.67	.94	.04	△ 3.57	△ 2.69	63.9
∼ Oct. 1965	1306.51	∼ Apr. 1966	95.500	60.293	13.68	21.67	△ 2.85	1.59	.41	△ 4.40	△ 3.26	63.1
∼ Apr. 1966	1300.43	∼ Oct. 1966	97.692	60.212	13.31	21.60	△ .47	2.30	△ .13	△ 2.70	△ .32	61.6
∼ Oct. 1966	1307.14	∼ Apr. 1967	100.113	59.986	13.06	21.79	.52	2.48	△ .38	△ 1.88	.88	59.9
∼ Apr. 1967	1337.01	∼ Oct. 1967	104.728	60.006	12.77	22.28	2.29	4.61	.03	△ 2.22	2.25	57.3
∼ Oct. 1967	1360.02	∼ Apr. 1968	111.365	60.902	12.21	22.33	1.72	6.34	1.49	△ 4.39	.22	54.7
∼ Apr. 1968	1380.83	∼ Oct. 1968	120.235	62.682	11.48	22.03	1.53	7.96	2.92	△ 5.98	△ 1.34	52.1
∼ Oct. 1968	1458.51	∼ Apr. 1969	130.360	65.035	11.19	22.43	5.63	8.42	3.75	△ 2.53	1.82	49.9
∼ Apr. 1969	1514.19	∼ Oct. 1969	141.930	68.189	10.67	22.21	3.82	8.88	4.85	△ 4.65	△ .98	48.0
∼ Oct. 1969	1593.48	∼ Apr. 1970	154.285	71.366	10.33	22.33	5.24	8.70	4.66	△ 3.19	.54	46.3
∼ Apr. 1970	1742.46	∼ Oct. 1970	167.795	74.905	10.38	23.26	9.35	8.76	4.96	.48	4.16	44.6
∼ Oct. 1970	1857.07	∼ Apr. 1971	178.880	78.401	10.38	23.69	6.58	6.61	4.67	.00	1.85	43.8
∼ Apr. 1971	1997.82	∼ Oct. 1971	183.720	80.901	10.87	24.69	7.58	2.71	3.19	4.72	4.22	44.0
∼ Oct. 1971	2137.98	∼ Apr. 1972	186.470	82.229	11.47	26.00	7.02	1.50	1.64	5.52	5.31	44.1
∼ Apr. 1972	2310.28	∼ Oct. 1972	188.340	82.924	12.27	27.86	8.09	1.00	.85	6.97	7.15	44.0
∼ Oct. 1972	2634.87	∼ Apr. 1973	196.308	84.303	13.42	31.25	14.05	4.23	1.66	9.37	12.17	42.9
∼ Apr. 1973	3071.17	∼ Oct. 1973	210.358	85.810	14.60	35.79	16.56	7.16	1.79	8.79	14.53	40.8
∼ Oct. 1973	3505.35	∼ Apr. 1974	224.033	87.610	15.65	40.01	14.14	6.50	2.10	7.19	11.79	39.1

available data, and goes through *3YE* [~Oct. 1954], *3YE* [~Apr. 1955], *3YE* [~Oct. 1955] and so on, terminating at *3YE* [~Apr. 1974]. On the other hand, the series of extracted *3YD* starts with *3YD* [~Oct. 1954] which is the earliest *3YD* obtainable from available data, and goes through *3YD* [~Apr. 1955], *3YD* [~Oct. 1955], *3YD* [~Apr. 1956] and so on, terminating at *3YD* [~Apr. 1974].

Table 5 shows the values of these *3YE* and *3YD*, and compares them with those of the extracted *35MP* which sit six months ahead of them, since it is generally accepted that stock prices are primarily influenced by the anticipated earnings and dividends in the near future. The table also shows the values of *36MP* [~t] / *3YE* [~$t+6$] and *36MP* [~t]/ *3YD* [~$t+6$], and the percentage change of each [~t] value compared with [~$t-6$] value in each of the five series. (The payout ratios *3YD* [~t] / *3YE* [~t] are added as reference data.)

The *36MP* series had a rising tendency until [~Oct. 1963], then a declining one until [~Apr. 1966], and again a rising one afterward. The *3YE* series had a declining tendency until [~Oct. 1959] and then rose continuously. The *3YD* series continued to rise over the whole period except in [~Oct. 1966] and [~Apr. 1967]. The *36MP* / *3YE* series and the *36MP* / *3YD* series had in common a rising tendency until *36MP* [~Apr. 1963], then a declining one until *36MP* [~Oct. 1969], and again a rising one afterward. A summary picture of these performances is given in Table 6.

While it is clear that *36MP* is inversely correlated with *3YE* until *36MP* [~Apr. 1959], there seems to be a high positive correlation between *36MP* since [~Apr. 1959] and *3YE* since [Oct. 1959]. The linear regression analysis of these two series consisting of thirty values respectively has produced the following equation (T1).

TABLE 6. A SUMMARY OF THE PERFORMANCES OF *36MP*, *3YE* AND *3YD*

from (in terms of *36MP*)	to	*36MP*	*3YE*	*3YD*	*36MP* / *3YE*	*36MP* / *3YD*
(1) the ratio of the ending value to the starting value in each period						
~ Oct. 1953	~ Apr. 1959	2.3378	.7899	*1.3829	2.9549	*1.4351
~ Apr. 1959	~ Apr. 1963	2.5254	1.6193	1.6249	1.5596	1.5547
~ Apr. 1963	~ Oct. 1970	1.3092	2.0637	1.3972	.6345	.9371
~ Oct. 1970	~ Oct. 1973	1.8876	1.2524	1.1175	1.5077	1.6889
~ Oct. 1959	~ Oct. 1973	5.6431	4.1547	2.4965	1.3585	2.2605
the whole period		14.5904	3.3059	*3.5086	4.4085	*3.5313
(2) the annual rate of change in each period (per cent)						
~ Oct. 1953	~ Apr. 1959	16.70	△ 4.20	*6.70	21.77	*7.49
~ Apr. 1959	~ Apr. 1963	26.06	12.81	12.90	11.75	11.66
~ Apr. 1963	~ Oct. 1970	3.66	10.14	4.56	△ 5.89	△ .86
~ Oct. 1970	~ Oct. 1973	23.59	7.79	3.77	14.67	19.09
~ Oct. 1959	~ Oct. 1973	13.16	10.71	6.75	2.21	6.00
the whole period		14.34	6.16	*6.65	7.70	*6.68

Note: Sign * indicates that they start with *3YD* [~ Oct. 1954] and *36MP* [~ Apr. 1954].
Sign △ means minus.

(T1) $36MP = 106.87 + 12.02 \cdot 3YE$ $\begin{Bmatrix} \text{from } 36MP\ [\sim \text{Apr. } 1959] \\ \text{to } 36MP\ [\sim \text{Oct. } 1973] \end{Bmatrix}$

The coefficient of determination is 0.854, and the constant term and the coefficient of *3YE* can be regarded as reasonably representing a stable relationship between *36MP* and *3YE*.

The behavior of *36MP / 3YD* series and the results of the analyses as shown in (T1) and the following (T2)~(T6) suggest that it would be better to use both *3YD* and the retained earnings (*3YE—3YD*) as independent variables than to use *3YD* alone.

(T2) $36MP = -719.96 + 36.70 \cdot 3YD$ $\begin{Bmatrix} \text{from } 36MP\ [\sim \text{Apr. } 1954] \\ \text{to } 36MP\ [\sim \text{Oct. } 1973] \end{Bmatrix}$

The coefficient of determination is 0.899, and the marginal dividend yield equivalent to the marginal *36MP / 3YD* is 2.72 per cent.

(T3) $36MP = -867.06 + 38.85 \cdot 3YD$ $\begin{Bmatrix} \text{from } 36MP\ [\sim \text{Apr. } 1959] \\ \text{to } 36MP\ [\sim \text{Oct. } 1973] \end{Bmatrix}$

The coefficient of determination is 0.828, and the equivalent marginal dividend yield is 2.57 per cent.

(T4) $36MP = -1122.89 + 42.44 \cdot 3YD$ $\begin{Bmatrix} \text{from } 36MP\ [\sim \text{Apr. } 1961] \\ \text{to } 36MP\ [\sim \text{Oct. } 1973] \end{Bmatrix}$

The coefficient of determination is 0.774, and the equivalent marginal dividend yield is 2.36 per cent.

(T5) $36MP = -249.24 + 27.00 \cdot 3YD$ $\begin{Bmatrix} \text{from } 36MP\ [\sim \text{Apr. } 1959] \\ \text{to } 36MP\ [\sim \text{Apr. } 1971] \end{Bmatrix}$

The coefficient of determination is 0.948, and the equivalent marginal dividend yield is 3.70 per cent.

(T6) $36MP = -0.80 + 23.15 \cdot 3YD$ $\begin{Bmatrix} \text{from } 36MP\ [\sim \text{Apr. } 1961] \\ \text{to } 36MP\ [\sim \text{Apr. } 1971] \end{Bmatrix}$

The coefficient of determination is 0.895, and the equivalent marginal dividend yield, which is approximately equal to the equivalent average dividend yield in this case, is 4.32 per cent. The constant term and the coefficient of *3YD* can be regarded as reasonably representing a stable relationship between *36MP* and *3YD*.

The regression analyses involving both *3YD* and the retained earnings have produced the following (T7) and (T8).

(T7) $36MP = -183.54 + 19.65 \cdot 3YD + 8.83\ (3YE - 3YD)$

$\begin{Bmatrix} \text{from } 36MP\ [\sim \text{Apr. } 1959] \\ \text{to } 36MP\ [\sim \text{Oct. } 1973] \end{Bmatrix}$

The coefficient of determination is 0.858, and the coefficient of (*3YE—3YD*) is less than half of that of *3YD*.

(T8) $36MP = 208.67 + 11.18 \cdot 3YD + 11.54\ (3YE - 3YD)$

$\begin{Bmatrix} \text{from } 36MP\ [\sim \text{Apr. } 1961] \\ \text{to } 36MP\ [\sim \text{Oct. } 1973] \end{Bmatrix}$

The coefficient of determination is 0.807, and the coefficient of (*3YE—3YD*) is a little above that of *3YD*.

In representing a stable function as to the levels of *36MP*, (T7) is preferable to (T3), but is inferior to (T1), carrying virtually no better coefficient of determination than (T1).

As for (T8), in representing a stable function as to the levels of *36MP*, it is preferable to (T4), but is no better than (T1) which covers a longer period including the period of (T8), and bears a somewhat lower coefficient of determination than (T1). Using the two components of earnings (dividends and retained earnings) in (T7) and (T8), instead of earnings as a whole used in (T1), to explain the levels of *36MP* has made no improvements over (T1). However, the series of residuals in (T1) has only four runs, thus suggesting the necessity of further analyses about the behavior of *36MP*.

V

In the analyses to relate the cyclical behavior of *P* to the cyclical movements of earnings and / or dividends, we have employed those rate-of-change variables which we mention below together with their notations, rather than such level variables as *5MP*, *E*, *YE*, *D* and *YD*, because all of these level variables reflect heavily their relatively rapid growth trends as shown in Tables 5 and 6, and make the regression analyses using them almost fruitless in explaining *P's* cyclical movements, and because it seems advisable to include an independent variable representing the rate of change in *P* along its somewhat smoothed path in the immediate past.

The rate-of-change variables introduced here and their notations are:

$r_{6m}(5MP)$ or $r_{6m}(5MP;\ \sim t)$....the percentage change of *5MP* $[\sim t]$ as compared with *5MP* $[\sim t-6]$.

$r_{6m}(3MP)$ or $r_{6m}(3MP;\ \sim t)$....the percentage change of *3MP* $[\sim t]$ as compared with *3MP* $[\sim t-6]$.

$r_{6m}(MP)$ or $r_{6m}(MP;\ t)$....the percentage change of *MP* $[t]$ as compared with *MP* $[t-6]$.

$r_{5m}(5MP)$ or $r_{5m}(5MP;\ \sim t)$....the percentage change of *5MP* $[\sim t]$ as compared with *5MP* $[\sim t-5]$.

$r_{4m}(4MP)$ or $r_{4m}(4MP;\ \sim t)$....the percentage change of *4MP* $[\sim t]$ as compared with *4MP* $[\sim t-4]$.

$r_{3m}(3MP)$ or $r_{3m}(3MP;\ \sim t)$....the percentage change of *3MP* $[\sim t]$ as compared with *3MP* $[\sim t-3]$.

$r_{6m}(E)$ or $r_{6m}(E;\ \sim t)$....the percentage change of *E* $[\sim t]$ as compared with *E* $[\sim t-6]$.

$r_{6m}(YE)$ or $r_{6m}\ (YE;\ \sim t)$....the percentage change of *YE* $[\sim t]$ as compared with *YE* $[\sim t-6]$.

$r_{6m}(D)$ or $r_{6m}(D;\ \sim t)$....the percentage change of *D* $[\sim t]$ as compared with *D* $[\sim t-6]$.

$r_{6m}(YD)$ or $r_{6m}(YD;\ \sim t)$....the percentage change of *YD* $[\sim t]$ as compared with *YD* $[\sim t-6]$.

Table 7 shows the cyclical upswings and downswings of *P* as identified by the behavior of r_{6m} (*5MP*) according to whether r_{6m} (*5MP*) does remain predominantly in the plus area or predominantly in the minus area. The earliest r_{6m} (*5MP*) obtainable from available data is $r_{6m}(5MP;\ \sim$ Mar. 1950), the latest being $r_{6m}(5MP;\ \sim$ Nov. 1974).

Setting aside (1) which might or might not cover a full downswing and (15) whose downswing is now in progress, we have seven upswings and six downswings. But, in view of the available data of earnings and dividends which do not suffice to cover (2) fully, we have decided to take up the period comprising (3) $\sim$ (14) for analysis. This period has

TABLE 7. CYCLICAL UPSWINGS AND DOWNSWINGS OF P AS IDENTIFIED BY THE BEHAVIOR OF r_{6m} ($5MP$)

from	to	upswing or downswing	length (months)
(1) (~ Mar. 1950)	~ Oct. 1950	downswing	(8)
(2) ~ Nov. 1950	~ Mar. 1954	upswing	41
(3) ~ Apr. 1954	~ Nov. 1954	downswing	8
(4) ~ Dec. 1954	~ Jul. 1957	upswing	32
(5) ~ Aug. 1957	~ Mar. 1958	downswing	8
(6) ~ Apr. 1958	~ Oct. 1961	upswing	43
(7) ~ Nov. 1961	~ Feb. 1963	downswing	16
(8) ~ Mar. 1963	~ Sep. 1963	upswing	7
(9) ~ Oct. 1963	~ Oct. 1965	downswing	25
(10) ~ Nov. 1965	~ Sep. 1966	upswing	11
(11) ~ Oct. 1966	~ May 1968	downswing	20
(12) ~ Jun. 1968	~ Jul. 1970	upswing	26
(13) ~ Aug. 1970	~ Feb. 1971	downswing	7
(14) ~ Mar. 1971	~ Jul. 1973	upswing	29
(15) ~ Aug. 1973	~ (?)	downswing	(?)

a length of 232 months in terms of t as included in r_{6m} ($5MP$; $\sim t$), and contains six cycles, each consisting of a downswing period and its successor (being an upswing period). By the way, the length of each cycle ranges from 51 months (5+6) to 23 months (7+8), with the mean value of 38.7 months.

The results of our attempts to explain the behavior of r_{6m} ($5MP$) throughout the six cycles by one or more of the other rate-of-change variables are as follows. Here, figures in parentheses under the coefficients are their standard errors, $\bar{R}^2$ is the coefficient of determination adjusted for degrees of freedom, and S is the standard deviation of residuals.

$$\text{(C1)}\quad r_{6m}\ (5MP;\ \sim t) = \underset{(0.7859)}{4.1066} + \underset{(0.0678)}{0.6927}\cdot r_{6m}\ (E;\ \sim t+6)$$

$$\bar{R}^2=0.309,\ S=10.87$$

$$\text{(C2)}\quad r_{6m}\ (5MP;\ \sim t) = \underset{(0.6841)}{2.6143} + \underset{(0.0659)}{0.3837}\cdot r_{6m}\ (E;\ \sim t+6) + \underset{(0.0858)}{0.8197}\cdot r_{3m}\ (3MP;\ \sim t-5)$$

$$\bar{R}^2=0.504,\ S=9.21$$

$$\text{(C3)}\quad r_{6m}\ (5MP;\ \sim t) = \underset{(0.7647)}{2.8874} + \underset{(0.0735)}{0.4769}\cdot r_{6m}\ (E;\ \sim t+6) + \underset{(0.0794)}{0.4611}\cdot r_{4m}\ (4MP;\ \sim t-5)$$

$$\bar{R}^2=0.395,\ S=10.17$$

$$\text{(C4)}\quad r_{6m}\ (5MP;\ \sim t) = \underset{(0.8092)}{3.2480} + \underset{(0.0766)}{0.5625}\cdot r_{6m}\ (E;\ \sim t+6) + \underset{(0.0725)}{0.2458}\cdot r_{5m}\ (5MP;\ \sim t-5)$$

$$\bar{R}^2=0.339,\ S=10.63$$

$$\text{(C5)}\ r_{6m}\ (5MP;\ \sim t) = \underset{(0.7541)}{2.9055} + \underset{(0.0769)}{0.9703}\cdot r_{6m}\ (YE;\ \sim t+11)$$
$$\bar{R}^2=0.406,\ S=10.08$$

$$\text{(C6)}\ r_{6m}\ (5MP;\ \sim t) = \underset{(0.6461)}{1.6272} + \underset{(0.0720)}{0.6553}\cdot r_{6m}\ (YE;\ \sim t+11) + \underset{(0.0766)}{0.7560}\cdot r_{3m}\ (3MP;\ \sim t-5)$$
$$\bar{R}^2=0.582,\ S=8.46$$

$$\text{(C7)}\ r_{6m}\ (5MP;\ \sim t) = \underset{(0.7255)}{1.7689} + \underset{(0.0790)}{0.7590}\cdot r_{6m}\ (YE;\ \sim t+11) + \underset{(0.0697)}{0.4334}\cdot r_{4m}\ (4MP;\ \sim t-5)$$
$$\bar{R}^2=0.490,\ S=9.34$$

$$\text{(C8)}\ r_{6m}\ (5MP;\ \sim t) = \underset{(0.7655)}{2.0024} + \underset{(0.0815)}{0.8395}\cdot r_{6m}\ (YE;\ \sim t+11) + \underset{(0.0630)}{0.2505}\cdot r_{5m}\ (5MP;\ \sim t-5)$$
$$\bar{R}^2=0.442,\ S=9.77$$

$$\text{(C9)}\ r_{6m}\ (5MP;\ \sim t) = \underset{(0.7985)}{2.0446} + \underset{(0.1011)}{0.7744}\cdot r_{6m}\ (YE;\ \sim t+11) + \underset{(0.1741)}{0.5083}\cdot r_{6m}\ (YD;\ \sim t+11)$$
$$\bar{R}^2=0.425,\ S=9.92$$

$$\text{(C10)}\ r_{6m}\ (5MP;\ \sim t) = \underset{(0.6871)}{1.1404} + \underset{(0.0891)}{0.5615}\cdot r_{6m}\ (YE;\ \sim t+11) + \underset{(0.1502)}{0.2838}\cdot r_{6m}\ (YD;\ \sim t+11) + \underset{(0.0776)}{0.7261}\cdot r_{3m}\ (3MP;\ \sim t-5)$$
$$\bar{R}^2=0.583,\ S=8.45$$

Among these, (C6) explains best the behavior of r_{6m} *(5MP)*. Although (C10), which includes one more variable relating to changes in dividends than (C6), has values of $\bar{R}^2$ and S being almost equal to those of (C6), it carries drawbacks as to the term involving changes in dividends. The variable r_{6m} *(D)* was not utilized, because we found it to be no better than r_{6m} *(YD)* in the simple correlations with r_{6m} *(5MP)*.

To get better results than (C6), we attempted also to explain the cyclical movements of P by using r_{6m} *(3MP)* as the dependent variable. Though r_{6m} *(3MP)* concerns *3MP* which is not suitable for depicting the cyclical path of P in terms of level, we found it to move quite similarly to r_{6m} *(5MP)*, probably for the reason that its values are rates of change at six months' intervals. On the other hand, r_{6m} *(MP)* was found to wander sometimes far away from r_{6m} *(5MP)*, and we have decided not to employ it as the dependent variable.

Table 8 shows the cyclical upswings and downswings of P as identified by the behavior of r_{6m} *(3MP)* in a similar manner to Table 7. The period taken up for analysis comprises (3) $\sim$ (14), having a length of 232 months and including six cycles, just like the analyses of r_{6m} *(5MP)*.

The results we have obtained are:

TABLE 8. CYCLICAL UPSWINGS AND DOWNSWINGS OF P AS IDENTIFIED BY THE BEHAVIOR OF r_{6m} (3MP)

from	to	upswing or downswing	length (months)
(1) (~ Jan. 1950)	~ Aug. 1950	downswing	(8)
(2) ~ Sep. 1950	~ Feb. 1954	upswing	42
(3) ~ Mar. 1954	~ Sep. 1954	downswing	7
(4) ~ Oct. 1954	~ Jun. 1957	upswing	33
(5) ~ Jul. 1957	~ Feb. 1958	downswing	8
(6) ~ Mar. 1958	~ Sep. 1961	upswing	43
(7) ~ Oct. 1961	~ Jan. 1963	downswing	16
(8) ~ Feb. 1963	~ Aug. 1963	upswing	7
(9) ~ Sep. 1963	~ Sep. 1965	downswing	25
(10) ~ Oct. 1965	~ Aug. 1966	upswing	11
(11) ~ Sep. 1966	~ Mar. 1968	downswing	19
(12) ~ Apr. 1968	~ Jun. 1970	upswing	27
(13) ~ Jul. 1970	~ Feb. 1971	downswing	8
(14) ~ Mar. 1971	~ Jun. 1973	upswing	28
(15) ~ Jul. 1973	(?)	downswing	(?)

$$\text{(C11)}\quad r_{6m}\ (3MP;\ \sim t) = \underset{(0.8646)}{2.1552} + \underset{(0.1097)}{0.8092}\cdot r_{6m}\ (YE;\ \sim t+11) + \underset{(0.1896)}{0.4768}\cdot r_{6m}\ (YD;\ \sim t+11)$$
$$\bar{R}^2=0.400,\ S=10.80$$

$$\text{(C12)}\quad r_{6m}\ (3MP;\ \sim t) = \underset{(0.5413)}{1.3203} + \underset{(0.0637)}{0.4085}\cdot r_{6m}\ (YE;\ \sim t+11) + \underset{(0.0687)}{1.1999}\cdot r_{3m}\ (3MP;\ \sim t-3)$$
$$\bar{R}^2=0.734,\ S=7.17$$

$$\text{(C13)}\quad r_{6m}\ (3MP;\ \sim t) = \underset{(0.5756)}{0.9882} + \underset{(0.0776)}{0.3350}\cdot r_{6m}\ (YE;\ \sim t+11) + \underset{(0.1263)}{0.2083}\cdot r_{6m}\ (YD;\ \sim t+11) + \underset{(0.0689)}{1.1858}\cdot r_{3m}\ (3MP;\ \sim t-3)$$
$$\bar{R}^2=0.736,\ S=7.14$$

(C12) is the best of these three in explaining the behavior of r_{6m} (*3MP*), and is better than (C6) in explaining the cyclical behavior of P in terms of its rates of change. But, it is to be noted that (C 12) should be complemented by the analysis of how r_{3m} (*3MP*) is determined.

All of the results presented above are tentative in nature and to be followed by further analyses, but they show at least that the general movement of corporate earnings has been a determinant of prime importance as to the trend and cyclical behavior of Japanese stock market during the past two decades.