

# **An analysis of employee stock options in Japan**

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## **Abstract**

This paper analyzes the current state of non-executive employee stock option (ESO) issuance in Japan from both micro and macro perspectives using firm data issued in 2000. I find firstly that the main determinant of ESO issuance for individual firms is the extent of their corporate flexibility, although other hypotheses may be applicable depending on the industrial sector; and secondly that the impact on the macro economy is still quite small at the aggregate level at present. However, I also find that taking appropriate account of the fair cost of issuing ESOs could have a substantial effect on the currently disclosed profits of individual issuing firms. The moment firms recognize that ESO issuance is no longer a new-fangled practice, it may well become rapidly widespread and, as a result, could distort aggregate corporate profits on a macro basis.

**Keywords:** stock options, employees, non-executives, compensation

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## 1 Introduction

In recent years stock options for non-executive employees have become popular as part of compensation plans. In general, stock options are said to bring both non-executives' as well as executives' incentives in line with shareholders' interests and thus in general to be positive in their effect on issuing firms. However, the impact on actual profits may be concealed because stock options are not recorded as an expense in the current accounting system. Allan Greenspan, chairman of the Federal Reserve Board, states, "I fear that the failure to expense stock option grants has introduced a significant distortion in reported earnings—and one that has grown with the increasing prevalence of this form of compensation."<sup>1</sup> Under these circumstances, the International Accounting Standard Board (IASB) tentatively concluded, at its meeting in July 2002, that from 2004 firms should be required to account for stock options at fair value<sup>2</sup>.

The situation is somewhat different in Japan, where the commercial law was not revised to permit firms to grant stock options until 1997, and it is only since then that firms have begun to use stock options for both executives and non-executives. The effect of stock options on the actual economy may not therefore be as large as in the US. However, to the best of my knowledge, there have been few analyses to date dealing with stock options in Japan<sup>3</sup>; not are there any official statistics published on the subject<sup>4</sup>.

In this paper, focusing on non-executive employee stock options (ESOs, hereafter), I analyze the current state of ESO issuance in Japan and discuss its influence on both micro and macro economies. The discussion is developed as follows: in section 2, I present a factual overview of ESO issuance in Japan, then in section 3 I test several hypotheses with regard to this; in sections 4, I discuss the influence of issuing ESOs on operating profits and on stock prices.

## 2 Employee stock options in Japan: An Overview

In Japan, the commercial law determines two possible schemes for the granting of options.

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<sup>1</sup> See Greenspan (2002).

<sup>2</sup> See International Accounting Standard Board (2002).

<sup>3</sup> Utsunomiya, Hagino, and Nagano estimate the fair value of all stock options issued in 1999. The result is 110 billion yen, which corresponds to 0.04% of the compensation received by employees in 1999. See Utsunomiya, Hagino, and Nagano (2001).

<sup>4</sup> Only the "Basic Survey of Japanese Business Structures and Activities" published by the Ministry of Economy, Trade and Industry surveys the number of enterprises which introduce stock options in the commercial mining and manufacturing industries.

Under one scheme firms acquire their own stocks in advance of the transfer to employees; and under the other, firms issue new stocks to option holders at the time of exercise. In this paper I call the former “scheme 1” and the latter “scheme 2”.

The main differences between the two schemes are as follows. First, scheme 1 requires cash in advance to repurchase firms’ own stocks; scheme 2 does not. Second, scheme 1 may be introduced through a simple ‘ordinary voting’ at the shareholders’ general meeting; scheme 2, however, requires a special resolution and registration. Third, issuing ESOs under scheme 2 increases the total amount of extant stocks whenever an option is exercised. This has the potential to cause losses for existing shareholders by lowering the price of their stocks.

According to the database provided by Daiwa Securities SMBC Co. Ltd., since 1997, when the commercial law was revised, the number of companies granting stock options has been increasing (Chart 1). In 2000, there were more than 450 such companies, three times as many as in 1998. Given such a sharp increase, we would reasonably expect stock options to have exerted at least some influence on macro economic conditions.

Table 1 shows the ratios of non-executive employees to total number of employees granted stock options in 2000 according to scheme. It is clear that stock options issued in Japan have been granted mainly to non-executive employees. In particular, this tendency is remarkable in scheme 2.

Table 2 summarizes the numbers of firms issuing ESOs in 2000 by scheme and by industrial sector. The most vigorous issuer of ESOs is the service sector: around one third of listed firms issued ESOs in 2000. Then follow the electrical machinery, retail, and wholesale sectors. Comparison of industrial sectors across schemes reveals that manufacturers, such as those in the electronic machinery, machinery, and chemical sectors, are more likely to issue stock options under scheme 1. On the other hand, in the service sector scheme 2 is dominant and firms in the retail and wholesale sectors also have a tendency to issue stock options under scheme 2.

### **3 Determinants of ESO issuance**

In this section, I discuss the characteristics of ESO issuing firms. Although the value of ESOs depends on the stock price, there is broad agreement that one function of ESOs is as a substitute for cash compensation. However, while some firms use ESOs, others do not. In the following, in an effort to explain this within a Japanese context, I examine the determinants of ESO issuance, focusing specifically on four points: cash flow constraint, growth opportunity, monitoring cost, and flexibility.

### 3.1 Hypotheses

#### Cash flow constraint

The cash flow constraint hypothesis states that a firm whose cash flow is constrained may be a relatively extensive user of ESOs, since these require no cash payout. This hypothesis is often appealed to in discussions about the US, although we should note that in the Japanese case its only relevance is to ESOs issued under scheme 2, since issuance under scheme 1 requires cash up front.

There is also an argument that cash flow shortfall can be made up for by taking out bank loans. Thus, our cash constraint hypothesis is more robust when firms issuing ESOs also face difficulty in borrowing money from banks.

To examine the cash constraint hypothesis, I use the sum of operating cash flow and investment cash flow, while I introduce interest-paying debt as a proxy for the difficulty in borrowing money on the assumption that firms with high levels of debt find it harder to increase borrowing at will.

#### Growth opportunity

The growth opportunity hypothesis provides a popular explanation for why firms might choose to issue executive stock options, in order both to provide appropriate incentives and to retain executives. If a firm has potential growth opportunities and this causes information asymmetries between shareholders and agents, granting stock options could be an effective means of aligning the incentives of agents with the interests of shareholders. This logic is applicable not only to managers, but also to other employees who may often be in possession of better information than shareholders.

Furthermore, in firms where human capital plays an important role ESOs may be used more extensively as a device to retain employees. If so, growth opportunity per person could be the more critical variable.

Consequently, as a proxy for growth opportunity, quasi Tobin's Q, the ratio of market and book value, and the difference between market and book values per person are used in line with previous research.

#### Monitoring cost

Regardless of growth opportunities, ESOs can provide an appropriate method of compensation for retaining employees when direct monitoring is costly. One idea is that, the larger and the more decentralized a firm is, the more costly monitoring is. Here, assets, sales and the number of employees are used to test this hypothesis.

#### Flexibility

We may also envisage the possibility of a negative relationship between corporate size and the

firm's decision to issue ESOs. Because the proportional influence of each employee on overall corporate performance is smaller in a larger firm, granting ESOs may not provide a strong incentive to increase effort. This situation would be reversed in a smaller firm where the issue of ESOs would bring the employees' incentives into line with shareholders' interests. This may be especially true for a younger firm which has not yet developed a large bureaucracy. It is also plausible that employees in a relatively smaller and younger firm with a weak labor union may put up with lower wages than their counterparts in a larger and older firm, expecting compensatory capital gains from ESOs. Furthermore, it is reasonable to presume that large established Japanese firms hesitate to adopt ESOs simply because they are perceived as new. In Japan, the fear of moving "too soon" is a typical and persuasive excuse for doing nothing. I term this hypothesis, that the effect of firm size on ESO issuance may be negative, the 'flexibility hypothesis'.

Contemporaneous firm performance can be regarded as an explanatory variable for this flexibility hypothesis. The idea here is that high current performance, inducing expectations of further stock price increases, makes it easy for inflexible conservative firms to issue ESOs in two senses: it will make these options attractive to employees whose expectations about future stock prices are backwards-looking, and it will also lessen opposition from existing shareholders who fear losses caused by issuing ESOs<sup>5</sup>. In this paper earnings per share (EPS) is used as a performance variable<sup>6</sup>.

### **3.2 Comparison between ESO issuing firms and others**

Table 3 shows sample means and the results of t tests of the differences between listed firms issuing ESOs and other listed firms. I focus on the four sectors (service, wholesale, retail, and electrical machinery) in which the number of listed firms issuing ESOs exceeds ten for both schemes. Individual data are from the TOYOKEIZAI database and with the exception of the year of establishment, I carry out my analysis in this section using averages of the two years (t-1, t-2) prior to the issue of ESOs. In addition, I exclude outliers from both ends that lie outside a 90% range

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<sup>5</sup> Both schemes can have negative effects for existing shareholders: specifically, scheme 1 reduces the volume of profits available for distribution; scheme 2 causes stock dilution.

<sup>6</sup> In the existing research carried out in the US, a performance variable is usually included. The logic is that, "firms use options as a substitute for cash compensation in a fixed proportion, total compensation and option grants are expected to be greater when firm performance is stronger."(Core and Guay [2001], pp.260) However, there is no reason for assuming that ESOs should be a fixed proportion of total compensation across firms, and as shown in section 4, the individual firm ratios of ESOs to profits observed in Japan span a wide range of values.

centered on the median except for the case of the year of establishment.

First, cash flow shortage is significant in the service and retail sectors under scheme 2. In the sense that scheme 1 requires funds for repurchasing stocks in advance, it is reasonable for firms whose cash flow is constrained to issue ESOs under scheme 2. Thus the cash flow constraint hypothesis seems applicable to these two sectors. It should be noted, however, that the service sector shows a significant negative sign on the ratio of interest-paying debt to assets. This result does not in itself reject the cash flow constraint hypothesis, however it does reject the proposition that service sector firms issuing ESOs do so because they face a credit crunch due to their excessive levels of prior borrowing.

Second, in all four sectors the coefficients on both kinds of proxy for growth opportunities are clearly supportive of our growth opportunity hypotheses for firms issuing ESOs under scheme 2. This result changes under scheme 1, where it is only the electrical machinery sector that is consistent with the growth opportunity hypothesis. This might reflect the fact that firms whose stock price is relatively low may be more likely to choose scheme 1 for fear of the stock dilution that would result under scheme 2. If this were so, the results observed for scheme 2 could merely be demonstrating that it is easy for firms appreciated in the stock market to issue ESOs under scheme 2 rather than offering any profound insights into our growth opportunity hypotheses. We should, therefore, be cautious about interpreting the results for scheme 2.

Third, although the sign is, by and large, consistent across our three measures of corporate size (assets, sales, and numbers of employees), the signs are different across sectors. In the electrical machinery sector, corporate size is significantly positive under both schemes. This suggests that our monitoring cost hypothesis is applicable to this sector. On the contrary, the other three sectors under scheme 2 have a tendency to display negative signs. It seems, therefore, that what we are seeing in these sectors, at least when firms issue ESOs under scheme 2, is small firms acting flexibly.

The results for firms in the electrical machinery sector can be interpreted in two ways. One is that ESOs work more effectively as an incentive scheme in large electrical machinery firms than they do in other sectors. We can reasonably presume that this industry has a comparatively large proportion of technological experts who preserve the ability to influence firm performance even within large firms. It is also probable that monitoring experts in large firms is more costly because fundamental technological research is needed in this field. The other interpretation is that even large firms in the electrical machinery sector nevertheless possess enough flexibility to introduce new compensation schemes, in spite of their size. This flexibility manifests itself in their relative youth and generally higher levels of performance compared to firms of similar size in other sectors. In fact, looking into the individual data, most of the prominent Japanese electric giants are also issuers of ESOs. This contrasts sharply with the situation in the retail sector where large department and chain stores have not issued ESOs.

The coefficients on our corporate age and EPS variables may also be interpreted to support the flexibility hypothesis when issuing ESOs under scheme 2. All four sectors have almost the same results for these variables.

The differences between schemes 1 and 2 are probably due to the procedural requirements for introducing ESOs. As described in section 2, it is more difficult for a firm to introduce scheme 2 because to do so requires a special resolution at the shareholders' general meeting. In practice, existing shareholders may oppose such a motion for fear of the capital loss caused by stock dilution<sup>7</sup>. The use of scheme 2, therefore, requires much greater flexibility for firms, and it is this that is responsible for the signs we observe in table 3, i.e signs that, with the single exception of the sign on corporate size in the electrical machinery sector, are consistent with our flexibility hypothesis.

### 3.3 Regression analysis of ESO issuance firms

To test the determinants of ESO issuance in more detail, I employ a regression analysis using a probit model as follows:

$$ISSUE_i = \alpha_0 + \alpha_1 CF_i + \alpha_2 DEBT_i + \alpha_3 GROWTH_i + \alpha_4 SALES_i + \alpha_5 AGE_i + \alpha_6 EPS_i + \varepsilon_i \quad ,$$

where

$ISSUE_i = 1$ , if  $i$  firm is a issuer of ESOs,

or

0, otherwise,

$CF_i = (\text{operating cash flow} + \text{investment cash flow}) / \text{total assets}$

$DEBT_i = \text{interest paying debt} / \text{total assets}$

$GROWTH_i = (\text{book value of liabilities} + \text{market value of equity}) / \text{book value of assets}$

or

$(\text{market value of equity} - \text{book value of equity}) / \text{number of employees}$

$SALES_i = \text{logarithm of sales}$

$AGE_i = \text{logarithm of (2001-establishment year)}$

$EPS_i = \text{current profits after tax} / \text{outstanding amount of stocks}$

$\varepsilon_i = \text{random error term}$  .

As for growth opportunity hypothesis, two variables, the ratio of market and book value, and the difference between market and book values per person, are respectively regressed in different equations. As a proxy for corporate size, sales are used because using either of the other two

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<sup>7</sup> Theoretically, although scheme 1 also cause losses for existing shareholders, the fall in the price caused by stock dilution under scheme 2 appeals more directly to them.

variables would induce multicollinearity problems.

The results are shown in table 4, where significant variables are narrowed down. CF enters significantly into only one equation in the service sector under scheme 2. Only quasi Tobin's Q shows significant positive sign in the service and retail sectors. EPS has no explanatory power in any equation. Although those results are not inconsistent with the analysis in the previous section, we cannot obtain strong supportive evidence.

In the probit analysis SALES and AGE show relatively clear results. These parameters for the service and electrical machinery sectors under scheme 2, in particular, enter significantly into both equations with different growth opportunity variables, although their signs have different meanings. In this analysis, by and large, AGE supports the flexibility hypothesis, together with the results of scheme 1 in the electrical machinery and the results in the wholesale sector. On the other hand, the results of SALES in the service and electrical machinery sectors show the opposite direction under scheme 2. Thus, this analysis indicates that, while corporate flexibility in younger firms is a determinant of ESOs issuance except for the retail sector, corporate size measured by sales is not necessarily a hindrance to corporate flexibility. As I described in the previous section, monitoring cost hypothesis can be rather applicable to the electrical machinery sector. It is plausible that firms in the service sector like software service have the same characteristics. For the retail sector, while AGE is not significant, we can find the fact that coefficients for SALES have a tendency to be negative. Therefore, corporate flexibility determined by corporate size may be a determinant of ESOs issuance in the retail sector. Considering the actual situation, this result is quite understandable. In the retail sector, where business model is rapidly changing, a firm established ten years ago can be old-fashioned. Thus, the difference of corporate age of over ten years may not lead to any significant differences.

### 3.4 Regression analysis of the ratio of employees granted ESOs to total employees

For firms that issue ESOs, I also regress the variables described above on the ratio of employees granted ESOs to total employees using a simple OLS model. The regression takes the following form:

$$ESO_i = \beta_0 + \beta_1 CF_i + \beta_2 DEBT_i + \beta_3 GROWTH_i + \beta_4 AGE_i + \beta_5 EPS_i + u_i,$$

where

$ESO_i$  = logarithm of (number of employees granted ESOs / total number of employees)

$CF_i$  = (operating cash flow + investment cash flow) / total assets

$DEBT_i$  = interest paying debt / total assets

$GROWTH_i$  = (book value of liabilities + market value of equity) / book value of assets

or

(market value of equity – book value of equity)/number of employees

$AGE_i$  = logarithm of (2001-establishment year)

$EPS_i$  = current profits after tax/outstanding amount of stocks

$u_i$  = random error term.

In addition, focusing on the four sectors which I pick up in the previous section, I also carry out regressions using sectoral dummy variables to control for differences among industrial sectors. Just as in the probit model, two variables for growth opportunities are respectively regressed in different equations. Since the dependent variable is calculated using total employees, variables for corporate size are excluded.

The results are shown in table 5. Corporate age again enters significantly into almost every regression with negative values. This displays that younger firms grant ESOs to a larger fraction of employees. Even in the regression analysis limited to ESO issuing firms, the result is consistent with the flexibility hypothesis, while other hypotheses are not supported.

#### **4 The impact of ESOs on the micro and macro economies**

Under current accounting rules, ESOs are not regarded as compensation. However, this accounting treatment has been subject to much debate. Once ESOs are treated as an expense, as the IASB has proposed, corporate profits would inevitably be squeezed. The effect on corporate profits in the US is said to be quite large, as is demonstrated by the strong opposition to the FASB's 1993 proposal that stock-based compensation should be recognized as an expense and accounted for at fair value.

Mehran and Tracy (2001) estimate the aggregate value of stock options granted by US firms. According to their research, stock option grants reached 2.5%<sup>8</sup> of total compensation in 1999 and a recalculation of compensation per hour that fully accounts for the cost of ESOs, presents a different picture from that depicted in the official compensation statistics.

In Japan, on the other hand, as I described above, use of ESOs is still limited. However, if it is true that inflexible Japanese firms hesitate to use ESOs simply because they are new, then it is highly likely that ESO issuance will become rapidly widespread in the near future. In the following section I examine the magnitude of ESO issuance in Japan on both the micro and macro levels.

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<sup>8</sup> Prior to the estimation by Mehran and Tracy, Lebow, Sheiner, Slifman, and Starr-McCluer estimated the value of stock option grants from a sample of 120 companies. Based on this estimation, these make up 4.1% of total compensation in 1998. See Lebow, Sheiner, Slifman, and Starr-McCluer (1999).

#### **4.1 Effects on operating profits**

First, table 6 presents my estimates of aggregate fair values of ESOs and their ratios to total employee compensation in the SNA. Fair values of ESOs are calculated using the Black-Scholes model in line with the recent proposal by the IASB<sup>9</sup>.

From the macro perspective, the total value of all ESOs granted in 2000 is still only 0.05% of employee compensation in Japan<sup>10</sup>. Focusing on sectors where ESOs are relatively popular: electrical machinery comes out highest at 0.15%, while the figures for other sectors are still less than 0.1%. It should also be remarked that values at the end of September 2001 declined further due to the plunge of stock prices.

Fair values estimated using the Black-Scholes model may be criticized as being too dependant upon the assumptions used in making the calculation. To investigate this point, I also present the results of another calculation in which volatility is assumed to be twice as large; but even in this case, the aggregated values still make up only 0.07% of total compensation.

However, a different picture emerges when we look at the magnitude of these values for individual ESO-issuing firms. Table 7 shows the percentage decrease in operating profits that would be suffered were the fair values of ESO grants deducted. Based on the median, while firms issuing ESOs under scheme 1 would suffer a 2.5% reduction in their operating profits, the comparable figure for those issuing under scheme 2 would be 9%. Furthermore, considering the impact by industrial sector, the operating profits of service sector firms issuing ESOs under scheme 2 would be squeezed by 15% if ESO grants were recognized as compensation expenses.

In summary, aggregated values of ESO grants still make up only a small portion of total compensation in Japan; however taking appropriate account of the fair cost of issuing ESOs could have a substantial effect on profits and hence a significant influence on the macro economy as well.

#### **4.2 Effects on stock price in the near future**

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<sup>9</sup> I simply apply the Black-Scholes model to my estimation, although it is arguable to use this model for valuation of ESOs because of the differences between ESOs and stock options traded in financial markets. Valuation is mainly affected by three features of ESOs: ESOs are usually restricted to be transferred to the third party; ESOs cannot be exercised until vesting date; ESOs are generally forfeited if the holder leaves the grantor firm.

<sup>10</sup> Compared with my previous estimate using 1999 data, this figure represents a 0.01 percentage point increase, although it should be noted that the estimation for 1999 also includes stock options for executives. See Utsunomiya, Hagino, and Nagano (2001).

ESOs are said to be effective in motivating employees to work in line with the interests of shareholders. Although changes in productivity cannot be seen in the short term, issuing ESOs can benefit shareholders in the long run. If so, the stock market will regard ESOs as positive information when evaluating the issuing firm. On the other hand, since issuing ESOs has the potential to cause losses for shareholders, it may have a negative effect on stock prices.

To capture the effect of ESOs on stock price, I employ two kinds of test. One is a simple comparison of average stock returns between ESO issuing firms and other firms. The other is a regression analysis looking at the influence of the volume of ESOs issued on stock returns.

In this section, I use data from firms that secured approval to issue ESOs at their shareholders' general meetings in May and June 2001. Since most firms settle their accounts in March and hold their general shareholders' meetings in June, the majority of firms is covered by the following test.

First, table 8 shows that, while no significant result is found under scheme 1, the electrical machinery and wholesale sectors show significant negative signs under scheme 2. The retail sector also displays the same tendency. These results indicate that ESO issuance produces no positive effects, and that scheme 2 may indeed induce a fear of stock dilution. Of course, there may be some other reason for the negative relationship observed. In the electrical machinery sector for example, the "bursting of the IT bubble" might have damaged younger IT firms issuing ESOs more severely than their more established counterparts.

Second, in my regression analysis testing the effect of ESO issuance on stock returns, using data only on firms issuing ESOs, I employ the following regression form:

$$R_i = \gamma_0 + \gamma_1 EPS_i + \gamma_2 ESO_i + v_i$$

where

$R_i$  = the six-month return for firm i from the end of March 2001 to the end of September 2001

$EPS_i$  = current profits after tax/number of stocks outstanding

$ESO_i$  = logarithm of (fair value of ESOs / total number of employees)

or

logarithm of (fair value of ESOs )

or

logarithm of (number of employees granted ESOs / total number of employees)

$v_i$  = random error term.

As shown in table 9, while we obtain no clear information about firms under scheme 1, the value of ESOs issued tends to be negatively correlated with the stock return under scheme 2. The ESO variable enters significantly into two regressions using the four sectors' data, although EPS

becomes less significant. The rate of employees granted ESOs total employees has the same tendency. Thus, just as in the previous results, the regression analysis suggests that issuing ESOs under scheme 2 is likely to have a negative impact on a firm's stock price.

## 5 Conclusion

This paper analyzes the current state of ESO issuance in Japan from both micro and macro perspectives. Firstly, we find that, although some other hypotheses are applicable depending on the sector, the main determinant governing ESO issuance for individual firms may be the extent of their corporate flexibility. In other words, disregarding legal aspects, it can be said that it is their rigid bureaucracy that is the most substantial hindrance discouraging firms from using ESOs. Secondly, and as a result of this hindrance, the impact on the macro economy is currently still quite small at the aggregate level. Even if ESOs were to be regarded as an expense, they make up only a small proportion of total employee compensation at present.

However, on the individual firm level, we should note that taking appropriate account of the fair cost of issuing ESOs can have a substantial effect on a firm's profits. Thus, based on our flexibility hypothesis, the moment firms recognize that ESO issuance is no longer a new practice, it may well become rapidly widespread and, as a result, it could distort aggregate corporate profits on a macro basis. It should be also noted that, in the sense that issuing ESOs under scheme 2 tends to lower the issuer's stock price, there may be some negative aspects to ESO issuance from a macro perspective.

This research focuses on ESOs issued in 2000. Of course, the number of firms using ESOs is continuously increasing. As the firm sample expands, the results may change. An examination of the possibility of a structural change in ESO issuance in Japan and its influence on macro economy is left as a topic for future research.

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