

Broad-Based Stock Options Program: Adopters vs. Non-adopters

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The literature generally supports a positive association between broad-based stock options program and firm performance. However, what differentiates adopters from non-adopters remains unanswered. The key objective of this work is to compare the features of firms with broad-based stock options program to those that have no broad-based program. The empirical results suggest that adopters are relatively large (by total employment) as compared to the firms in the associated industry and exhibit higher research and development and training expenses prior to the adoption. We further interpret these empirical results as the evidence that stock options grant to lower-level employees is driven by the need of promoting mutual monitoring and enhancing employee retention in R&D and training intensive firms. However, a positive impact of broad-based program is inconclusive in our data. Stock option grants could be interpreted as a mechanism helping to sustain a firm's success in light of these empirical findings.

INTRODUCTION

Stock options program has long been associated with the executive level. However, over the past decade, it has increasingly become associated with lower level of employees. Employee stock options are contracts that give employees the right to buy a share of the firm's stock at a pre-specified "exercise" price according to pre-specified terms. Most employee stock options expire in ten years and are granted with an exercise price equal to the market price on the date of the grant (at-the-money stock options). Typically, a grant of stock options cannot be exercised immediately, but only over time. In the most common case, employees can exercise the stock options four years after granting. When a stock option can be exercised, the option is "vested". Employee stock options are non-tradable, and are typically forfeited if the employee leaves the firm before vesting. This program can be further distinguished into two different categories. The first is the stock options for executives, namely Executive stock options program. The other one is the stock options for employees other than the top 5 executives, namely Broad-based stock options program. Most of the firms adopted executive stock options program in the 1980s and broad-based stock options program mainly in the 1990s. This work will mainly address the incidences of the adoption of broad-based stock options program. More than 90 percent of options granted in 2002 were granted to employees at ranks below the top-five executive level

(Hall and Murphy, 2003). The National Center for Employee Ownership (NCEO) estimates that 7 to 10 million employees actually received stock options as of May 2000. This represents a substantial increase since 1991, when the NCEO estimated there were about 1000 companies with 1 million employees in such programs.

While the impact of option grants on labor productivity, firm performance, and labor attitudes has received considerable attention in the literature, with few exceptions, there has been little research on the characteristics that distinguish adopting firms from non-adopting ones. The importance of identifying these characteristics resides in the possibility that they can provide insights into why some firms adopt broad-based stock options program while other similar firms do not. Several reasons justify the question on why firms might adopt stock options program; thereby are related to the distinctive characteristics. Among those, the first is that stock options give employees a greater incentive to act in the interests of shareholders by providing a line between realized compensation and company performance. The second reason argues that a firm can recruit and retain highly motivated and optimistic employees by offering them employee stock options. There exists a number of discussions and evidence, favorable and unfavorable, which will be further discussed in the following section¹.

A general theory explaining why compensation contracts are changed or what contractual provisions should be adopted in specific decision settings does not exist (to the best of our knowledge), nor will this work attempt to provide such theory. We contribute to the literature by examining the characteristics of firms with broad-based stock options program against those of companies without such program.

In a sample of 74 adopting firms and matched non-adopting peers, our main findings include, first, adopting firms are relatively large (by total employment) in the associated industry. Second, adopting firms do not reveal significantly higher levels of physical capital stock, capital investment, market-to-book ratio, and dividend payout ratio than the matched peers. Third, the adopting firms show significantly higher research and development and employee training expenses over the examining period. We interpret these empirical results as the evidence that stock options granted to lower-level employees is more likely in R&D and training intensive firms in an attempt to retain growth opportunities and secure employee training investments. Lastly, better firm performance (as measured by the operating cash flow before R&D expenses) is observed in 6 years starting a year before adoption. Hence, a positive impact of broad-based program as generally supported by the literature is inconclusive in our data. Overall, stock option grants to lower level employees is cautiously interpreted as a mechanism helping to sustain a firm's success in light of these empirical results.

The structure of this work is as following: Section II covers literature review and conceptual analysis. Section III describes the data set and presents the empirical results. Section IV concludes.

LITERATURE REVIEW AND CONCEPTUAL ANALYSIS

The stated objectives of all company stock option plans are motivation, attraction, and retention of valuable employees. First, incentive-based explanation stems from the Principle-agent theory. Conflicts always exist between shareholders and employees (managers). When shareholders are too diffuse to monitor employees, corporate assets can be used for the benefits of employees rather than for maximizing shareholder wealth (Jesen and Meckling, 1976; Bloom and Milkovich, 1998). This is well known as the moral hazard problem and a solution is to give

employees equity stake in the firm. Following Alchian and Demsetz (1972), it has been argued that optimal levels of monitoring require that the monitor is given claim to the residual income of the enterprise. The provision of ownership rights reduces the incentive for agents' moral hazard since it makes their compensation dependent on their performance (Jensen, 1983). The stock options program is one way of attaining this goal. However, as one moves deeper into the organization to employees below the executive level and especially below management level, equity-based incentives take on a relatively less important role. In particular, while the size of the grants of stock options is small as compared to the grantee's total compensation (according to the National Center for Employee Ownership (NCEO), the proportion is less than 10% for rank-and-file employees), the incentive effect is at best ambiguous. Further, it runs into more difficulties when applied to stock options granted to employees without significant decision power (Murphy, 2002). Individual actions of rank-and-file employees do not have a discernible effect on the firm's overall performance, so some additional theory is needed to deal with the standard free-rider problem. In particular, the free rider problem predicts that broad-based plans will be most advantageous in small workplaces; nonetheless, larger establishments are documented as to be more likely to have such plans (e.g. Core and Guay, 1999).

An individual employee deciding whether or not to work hard will do so if and only if $bg > c$ where b describes the value of the payoff, g denotes the incremental likelihood that the bonus is paid when the employee works hard, and c represents the amount required to compensate an employee for additional effort (i.e. the cost of exerting higher effort). Because a single employee has a negligible influence on overall performance, we expect g to be very small. In general, we expect g to be a decreasing function of firm size because overall firm performance is less sensitive to the actions of individual employees in large firms. It is this observation that leads to an alternative approach stressing potential effects of granting broad-based stock options on group rather than individual behavior. By compensating employees based on overall performance, broad-based stock options program introduces externalities between the efforts of employees and their colleagues. Choice of low effort by any employee not only reduces the probability that he or she will receive the payoff, it also affects the likelihood that other employees will receive the payoff. This creates incentives for employees to monitor each other (Jensen and Meckling, 1976; Kandel and Lazear, 1992).

Second, the selection/attraction-based explanation argues that option grants may induce sorting. Firms can recruit the employees who are optimistic about the firm's prospect by offering stock options since this will tie the employees' compensation with the firm's future performance (Lazear, 1999). This, in turn, may contribute to a better working environment and more innovative practices. Further, firms may be able to attract risk-takers by offering such program since stock options are embedded with the risk of stock price fluctuations. If innovation and willingness to take risk are more important during times of structural change and expansion, we can expect firms on the verge of an expansionary stage (e.g. more research and development investments) to invest in attracting new better motivated employees by introducing the stock option program. Third, the prevalence of vesting periods for options and the requirement that employees immediately exercise options or leave options grants forfeited when they leave the company suggests that firms use options to retain employees. Consequently, firms can retain valuable employees by the distribution of stock options since employees can only exercise after the options are vested.

Drawing upon this literature, two streams of research have empirically tested those arguments with some success. The first stream utilizes survey data to document firms' self-reported

objectives of the introduction of stock options program. 91% of the firms surveyed in Weeden et al. (1998) initiated a broad-based stock options program as a means of improving employee attraction (selection) and retention. Ittner et al. (2003) summarize the relative importance of self-reported objectives for a sample of 194 new economy firms. Employee retention is the most often cited objective for stock option plans, followed by rewards for achieving specific milestones and goals, and attracting new employees. Table 1 shows a survey conducted by Pricewaterhouse Coopers and the National Association of Stock Plan Professionals in 1998 and it documents retention as the first reason for stock option plans.

TABLE 1
TOP REASONS FOR STOCK OPTION PLANS

Retaining valued employees	94%
Competing for top talent (attracting)	84%
Promoting shareholder ownership	69%
Hiring	36%
Building corporate culture/identity	33%
Wealth accumulation	32%

*By Pricewaterhouse Coopers and the National Association
of Stock Plan Professionals (1998)*

The second stream applies regression models such as Probit/Logit analysis on either cross-section or panel data set in an attempt to test the adopting justifications measured by proxy variables. Oyer and Shcafer (2004) gather data from three distinct sources and seek to determine which explanation is most consistent with the option grants observed. They reject an incentive-based explanation for broad-based stock option plans, and conclude that selection and retention explanations appear to be consistent with the data. With the data compiled from the 2000 Survey on Current Practices in Broad-Based Stock Option Plan Design conducted by the NCEO, Oyer and Schaefer (2003) document that if firms' option-granting decisions are driven by economic-profit maximization, the observed broad-based stock option grants are most consistent with explanations involving retention and attraction of employees. Kroumove and Sesil (2006) document that higher monitoring costs and intellectual capital prompt firms to adopt employee stock options program. Ittner et al. (2003) also examined determinants of employee stock option compensation, and found that growth opportunities and firm size are associated with high levels of option compensation. Empirical research on employee stock options by Core and Guay (2001) suggests that firms using options to attract and retain certain types of employees as well as to create incentives to increase firm value. A few most commonly used proxy variables associated with the three adopting justifications (motivation, attraction, and retention) is summarized in Table 2.

TABLE 2
SELECTED PROXY VARIABLES FOR DIFFERENT JUSTIFICATIONS USED BY
PAST RESEARCH

Adoption Justifications	Proxy Variables
Motivation/Mutual Monitoring	(1) Total Employment (2) Total capital stock
Attraction	(1) Research and Development expenses per employee (2) Market-to-Book Ratio
Retention	(1) Research and Development expenses per employee (2) Market-to-Book Ratio

1. Total employment is the total number of employees excluding temporary ones.
2. The capital stock is measured by total net physical capital.
3. Research and Development expenses is the R&D expenses a firm incurred in a year.
4. Market to Book ratio is calculated as (Adjusted fiscal year ending stock price/ total common equity).

Although the free rider problem predicts that broad-based stock options will be most advantageous in small workplaces, large firms may have more severe monitoring problems as it is difficult to observe the effort level of individual employees. Group incentive plans may encourage cooperative behaviors and mutual monitoring (Weitzman and Kruse, 1990). Hence, firm size as measured by total employment or total capital stock is commonly used as the testing variable for the motivation/mutual monitoring argument. Typically, research and development expenses represent a firm's growth options and intangible capital. It is a complement to worker skill levels and it may reflect changes in desired skills by the company. It also reflects the idea that innovative activity plausibly involves costly supervision and the importance of group cooperation. Market-to-book ratio has been interpreted as an aggregate indicator of a firm's growth opportunities. In essence, investor expectations about superior future profitability are contingent on the firm's intangible capital including valuable employees. Therefore, these two variables are used to test the attraction and retention arguments.

The two streams of research provide insights into grant-level determining factors either operate within stock option firms (Ittner et al. 2003; Core and Guay, 2001) or in a broader set of firms including non-adopting companies (Kroumove and Sesil, 2006). Running through these discussions and findings are two unanswered questions. First, the critical maintained hypothesis in the associated research is the existence of some distinctive features in adopting versus non-adopting firms which lead to the adoption decision. However, empirical evidence on such characteristics is virtually non-existent. In particular, while the Probit/Logit analysis helps to identify the determinants of the introduction and maintenance decision, it does not directly relate to the circumstances under which a diverse decision is taken by similar firms. For instance, while large firms are predicted to be more likely to employ broad-based program, the Probit/Logit analysis remains silent in the cases which firm with a similar size but make different adoption decisions. Second, while a majority of the literature suggests retention as the main intention of adoption, it is still not clear why firms consider retention as a major task.

With regard to the first question, by investigating the characteristics that distinguish adopters from non-adopting firms, we may be able to gain insights into the reasons for the introduction of

broad-based stock options program, on the assumption that these characteristics provide the context and the impetus for the managerial decision. With regard to the second question, a line of reasoning can be found as following. It is supported by evidence that employee ownership in general helps to reduce absenteeism and quits (e.g. Fakhfakh, 2004). According to Freeman (1976), strengthened selection and retention may result in lower turnover, longer tenure, and the formation of more firm-specific human capital. Investments in firm-specific human capital made by employees can be at risk in much the same way as shareholder equity capital. Once such investments have been committed to an enterprise, employees should have rights to residual income and control (Blair, 1999). Stock options program may be one way of facilitating this purpose. As Blair (1995: 298) argues, "Employee-owned companies are the ultimate examples of governance structures that empower employees and protect investments in firm-specific capital". Nonetheless, an opportunistic hazard exists under the circumstances that such human capital is firm specific which is only valuable to the current employer and is thus non-transferable. Therefore, if employees pay for the investments in the specialized human capital, the firm, ex post, may threaten not to use the services rendered by these investments in order to extract a greater share of the surplus value resulting from the investments. Similarly, employees may act much the same way to extract greater returns for themselves (Robinson and Zhang, 2005). This may result in an equilibrium in which both firms and employees refrain from paying for any investments in the specialized human capital. In turn, seriously dilute a firm's competitive advantage. Similarly, the human capital theory implies there exists little incentive for firms to compensate employees for the firm-specific human capital since it is non-separable from the current employer. However, the vast majority of human capital exist somewhere between firm-specific and general (Stevens, 1996; Becker, 1975). The combination of the two boundaries suggests employee ownership may be used to encourage and safeguard investments in human capital (Robinson and Zhang, 2005). Moreover, firms will have more incentive to grant employees stock options while the valuable human capital also relates and contributes to firm organization capital (Lin and Sesil, 2008; Prescott and Visscher, 1980). According to Tomer (1987, p.24), "Investment in organization capital refers to the using up of resources in order to bring about lasting improvement in productivity and /or worker well-being through changes in the functioning of the organizations. Organization capital formation could involve changing *individual attributes* important to organizational functioning. It follows that organizational capital is a factor of production and, accordingly, is an element in the production function along with labor, tangible capital, and other types of intangible capital". By reducing turnover, stock options grant may help to increase the expected tenure of employment and thus extend the amortization period of such valuable human capital (Levhari and Weiss, 1974). Indeed, Dess and Shaw (2001) states, "once an investment decision is made, the organization has an incentive to continue the employment relationship". Empirical evidence provided by Kruse, Blasi, and Freeman (2008) reveals that greater shared capitalism² programs involvement is generally linked to more employee training. The shared capitalism employees in their sample firms are more likely to have had employer-sponsored training in the past years. Also, evidence from profit-sharing firms anchors this argument. Employees participating in profit-sharing plans were less likely than non-participants to separate from their jobs. They also receive training more frequently and for longer duration (Azfar and Danninger, 2001). Thus, investments in employee training could be an important distinctive feature related to the adoption decision. The current paper extends prior research by addressing these crucial questions.

THE DATA, EMPIRICAL STRATEGY, AND RESULTS

The Data

A list of firms that adopted stock options program was provided by the National Center for Employee Ownership³ (NCEO). NCEO identified the adopters using its own resources and knowledge of the field, as well as information obtained from the media and consultants. Using the original list of adopting firms, the start year of the executive and broad-based programs was identified and confirmed⁴. This was accomplished through survey data collected in 2001 and early 2002 and by examining SEC 8-K forms between the years 1983 and 2002. A firm was considered to have an executive stock option plan if one or more of the top five executives received stock options. The New York Stock Exchange classifies as “broad-based” those plans that offer options to 20% or more of a company’s employees. However, to be more conservative, we followed NCEO’s definition of broad-based stock options plan as the plan with at least 50 percent of non-management employees actually received stock options since the incidence of a compensation program depends on what employees actually received not on the eligibility to a program. The NCEO’s list of adopting firms has two advantages. First, the adopting firms were not identified solely by NCEO but also by media and other unrelated consulting firms. This identification process helps to control for the possible *ignorance* problem in which an adopting firm may be wrongfully classified as a non-adopting company due to the lack of knowledge of a single source. Second, we have the exact start year of executive and broad-based programs. This feature helps to control for the potential effect of executive program while analyzing broad-based program.

Each adopting firm was required to satisfy two criteria. First, the adoption year of broad-based program must be at least three years later than executive program to control for the potential effect of the executive program. Second, an adopter must have a matched control firm.

A group of companies were identified as the potential associated control firms (non-adopting peers). Each non-adopting firm was required to meet two criteria. First, it is in same industry as the associated adopter (same 4-digit SIC code in the 2006 COMPUSTAT data base). Second, it had similar size as the adopting firm (by total employment) at the *adoption year*. The idea is that firms that operate in the same industry and are similar in size will likely be tapping the same labor market and employ human capital of similar quality. They may also use similar human resource management practices. One further advantage of constructing the control group in such a way is that it helps to control for much of the industry specific factors.

A total of thirty-seven adopting firms were identified and thirty-seven non-adopting peers were matched. The firm level data was extracted from the Standard & Poor’s COMPUSTAT 2006 full coverage firm-level data. In order to convert nominal numbers into real data, we deflated all the variables to 1997 dollar using GDP deflator. Basic information on the adopting firms is contained in Table 3 (described only in broad terms to preserve company confidentiality). First, fourteen different industrial classifications are represented in the sample firms. The adopting firms fall relatively evenly in a variety of industries which suggests the subsequent results do not seem to be seriously contaminated by industry effects. Second, a majority of the adopters introduced broad-based program in the 1990s which is consistent with the literature. Also, the adopting year does not tend to cluster in a particular year. Third, column three shows that while comparing to all other firms in the associated industry, 86% of the adopters’ size fall in the 3rd and 4th quartile in the size distribution of the industry, which agrees with Core and Guay (1999) and Kruse, Blasi, and Park (2008) that broad-based stock options program tend to be employed by large establishments.

TABLE 3
SAMPLE OF ADOPTING FIRMS: INDUSTRY, ADOPTION YEAR, AND FIRM SIZE
RELATIVE TO THE ASSOCIATED INDUSTRY

Adopters	Adoption Year	Size ¹ Quartile in the industry at the adoption year
<i>Industry: Grain Mill Products (2040²)</i>		
1	1995	3rd
<i>Industry: Pharmaceutical Preparations (2834²)</i>		
2	1986	4th
3	1990	4th
<i>Industry: Petroleum Fining (2911²)</i>		
4	1998	3rd
<i>Industry: Bolt, nut, screw, and rivets (3452²)</i>		
5	1996	4th
<i>Industry: Special Industry Machine (3559²)</i>		
6	1991	3rd
7	1992	3rd
8	1994	4th
<i>Industry: General Industry Machine and Equip. (3569²)</i>		
9	1995	3rd
<i>Industry: Electronic Computers (3571²)</i>		
10	1990	4th
<i>Industry: Computer Communication Equip. (3576²)</i>		
11	1990	3rd
12	1998	4th
<i>Industry: Computer Peripheral Equip. (3577²)</i>		
13	1996	1st
<i>Industry: Electrical Industry Apparatus (3620²)</i>		
14	1997	3rd
<i>Industry: Tel & telegraph Apparatus (3661²)</i>		
15	1990	2nd
16	1991	4th
<i>Industry: Electronic Computers, Accessories (3670²)</i>		
17	1995	1st
<i>Industry: Semiconductor related device (3674²)</i>		
18	1988	4th
19	1990	2nd
20	1991	2nd
21	1994	4th
22	1995	3rd
23	1996	4th

**TABLE 3 - CONTINUOUS
SAMPLE OF ADOPTING FIRMS: INDUSTRY, ADOPTION YEAR,
AND FIRM SIZE RELATIVE TO THE ASSOCIATED INDUSTRY**

Adopters	Adoption Year	Size ¹ Quartile in the industry at the adoption year
<i>Industry: Industrial Measurement (3823²)</i>		
24	1990	3rd
<i>Industry: Electronic measurement & test Equip. (3825²)</i>		
25	1990	3rd
26	1991	4th
27	1992	4th
<i>Industry: Lab Analytical Instruments (3826²)</i>		
28	1999	4th
<i>Industry: Surgical, Medical Instruments, Apparatus (3841²)</i>		
29	1998	4th
<i>Industry: Electromedical Apparatus (3845²)</i>		
30	1995	3rd
31	1997	4th
32	1999	4th
<i>Industry: Photographic Equipments and Supply (3861²)</i>		
33	1995	4th
<i>Industry: Prepackaged Software (7372²)</i>		
34	1991	4th
35	1994	4th
36	2002	4th
<i>Industry: Computer Integrated System Design (7373²)</i>		
37	2002	4th

1. Size is approximated by total employment which is available on COMPUSTAT data #29.
2. 4-digit SIC code

Empirical Strategy

The way the non-adopting peers were identified naturally provides a ground for testing the issue of why some firms use options while others in the same industry and with a similar size do not. In order to control for confounding macroeconomic or industry influences, a two-group matched pairs experimental design is used in the analysis, with the empirical tests focusing on the difference in central tendency for selected firm attributes including research and development expenses (R&D expenses), Market-to-Book ratio, selling, general, and administration expenses (SGA expenses), and cash flow from operations before R&D expenses for each of the matched pairs. These selected firm characteristics for the ten years surrounding the plan adoption – 5 years before, the year of adoption, and four years after are examined. Specifically, the Wilcoxon Matched-Pairs Signed-Ranks Test (hereafter, Wilcoxon test) provides a non-parametric test for differences in central tendency of correlated samples and is used in the subsequent analysis. This test is selected for the following three reasons. First, this study employs two related samples and

it yields difference scores in the selected characteristics which can be ranked in the order of absolute magnitude. Second, the Wilcoxon test is less sensitive to the statistical problems posed by modest sample size. Third, the power of the test is close to that of a corresponding parametric test (i.e. matched-sample t test). The test statistic for between-group differences is the Wilcoxon Z-statistic which has approximately a standard normal distribution in small samples with size larger than 25 firms (Siegel, 1956). The mean of the differences (i.e. mean differences) between matched pairs is reported for comparative purposes. We attempt to provide additional control for firm size by normalizing the selected firm characteristics by total employment in the subsequent analysis.

Estimation Results

A profile analysis of the adopting and non-adopting firms on selected attributes is presented in Table 4. The two groups are not statistically different in the 5 years⁵ prior to adoption in terms of total employment, capital stock, capital investment, or dividend payout ratio. The comparisons suggest that first, the constructed non-adopting peers is indeed of similar size as the adopting counterparts. This is further reinforced by the insignificant difference in capital stock. Second, the two groups of firms do not seem to have different capital investment pattern prior to the adopting year. Third, unlike the evidence suggested by the literature, firms' dividend payout (or earnings retention) policy does not seem to be a determinant of the adoption decision. Overall, the profile analysis suggests the two groups of firms are of similar attributes. Next, we attempt to further examine several selected firm attributes over the 10 years surrounding the adopting year.

TABLE 4
PROFILE OF ADOPTERS AND NON-ADOPTERS ON SELECTED ATTRIBUTES 5 YEARS PRIOR TO THE ADOPTION YEAR

Attribute	Mean Difference ¹	Wilcoxon Z ⁵
Employment (in thousands)	1.195	0.348
Capital Stock ² (in millions)	-82.292	-0.103
Capital Investment ³ (in millions)	-25.951	-0.988
Dividend Payout Ratio ⁴	0.219	0.735

1. The differences are calculated by subtracting the non-adopting firm observations from the adopting firm observation.
2. The capital stock is measured by net Property, Plant, and Equipment (COMPUSTAT data #8)
3. The capital investment figures are obtained from COMPUSTAT data #30.
4. Dividend payout ratio is calculated as (Dividend payments/operating income before extraordinary items).
5. None of the comparisons were statistically significant.

The matched-pair comparison on R&D expenses per employee is contained in Table 5. One important result is that the adopting and non-adopting firms exhibit statistically significant differences in R&D expenses per employee over the 10 examining years. In particular, the adopters reveal significantly higher R&D expenses per employee in the 5 years prior to the adopting year. This agrees with the literature that firms eventually adopt broad-based stock options program are R&D intensive. The broad-based program helps firms to retain growth

potentials. Further, Kruse et al. (2008) states that greater shared capitalism programs involvement is generally linked to more employee training. The shared capitalism employees in their sample firms are more likely to have had employer-sponsored training in the previous years. We attempt to examine this observation by constructing and testing a variable – Selling, General, and Administration expenses (hereafter: SGA; COMPUSTAT data #189) per employee. This variable is utilized since SGA expenses include outlays related to employee training as well as to brand promotion, distribution channels, and information systems (Lev and Radhakrishnan, 2003). Thereby, it is associated with human capital and organization capital (Lin and Sesil, 2008). The comparison results are presented in Table 6. Agrees with Kruse et al. (2008), adopting firms tend to have significantly higher SGA expenses per employee than non-adopting peers over the 5-year pre adopting period as well as the 5 at- and post-adoption years. The observation supports the argument that adopters tend to be employee training intensive. We further interpret the empirical result as the evidence that the more firms invest in employee training which leads to better human and organization capital, the more likely they take steps to secure such investment. Training may be one important complementary policy, helping to develop work skills and commitment that can be reinforced by stock options. Taken together, Table 5 and Table 6 suggest that even in the same industry and with a similar size, adopters tend to exhibit higher growth potential as conferred by higher R&D expenses and more investment in human capital (which is associated with organization capital).

TABLE 5
YEARLY RESEARCH AND DEVELOPMENT EXPENSES PER EMPLOYEE

Research and Development/Employment¹

Year	Mean Difference ²	Wilcoxon Z
-5	7.269	2.59
-4	4.823	1.91
-3	6.708	2.69
-2	6.771	2.09
-1	9.145	2.89
0	8.494	2.86
+1	9.81	2.96
+2	13.730	2.83
+3	13.257	3.30
+4	12.814	3.24

1. Research and Development expenses/employment is expressed in thousands of dollars
2. The differences are calculated by subtracting the non-adopting firm observations from the adopting firm observation.

TABLE 6
YEARLY SALES, GENERAL, AND ADMINISTRATION EXPENSES PER EMPLOYEE

Sales, General, and Administration/Employment¹

Year	Mean Difference ²	Wilcoxon Z
-5	14.345	2.59
-4	11.941	2.44
-3	11.025	2.45
-2	11.492	2.33
-1	17.276	2.93
0	18.681	2.96
+1	21.665	3.21
+2	31.146	3.57
+3	27.266	3.78
+4	23.679	3.12

1. Sales, General, and Administration expenses/employment is expressed in thousands of dollars.
2. The differences are calculated by subtracting the non-adopting firm observations from the adopting firm observation.

As discussed in previous section, Market-to-book ratio has been interpreted as an aggregate indicator of a firm's growth opportunities. It reflects investor expectations about superior future profitability which are contingent on the firm's intangible capital including valuable employees. We apply the Wilcoxon test on Market-to-book ratio to examine this argument and the empirical result is presented in Table 7. Contrast to the literature, the adopting firms do not show significantly higher market-to-book ratio in the 10 examining years. However, one needs to interpret this result cautiously. In particular, in as much as markets are efficient, *Stock Price*, which relies on stock market evaluation of the firm, would reflect expectation of future increase in performance/profitability. The adoption of a broad-based stock options program is an event that is publicly announced, so that if the markets expect it to result in an increase in firm performance, it will lead to an immediate increase in firm's valuation by the market. Hence, the lack of detailed announcement date may lead to such insignificant results. At the same time, it may also be true that a firm's own expectation of increased future productivity (which is reflected in stock market prices) leads it to issue broad-based stock options as a means of rewarding its dedicated employees.

TABLE 7
YEARLY MARKET-TO-BOOK RATIO

Market-to-Book Ratio¹

Year	Mean Difference ²	Wilcoxon Z
-5	-0.526	-0.99
-4	4.193	0.23
-3	1.172	0.31
-2	-0.045	-0.33
-1	0.205	0.07
0	-2.358	-0.75
+1	-2.374	-1.44
+2	0.152	-0.57
+3	-2.279	-0.49
+4	-4.428	-1.05

1. Market to Book ratio is calculated as (Adjusted fiscal year ending stock price/ total common equity).
2. The differences are calculated by subtracting the non-adopting firm observations from the adopting firm observation.

The last task we embark upon is to examine the impact of the introduction decision on firm performance. We measure firm performance as the normalized (by total employment) cash flow from operations before R&D expenses⁶. One advantage of this measurement is that it reflects firm performance by employee level productivity and is more appropriate for our purpose since the employees received broad-based stock options mostly do not have the decision power to influence stock price. The comparison results are contained in Table 8. Important results include, first, adopting firms do not exhibit significant better performance from year -5 to -2. Second, significantly better performance is observed over the rest of the examining periods. Overall, there is weak evidence that the relative central tendency of firm performance has shifted upward for the adopting firms due to the employment of broad-based stock options program. However, this result should be interpreted with caution. Broad-based stock options may be an effect of better performance as well as a potential cause. Improved employee productivity could be the trigger mechanism for the adoption of the program. It remains possible that a firm's own expectation of increased future performance leads it to issue stock options to lower level employees as a means of rewarding them. This, in turn, may enable a company to continue an onward advance in terms of productivity. Hence, the impact of broad-based stock options program on firm performance is inconclusive in our data.

TABLE 8
YEARLY CASH FLOW FROM OPERATIONS BEFORE R&D EXPENSES PER
EMPLOYEE

Cash Flow from Operations before R&D Expenses/Employment¹

Year	Mean Difference ²	Wilcoxon Z
-5	0.231	0.26
-4	6.112	0.64
-3	7.032	0.83
-2	11.317	1.21
-1	15.912	2.65
0	11.062	1.71
+1	15.233	2.34
+2	14.626	2.15
+3	13.159	1.76
+4	18.656	2.26

1. Cash Flow from Operations before R&D expenses/employment is expressed in thousands of dollars. It is calculated as net cash flow from operating activities (COMPUSTAT #308) plus R&D expenses.
2. The differences are calculated by subtracting the non-adopting firm observations from the adopting firm observation.

CONCLUSION AND DISCUSSION

The literature identified several determinants of broad-based stock options program. While those determinants are often referred to as the characteristics which can distinguish adopting firms from non-adopting ones, there has been virtually no empirical examination of this hypothesis due to the lack of appropriate data. This study has examined several firm level features that are suggested to be of significant difference between adopters and non-adopting peers. The empirical results indicate that, first, agree with the majority of the literature, the adopting firms are generally larger relative to all other firms in the associated industry. Second, the firms which eventually employ the broad-based program exhibit higher R&D and employee training expenses throughout the 10 years surrounding the adoption year. The analysis reveals that broad-based stock options program is more likely to be observed in a workplace that depends on valuable investments in human and organization capital. We further interpret this empirical result as the evidence that firms tend to grant lower level employees to retain growth opportunities and secure investments in human capital. Third, the comparison results on firm performance do not yield conclusive evidence of a positive impact of the program. The broad-based stock options could be either a means of rewarding the valuable employees or a mechanism which enables a company to continue an onward advance in terms of productivity.

Our findings suggest at least three avenues for future research. First, the weak evidence of the impact could be due to some confounding variables (self-selection problems). The selectivity problem confronts all empirical studies of this type and makes it extremely difficult to conclude that the results are due to the intended effects rather than some confounding variables. In the current work, the adopters may have changed their human resources management practices

which simultaneously lead to the adoption decision. On the other hand, the adopting firms may have experienced better performance and granting stock options broadly is just as a means of rewarding employees. It should be noted that such effect was not examined in this study. The self-selection problem should be explicitly examined either with data sets which provide additional measures of the changes in human management practices or by using techniques which cast such changes as an unobservable which appears in several equations of a more complicated model. Second, given the relatively better performance of the adopting firms in the post-adoption period, it still remains a possibility that broad-based stock options have a true effect but indirectly mediated through human and organization capital. Thus, how to theoretically and empirically examine this alternative channel (other than motivation) represents an important area for future research. Third, future survey-based research in this area should be designed to incorporate a more qualitative dimension so that the analysis between the adoption decision and firm-level features can be pursued at a deeper level.

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ENDNOTES

1. Other justifications include, first, under current U.S. tax rules, the granting of stock options does not constitute a taxable event for either the company or the employees. The second is the favorable accounting treatment. There is usually no accounting expense (i.e. no cash outlay) recorded for options at time of grant. However, this special treatment was terminated in 2005. The third reason is that firms might adopt stock options program to conserve cash since there is no cash outlay while distributing them.
2. Shared capitalism as defined by Kruse et al. (2008) includes the programs/plans involved with direct employee participation in the financial performance of capitalist enterprises. It includes profit sharing, gain sharing, bonuses, employee stock ownership, and broad-based stock options.
3. The National Center for Employee Ownership (NCEO) is a private, nonprofit membership and research organization that serves as the leading source of accurate, unbiased information on employee stock ownership plans (ESOPs), equity compensation plans such as stock options, and ownership culture. They are the main publisher and research source in the field, hold dozens of Webinars and live meetings annually, and provide services to thousands of members.
4. This was accomplished by NCEO and by researchers at the Rutgers University.
5. A profile analysis of 1 year prior to adoption was also attempted and revealed no significant comparison results.
6. Value added per employee is another viable employee level productivity measure. However, it reduces our sample substantially since only 20% of COMPUSTAT firms report labor expenses.

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