

EMPLOYEE STOCK OPTION EXERCISES - AN INTERNATIONAL ANALYSIS

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Abstract

In this paper we use a proprietary data set that consists of all stock option grants and exercises for a Fortune 100 multinational corporations from 1990 to 1999 to show that the exercise patterns of employees varies across countries. When we examine the variables overall exercise responds to we find evidence that the variables vary with culture, e.g., in general patterns in English speaking countries appear to be comparable, but not so for other countries. When we examine variables that determine the length of time an individual option is held before exercise, we also find it also varies across countries. Further analysis indicates that these differences are tied to systematic differences in national income and tax rates.

Keywords: stock options, employees, tax rates

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1. Introduction

Huddart and Lang (1996) show that, among other things, exercise patterns differ across employee levels. This paper extends their findings by showing that exercise patterns differ across countries. Like Huddart and Lang (1996) we use a proprietary data set that consists of all stock option grants and exercises for a Fortune 100 multinational corporation from 1990 to 1999.

This paper continues with section 2 which provides some background on the use of options and variables that might affect their use across the globe. Section 3 then discusses the data, and section 4 provides the empirical analysis. The paper concludes with a summary in section 5.

2. Background

Companies grant options to employees to both compensate them for previous service and to give them incentive to increase shareholder value. These options typically give the employee the right to purchase shares in his or her employer, at a fixed price, normally the share price on the grant date, over a period of time. If the share price rises above the exercise price, the employee can exercise his or her option to purchase the shares, and then either hold the shares or sell them at the then current market price.¹

¹ Some companies, including the one studied in this paper, have set up programs with investment bankers that allow the employee to realize the profits from their stock options without ever taking

As discussed below, our data set is unique, in that one company granted a constant number of options to all of its employees (i.e., broad-based grants) across the world (25 countries with at least 200 individual grants are considered in this study),² at the same time with the same terms on three occasions during the 1990's. Yet at an employee level there are differences in income, wealth, education, and culture, differences that are greater when examining employees across a variety of countries than within a given country. And tax incentives, which are somewhat constant within a country, differ greatly across countries.³

As an example of these differences, note that income and wealth range dramatically across the globe. At their peak, an employee who was still holding the options granted in the broad-based grants (see below) was in-the-money to the tune of almost \$20,000. While a substantial sum in the United States, in countries like Mexico and Brazil, where average annual manufacturing wages were \$2,600 and 3,048, respectively, this sum was enormous.⁴ Presu-

share ownership. In these programs the employee merely calls up the broker and says that he or she wants exercise the option and simultaneously sell the shares, and the net proceeds are later deposited in his or her account.

² In countries where stock options were not allowed the company granted stock appreciation rights in their place.

³ Ignoring local taxes, e.g., state taxes in the U.S., provincial taxes in Canada, etc.

⁴ Unfortunately the test company did not provide us wage data for all of the countries in which they operate. Consequently average

mably the desire to exercise, for example to diversify risk, is greater in countries with lower levels of income, *ceteris paribus*. At the extreme an employee in one of these countries could retire on the proceeds of the option exercise.

Taxes which influence the amount of profits retained by the employee also vary greatly. The tax rate paid by the average manufacturing worker ranged from five percent or less in Hong Kong and Thailand to over 25 percent in countries such as Australia, Canada, India, and Ireland.

3. Data

The test firm, a Fortune 100 multinational, with both a management and broad based stock option plan, has generously provided data that will permit an in-depth analysis of the exercise patterns discussed above. As noted above these plans cover both domestic and international employees.

The company made multiple management grants and three broad-based grants to its global workforce over the years 1990 to 1999. The exercise period used in this study and included in the test company database represented 1,949 trading days from February 15, 1992 to November 2, 1999, the last day on which an exercise is recorded in the database. While the size of the management grants varied, the broad-based grants were consistent, i.e., each active full-time employee received a grant of 100 options in 1991, 1995, and 1997.⁵ In total our database has information on 362,989 individual grants, 294,732 of which pertain to U.S. employees and 68,257 of which pertain to international employees. Table 1 provides some descriptive information about the sample and exercise patterns by country, i.e., percentage of options exercised, as well as average age of option at exercise. In untabulated correlation analysis we find that the percentage of options exercised in a country varies inversely with national income. This is consistent with employees in low income countries exercising more quickly, as the options and the potential gains represent a larger amount of their income/wealth and hence they are more risk averse. The vast majority of the grants in the database consist of three broad-based grants made on February 15, 1991, January 25, 1995, and January 29, 1997.⁶ To some extent the broad-based grants dominate the data set as the number of employees per grant ranged from 127,027 in 1991 to 83,522 in 1997 and totaled 306,819 for the three grants. In contrast the number of management grants totaled 56,170. Consequently

gross monthly earnings, by country, for manufacturing were obtained from International Marketing Data Statistics (EUROMONITOR, 2000).

⁵ The company declared a 2:1 stock split in 1997. All grants have been adjusted to 200 shares to reflect the split.

⁶ The 1991 and 1995 grants vested one year from the date of the grant and expired 10 years from the date of grant. The 1997 grant vested after one year and could be exercised after the stock exceeded a hurdle price for five consecutive trading days. The hurdle price was exceeded in April, 1998. The 1997 grant also expired 10 years from the date of grant.

while analysis conducted below is reported for all grants, we verify that the results hold for both the broad-based and management grants independently. Through November 2, 1999, the last date for which the test company provided employee exercise data, 205,415 grants or 56.59 percent of the total grants had been exercised.

Insert Table 1 about here

4. Empirical analysis

The study uses regression analysis to investigate the theory suggested above. We posit that after taking other known factors into consideration, employee exercise differs across borders. We conduct our analysis using two broad models. The first model examines whether the proportion of options exercised on a given day differs across countries, after controlling for known covariates, while the second examines the time to exercise of the options. Since the dependent variable is our first regression is bounded by 0 and 1 we use a Tobit model, whereas in our second regression we utilize ordinary least squares.

$$\text{Proportion Exercised} = \alpha_0 + \alpha_1 \text{Lag Exercise} + \alpha_2 \text{Grant Recently Vested} + \alpha_3 \text{Share Price Exceeds High for Year} + \alpha_{4-7} \text{Prior Stock Return} + \alpha_{8-11} \text{Subsequent Stock Return} + \alpha_{12-35} \text{Country Indicator Variables} + \varepsilon \quad (1)$$

$$\text{Time To Exercise} = \beta_1 + \beta_2 \text{Employee Age} + \beta_3 \text{Participant Management Plan} + \beta_4 \text{Left Company Voluntarily} + \beta_5 \text{Left Company Due To Layoff} + \beta_6 \text{Left Company Retired} + \beta_7 \text{Left Company Death} + \beta_8 \text{Terminated For Cause} + \beta_{9-33} \text{Country Indicator Variables} + \varepsilon \quad (2)$$

where the variables are described below:

Dependent variables

The dependent variable in model (1) represents the proportion of stock options exercised to options available to be exercised during a given trading day_n. It is calculated as follows:

$$\text{Proportion Exercised} = \frac{\text{Options exercised on day } n}{(\sum \text{Options granted and vested through day } n - \sum \text{Options exercised prior to day } n)}$$

The dependent variable in model (2) represents the time to exercise for a given grant of options.⁷ It is calculated as follows:

$$\text{Time To Exercise} = \text{Exercise date less grant date}$$

Test and Control Variables

Since the objective of our paper is to examine exercise patterns across the globe our test variables are the country indicator variables, where we use the United States as the comparison country, i.e., its' coefficient is included in the intercept. In model (1)

⁷ While in theory the options in a given grant can be exercised over multiple dates, our database only provides one date per grant. The plan manager at the corporation indicates that for the vast majority of grants (remember most of the grants in the database were 100 shares) all options were exercised at the same time.

we also include the following control variables, which we believe may influence option exercise patterns. Lag Exercise the cumulative exercise over the five days prior to day n in country i is included to control for the potential autocorrelation in exercise patterns. We believe that this effect will be positive because of both information flow and herding instincts. We include an indicator variable, Grant Recently Vested, which takes the value of 1 in the 180 day window after a grant vests, because prior research, i.e., Gifford (2001), Balsam and Gifford (2004), shows that exercise activity increases in the period immediately after option vesting. This study adopts variables similar to those of Heath et al. (1999) to test for the influence of psychological variables on exercise behavior. As in Balsam and Gifford (2004) returns for each of the four five-day periods immediately prior to the exercise day (Prior Stock Return) are examined to determine if employees react to recent changes in market prices (beliefs). To determine if reference points (values) influence employee decisions to exercise, stock highs are identified for the one-year period (Share Price Exceeds High for Year) prior to the exercise day. More recent research (Balsam and Gifford 2004, Bartov and Mohanram 2004, Huddart and Lang 2003) show that stock option exercise has information about future returns, i.e., possibly revealing inside information, also found evidence that employees may also be exercising options in anticipation of future (downward) movements in stock prices. Consequently analogously to our prior return variable we include returns for each of the four five-day periods immediately after the exercise day (Subsequent Stock Return). Stock returns prior to and following exercise were calculated for the test period February 15, 1992 through November 2, 1999, as obtained from the CRSP database.

Once again, in model (2) where we examine the time to exercise for those options that have been exercised by the end of our sample period, our test variables are the country indicator variables. We also include following control variables, which we believe may influence option exercise patterns. We include Employee Age as an control variable because risk aversion with respect to financial returns increases with age (Weagley and Gannon, 1991; Schooley and Worden, 1999) as individuals anticipate retirement and other commitments that place claims on income. Accordingly, older employees may be less willing to hold options. However, options may also represent a higher proportion of a younger individual's wealth and may influence a younger individual to exercise early because of liquidity requirements. Because of these potentially conflicting motivations, no prediction of direction is made. We also include an indicator variable that takes the value of one if the employee participates in the management plan (Participant Management Plan), as these employees have knowledge about options that differ significantly from those employees who only participate in the

broad based plan and in addition, are likely to hold significantly more options. Last we include control variables that take the value of one if the employee has left the company and indicate the reason he or she has left, i.e., Left Company Voluntarily, Left Company Due To Layoff, Left Company Retired, Left Company Death, and Terminated for Cause.

Results

Table 2 provides the results for model (1). Looking at the country indicator variables we see that all 24 are significantly different from zero, i.e., the base country the United States. Of these differences 23 are negative and only one, the Columbia, is positive. Consequently we observe that in terms of proportion of options exercised in a given day, there is a wide variation across the globe. Or perhaps more appropriately, the proportion of options exercised in a given day that are not explained by the control variables varies. Looking at the control variables we see that as expected the coefficients on Lag Exercise and Grant Recently Vested are positive and significant. In contrast the coefficient on Share Price Exceeds High for Year is insignificantly different from zero. In general the coefficients on the return variables are positive both before and after exercise, inconsistent with prior research indicating that individuals exercising stock options used their insider knowledge to time exercise. Of course that previous research focused on executives and the vast majority of the exercises in our sample were by non executive personnel.

Given that the results indicate differences in exercise patterns between employees in the United States and employees elsewhere we reran the model separately for each of the 25 countries omitting the country indicator variables and focusing on the relationship between the proportion exercised and control variables in each country. We found (un-tabulated results) that the coefficient on Lag Exercise was positive and significant in 24 of 25 individual regressions. The only time it was insignificant was in the Thailand model. This may be because Thailand had the fewest grants 284, and exercises 180, in the sample, creating a preponderance of days in which the dependent variable is zero, which may bias the coefficients on the variables towards zero.

The coefficient on Grant Recently Vested which was positive and significant in the overall regression was positive and significant in 18 of the individual regressions, negative and significant in six of the regressions, and insignificant in one. We had a hard time explaining how vesting, which gives employees the right to exercise shares, could result in lower exercise. The only explanation we could come up with was that, as noted in footnote 6, the third broad-based grant only became exercisable when the stock price hit a certain level, effectively a new high. As discussed below, individuals can have differing expectations in this situation. That is, while some take it as a selling opportunity, others expect the price to continue to rise further and consequently delay exer-

cise. To try to control for this possibility we reran our analysis stopping just prior to the vesting date for the third broad-based grant. The results were somewhat improved, as of the six coefficients that were negative and significant, one became positive and significant and two became insignificant. Three (France, Japan, and Spain) were still negative and significant.

The coefficient on Share Price Exceeds High for the year, which was insignificantly different from zero in the pooled regression, was where we found the biggest divergence in the sample. We found it positive and significant in 17 of the regressions, including the one for the United States, negative and significant in five of the regressions, and insignificant in four of the regressions. This seems to indicate that employees in different countries paid differing amounts of attention to the company's share price, and reacted differently to it. That is in all the English speaking countries, e.g., United States, United Kingdom, Canada, and Australia, employees perceived the stock price hitting a new high as a selling opportunity. In contrast in other cultures, i.e., Brazil, Columbia, France, Italy and Japan, it seems that employees held back on exercise, presumably because they expected the price to go even higher.

Insert Table 2 about here

Table 3 provides the results for model (2). In the first set of columns we present the parameter estimates and p-values for model (2) itself. Since the first set of columns shows significant variation across countries, in the second set of columns we replace the country indicator variables with average national income for a manufacturing worker and the tax rate faced by that worker to further investigate the causes of these differences.

Looking at the country indicator variables we see that 20 of the 24 are significantly different from zero, i.e., the base country the United States. Of these differences 16 are negative and four are positive. The four countries in which the time to exercise is greater than the United States are Belgium, Canada, Luxembourg, and Spain, all developed countries. The 16 countries in which the time to exercise is less than the United States are primarily developing nations, e.g., Argentina, Brazil, Columbia, and Mexico, but also include developed countries such as Germany, Netherlands and the United Kingdom. Consequently we observe that in terms of time to exercise, there is a wide variation across the globe. As noted above, in the second set of columns we replace the country indicator variables with average national income for a manufacturing worker and the tax rate faced by that worker to further investigate the causes of these differences. We observe that time to exerci-

se increases with national income, which is what we would expect, and we also observe that it decreases with tax rate, i.e., as the after-tax benefits to additional gains decrease, employees exercise earlier. Looking at the control variables we see that time to exercise increases with employee age and employee participation in the management plan. It is also higher for employees who left the company either voluntarily, due to layoff, or because they retired, and it is lower for employees terminated for cause, probably because they had to exercise at the time of termination.

Insert Table 3 about here

5. Summary

In this paper we use a proprietary data set that consists of all stock option grants and exercises for a Fortune 100 multinational corporation from 1990 to 1999 to show that the exercise patterns of employees varies across countries. When we examine the variables overall exercise responds to we find evidence that the variables vary with culture, e.g., in general patterns in English speaking countries appear to be comparable, but not so for other countries. When we examine variables that determine the length of time an individual option is held before exercise, we also find it also varies across countries. Further analysis indicates that these differences are tied to systematic differences in national income and tax rates.

References

1. Balsam, S. and R. Gifford (2004) The effect of taxes on the timing of stock option exercises. *Journal of Derivatives Accounting* 1 (1): 81-88.
2. Bartov, E. and P. Mohanram (2004) Private information, earnings manipulations, and executive stock-option exercises. *The Accounting Review* 79(4): 889-920.
3. Gifford, R. (2001) An analysis of the market response to announcements of broad-based stock option plans and an analysis of the effects of broad-based plans on firm performance, employee behavior, and employee retention, Dissertation, Temple University.
4. Heath, C., Huddart, S., & Lang, M. (1999). Psychological factors and stock options exercise. *The Quarterly Journal of Economics*, 114 (2), 601-627.
5. Huddart, S. and M. Lang (1996) Employee stock option exercises: An empirical analysis. *Journal of Accounting and Economics* 21 (February): 5-43.
6. _____. and _____. (2003). Information distribution within firms: Evidence from stock option exercises. *Journal of Accounting & Economics*, 34 (1-3), 3-31.
7. Schooley, D., and Worden, D. (1999). Investors' assets allocations versus life cycle funds. *Financial Analysts Journal*, 9 (September/October), 37-43.
8. Weagley, R. and Gannon, C. (1991). Investor portfolio allocation. *Financial Counseling and Planning*, 2, 131-154.

Appendices

Table 1. Exercise by Country

Country Name	#grants	% options exercised	Age at Exercise	
			Mean	Median
Argentina	774	56.66%	25.86%	22.77%
Australia	2,790	59.61%	24.92%	19.67%
Belgium	1,730	45.82%	32.80%	29.10%
Brazil	2,705	65.33%	20.88%	13.85%
Canada	5,362	48.72%	28.95%	23.26%
Columbia	531	77.24%	21.02%	13.89%
France	2,756	57.62%	28.00%	22.23%
Germany	12,630	56.76%	27.26%	21.84%
Greece	306	75.82%	28.87%	22.40%
Hong Kong	636	50.67%	27.24%	21.88%
Ireland	914	65.23%	24.06%	19.92%
Italy	321	56.13%	29.23%	23.14%
Japan	2,169	50.42%	25.98%	20.60%
Luxembourg	4,230	47.07%	21.97%	25.26%
Mexico	4,542	68.68%	21.47%	16.82%
Netherlands	1,996	49.69%	20.78%	15.99%
Puerto Rico	1,882	66.41%	21.22%	14.37%
Singapore	1,810	52.11%	19.93%	13.01%
South Korea	840	60.63%	22.68%	16.48%
Spain	4,091	46.04%	30.21%	29.05%
Switzerland	4,019	47.73%	25.51%	19.75%
Taiwan	1,747	54.28%	20.58%	15.42%
Thailand	284	63.30%	25.53%	22.00%
United Kingdom	8,933	58.28%	19.77%	13.37%
USA	294,730	56.85%	29.93%	24.38%
Total	362,989*	56.59%	28.87%	22.79%

* Column does not sum to 362,989 because countries with less than 200 observations were omitted.

Table 2. Tobit Analysis
Dependent Variable – Proportion of Options Exercised

Variable Name	T-statistic	P-Value
Intercept	0.0057	<.0001
Lag Exercise	0.2550	<.0001
Grant Recently Vested	0.0147	<.0001
Share Price Exceeds High for Year	-0.0001	0.786
Stock return week prior to exercise	0.0356	<.0001
Stock return second week prior to exercise	0.0232	<.0001
Stock return third week prior to exercise	-0.0096	<.0001
Stock return fourth week prior to exercise	0.0220	<.0001
Stock return week subsequent to exercise	0.0005	0.7273
Stock return second week subsequent to exercise	0.0150	<.0001
Stock return third week subsequent to exercise	0.0226	<.0001
Stock return fourth week subsequent to exercise	0.0072	<.0001
Argentina	-0.0061	<.0001
Australia	-0.0064	<.0001
Belgium	-0.0063	<.0001
Brazil	-0.0063	<.0001
Canada	-0.0064	<.0001
Columbia	0.0532	<.0001
France	-0.0064	<.0001
Germany	-0.0065	<.0001
Greece	-0.0057	<.0001
Hong Kong	-0.0060	<.0001
Ireland	-0.0062	<.0001
Italy	-0.0046	<.0001
Japan	-0.0064	<.0001
Luxembourg	-0.0064	<.0001
Mexico	-0.0038	<.0001
Netherlands	-0.0063	<.0001
Puerto Rico	-0.0062	<.0001

Table 2 continued

Singapore	-0.0056	<.0001
South Korea	-0.0045	<.0001
Spain	-0.0064	<.0001
Switzerland	-0.0064	<.0001
Taiwan	-0.0054	<.0001
Thailand	-0.0047	<.0001
United Kingdom	-0.0049	<.0001

Table 3. OLS Analysis. Dependent Variable - Time to Exercise

Variable Name	Estimate	P-Value	Estimate	P-Value
Intercept	431.2699	<.0001	441.7598	<.0001
Employee Age	0.0382	<.0001	0.04021	<.0001
Participant Management Plan	350.2565	<.0001	359.3768	<.0001
Left Company Voluntarily	27.97593	<.0001	34.82606	<.0001
Left Company Due To Layoff	32.19782	<.0001	35.46106	<.0001
Left Company Retired	348.1259	<.0001	351.5472	<.0001
Left Company Death	23.47075	0.6395	22.51678	0.6552
Terminated For Cause	-135.918	<.0001	-147.063	<.0001
National Income			0.00104	<.0001
Tax Rate			-579.797	<.0001
Argentina	-176.404	<.0001		
Australia	-130.226	<.0001		
Belgium	196.7345	<.0001		
Brazil	-216.664	<.0001		
Canada	24.64217	0.0458		
Columbia	-247.313	<.0001		
France	-14.8251	0.3539		
Germany	-89.2306	<.0001		
Greece	44.95351	0.2708		
Hong Kong	-0.98064	0.9796		
Ireland	-201.977	<.0001		
Italy	48.28634	0.3055		
Japan	-76.7888	0.0001		
Luxembourg	40.04035	0.0046		
Mexico	-190.908	<.0001		
Netherlands	-298.79	<.0001		
Puerto Rico	-197.812	<.0001		
Singapore	-185.874	<.0001		
South Korea	-81.6743	0.0035		
Spain	48.92731	0.0007		
Switzerland	-118.094	<.0001		
Taiwan	-215.566	<.0001		
Thailand	-86.3563	0.0653		
United Kingdom	-300.246	<.0001		