Stock Option Grants in Finland

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Abstract

Who receives stock option grants? What do grant holders do with their options? We address these questions using comprehensive individual-level panel data on 195,000 grants worth 6.4 billion euros from 637 executive and employee stock option plans from 1997 to 2014. Our key findings are as follows. (1) One percent of the Finnish population was granted options during the sample period. (2) At the time of allocation, the average grant is worth 33,000 euros and the median grant is worth 1800 euros. When realized, the median grant is worth only 67 euros. (3) Men account for 74% of the number and 88% of the value of the grants. (4) Option grant income is highly concentrated. The top 1% of the grantees is allocated half of the value of all grants. (5) Grant holders are much more likely to sell than to exercise their options.

1. Introduction

This paper uses a unique data set to document demographic patterns in employee and executive stock option grants in Finland between 1997 and 2014. Our analysis is descriptive in nature and focuses on the following aspects. First, we document basic patterns in the option plans, such as their value, annual frequency, and the number of remunerated people. Second, we study the following socioeconomic characteristics of the grantees: gender, age, mother tongue, and location. Here, we are interested in the link between demographic variables and the likelihood to receive a grant and the size of the grant. Third, we study the extent to which the grants are concentrated, comparing the degree of concentration in grant income to that in income in general. Fourth and finally, we study what grantees do with their options and what type of investors ultimately exercise them.

The paper proceeds as follows. The next section describes the data. Section 3 presents the empirical results. Section 4 concludes.

2. Data

Our paper merges data from two sources, Euroclear Finland and Alexander Incentives. Below is a description of the data sets.

Euroclear Finland. This dataset includes daily holdings and changes in the holdings of the securities registered in Euroclear Finland from 1995 to 2014. For our purposes, the most important securities are employee and executive stocks options, but the data set also includes information on other securities, most importantly directly owned stocks.

We use the data to generate the following information for each individual and for each point of time:

- Grantee identification number. Grantees are initially identified by their social security number. With the help of this unique number the holdings of an individual are kept separate from the holdings of other in-

dividuals. For security reasons, in our data, the unique identifying number is replaced by a unique running number.
- Security. Each security is identified by its unique ISIN code. In addition, it includes a description of the name of the issuer and the plan.
- Number of securities
- Dummy variables for males and females
- Birth year
- Mother tongue
- Zip code. We designate grantees with a post office box number to the respective zip code. We use the zip codes to identify the municipality and the province where the grantee lives.
- Transaction type. This variable identifies the reason for a change in a holding.
- Transaction day. This day identifies the day when a change in a holding has taken place.
- Transaction price. If an option is sold on the open market, we use the price at which the investor has sold the option. If this price is unknown, we use the closing price of the option. If this price is not available, we use the Black-Scholes value for the option.
- Ownership type. Euroclear classifies ownership into eight types. Except for the analyses of option exercises, we only consider private ownership.
- Investor category. We focus on grantees who are domiciled in Finland. In the analysis of option exercises, we also consider foreign investors.

Alexander Incentives. This dataset includes information on the characteristics of 1331 employee and executive stock option plans issued in Finland between 1995 and 2014. Alexander Incentives designed almost all of these plans. The dataset does not include the ISIN code of the security.

Euroclear and Alexander Incentives databases are primarily matched based on year and the names of the issuer and the plan, and secondarily based on plan characteristics

such as size. This match gives us a sample of 637 options plans. The number of plans is smaller than that in the Alexander data set for the following reasons. First, Euroclear does not have data on synthetic option plans. Second, we exclude the plans of unlisted companies, plans that cannot be matched unambiguously, and plans that have been allocated abroad, to entities that appear as institutions in the data set, or have not been allocated at all.

3. Results

3.1. Descriptive statistics on option grants

Table 1 Panel A reports descriptive statistics of the grants. The first row describes the grants at the time of allocation. In all, our data set includes 637 plans from 95 firms. The total number of grants is 195,000, which is divided between 56,000 distinct individuals. The average number of grants per grantee is thus 3.5. The total value of the grants, valued

Table 1. Descriptive statistics on option grants

This table reports descriptive statistics on executive and employee option grants. Panel A reports these statistics for the entire sample, while Panel B reports them separately for each sample year. In Panel B, for a given option series, only the first issuing year is considered. Allocated grant values are calculated using the Black-Scholes formula at the time the option series is allocated to the grantee's account. When valuing the allocated options, we follow Ikäheimo et al. (2006) and estimate implicit volatility as standard deviation of daily log returns from the 250 trading days prior to the allocation. We interpolate the risk-free rate from the Euribor rate (Helibor before the Euribor rate applied) for the time to maturity. Realized option values are determined at the time the grantee parts from the option. Realized value is defined as the sell price (intrinsic price) if the grantee sells (exercises) the option. If the grantee parts from the options due to a personal event (such as donating the option) or a firm event (such as a merger), or if the grantee owns the options at the end of the sample period, the realized value is calculated using the Black-Scholes formula, valued at the time of parting from the option position or at the end of the sample period. To simplify the calculation of the realized option values, we ignore the effect of grantees' open market purchases on their option portfolios. In all, the grantees purchased on the open market employee or executive options allocated to them with 37 million euros during the sample period. All exercise prices are split adjusted when appropriate. We dividend adjust the exercise prices when Alexander Incentives data on option terms stipulate that a dividend adjustment has been made. The number of option series (Nr of option series) in Panel A in the allocated and realized rows differ from one another because some option series have merged into one. These mergers also largely explain the difference in the number of distinct grantee-option series observations (Nr of grants). The small difference in the number of grantees (Nr of grantees) is due to unobservable changes in the individual's ownership type between the allocation and the realization of the option position. In Panel B, only the column Total value of grants when realized refers to the value of realized allocations.

	Nr of firms	Nr of option series	Nr of grantees	Nr of grants	Mean nr of grants per grantee	Total value of grants when allocated, mill. EUR	Total value of grants when realized, mill. EUR	Mean value of grant, EUR	Median value of grant, EUR	Std. dev. of the value of grant, EUR
Panel A: Full sample										
Allocated	95	637	55,682	194,727	3.5	6,380		32,805	1,834	269,824
Realized	95	620	55,674	155,595	2.8		5,409	34,761	67	356,065
Panel B: By allocation year										
1997	1	2	81	162	2.0	1	0	6,260	3,951	6,008
1998	7	18	1,029	1,847	1.8	63	23	34,501	16,942	75,732
1999	14	36	1,896	4,570	2.4	2,346	1,058	513,537	307,200	960,330
2000	34	108	21,114	35,703	1.7	2,431	1,239	68,545	12,596	483,047
2001	52	161	15,681	30,115	1.9	425	642	14,116	2,545	49,218
2002	45	141	24,008	68,152	2.8	125	607	1,830	235	11,128
2003	45	144	21,838	23,363	1.1	105	149	4,475	1,566	19,404
2004	43	92	2,880	3,755	1.3	131	247	34,779	6,779	95,280
2005	37	79	2,267	2,720	1.2	135	299	49,729	4,197	138,779
2006	30	55	2,925	3,345	1.1	293	506	87,459	7,422	243,297
2007	28	50	2,988	3,267	1.1	67	305	20,651	5,242	54,852
2008	24	39	2,888	2,968	1.0	68	81	22,993	3,199	94,200
2009	19	38	2,551	2,677	1.0	29	22	10,712	276	37,736
2010	23	44	2,730	2,938	1.1	36	34	12,272	1,625	32,866
2011	18	31	2,431	2,470	1.0	37	44	14,797	1,801	64,698
2012	17	43	2,346	2,525	1.1	36	46	14,103	2,626	59,168
2013	16	28	1,943	2,153	1.1	43	57	19,745	1,121	56,016
2014	15	25	1,918	1,997	1.0	10	51	5,002	147	22,156

using the Black-Scholes formula on the day they are registered in Euroclear Finland, is 6.4 billion euros.[1,2] On average, the grants are worth 33,000 euros. However, the value of the grants is highly skewed to the right: the median value of the grant is worth 1800 euros.

The second row describes the value of the grants at the time the grantees realize them, such as by selling them in the open market or by exercising them (Table 11 describes the distribution of various grant outcomes). The value of the options realized is 85% of the value of the allocated options, 5.4 billion euros. The median value of the realized grant, 67 euros, is quite small, reflecting the fact that many options expire worthless.

Table 1 Panel B reports descriptive statistics of the grants separately for each sample year. Except for the column detailing the value of realized grants, the panel describes allocations of grants. The number of companies issuing options and the number of option series issued increase from the first sample year of 1997 up to year 2001, after which the issuing activity decreases gradually. Figure 1 illustrates this time pattern for the number of issuing companies. The largest numbers of grants were allocated in years 2000 through 2003. Combined, these four years account for 81% of the total number of grants. By far the largest grant volumes occurred in years 1999 and 2000, when the combined value of the grants was over two billion euros in each year. The combined value of the grants allocated in the other sample years was 1.6 billion euros. In 1999, the mean grant was worth as much as 514,000 euros and the median grant was worth 307,000 euros.

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[1] This day may either reflect the day when the options are granted, or the day when the options are vested. From here on, we refer the first registration day as the day when the options are granted.

[2] When valuing the options, we follow Ikäheimo, Kuosa, and Puttonen (2006) and estimate implicit volatility as standard deviation of daily log returns from the 250 trading days prior to the allocation. We interpolate the risk-free rate from the Euribor rate (Helibor before the Euribor rate applied) for the time to maturity.

Figure 1. Number of firms by year
This figure reports the number of firms issuing executive or employee options in each sample year. For a given option series, only the first issuing year is considered.
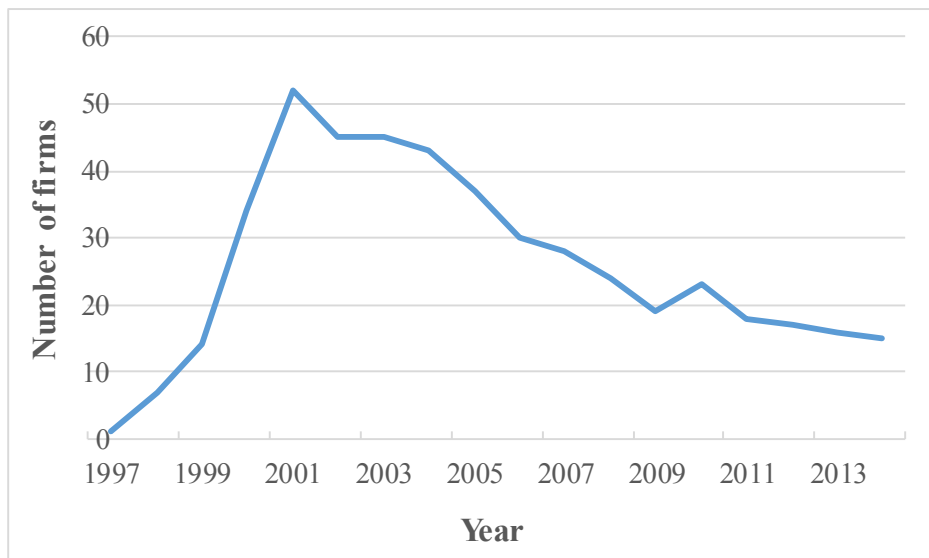
Table 2. Firms with largest option grant volume
This table reports descriptive statistics on the grants of the ten firms with the greatest value of grants. See Table 1 for information on how the options have been valued.

Firm name	Nr of option series	Nr of grantees	Nr of grants	Share of total nr of grants	Total value of grants when allocated, mill. EUR	Total value of grants when realized, mill. EUR	Share of total value of grants when allocated	Share of total value of grants when realized
Nokia	16	16,812	82,718	42.5%	4,384	3,507	68.7%	64.8%
Fortum	6	1,776	2,601	1.3%	373	453	5.8%	8.4%
Tietoenator	13	4,588	11,491	5.9%	289	106	4.5%	2.0%
Sonera	6	7,239	17,170	8.8%	181	11	2.8%	0.2%
Nokian Renkaat	12	2,526	15,601	8.0%	142	171	2.2%	3.2%
UPM-Kymmene	10	700	2,892	1.5%	101	90	1.6%	1.7%
F-Secure	30	339	1,499	0.8%	87	42	1.4%	0.8%
Sampo	5	2,573	7,749	4.0%	78	200	1.2%	3.7%
Kesko	9	658	1,542	0.8%	50	87	0.8%	1.6%
Perlos	13	102	284	0.1%	45	44	0.7%	0.8%
Other 85 firms	517	19,149	51,180	26.3%	650	698	10.2%	12.9%

3.2. Most important option-granting firms in the sample

Table 2 reports on the ten sample firms with the largest value of the grants at the time of allocation. Nokia is by far the largest option-granting firm, accounting for 69% (65%) of the value of the options allocated (realized) and 43% of the number of grants. Fortum, Tietoenator, Sonera, and Nokian Renkaat have the next-largest option programs, accounting combined for about 15% of the total value of grants at the time of allocation.

Table 2 also shows that Nokia is largely responsible for the fact that the total value allocated and realized differ in the data: 880 million of the total difference of 970 million euros is due to Nokia. Among other companies, in particular the realizations from Tietoenator's and Sonera's options are worth less than are their allocation values.

3.3. Technology firm share of option grants by year

Some of the most avid issuers of executive and employee stock options are technology firms. The sample has altogether 35 technology firms, which account for 37% of all sample firms.[3] Table 3 and Figure 2 report on the share of technology companies of all option grants by year. In 1998, i.e. the second sample year, seven firms issued options, and only one of them was a technology firm. Perhaps because of rising technology firm valuations, in 1999 already 36% of the issuers were technology firms. The importance of technology firms was even larger among the number of grantees (84%), number of grants (89%), and in particular in the value of grants (99%). Based on the number of grants, the technology firm share remained high up to year 2003, hovering between 66% and 92%. The share plunged in 2004-05 to 37% or less and remained thereafter below 20% until the end of the sample period.

3.4. Distribution of the number of plans, grantees, and firms

The first row of Table 4 reports the distribution of the number of plans across companies. The median firm has five plans in the data set, while the mean firm has seven plans. The second row reports the distribution of the number of grantees across plans. The median plan has 50 grantees. The mean number of grantees, 306, is much higher, suggesting that the number of grantees is highly skewed

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[3] Admittedly, the definition of a technology firm is ambiguous. We have adopted a broad definition including technology firms and their major contract suppliers (which derived their business largely from Nokia). The technology firm share would follow a similar pattern also with alternative definitions of technology firms.

Table 3. Technology firm share of option grants by year
This table reports the share of technology companies among allocations of option grants. Technology firms include the following 35 firms and their predecessors and followers: Sysopen, Satama Interactive, Tietoenator, SSH Communications Security, TJ Tieto, TH-Tiedonhallinta, Comptel, Novo Group, Stonesoft, Jippii Group, Tecnomen Holding, Nokia, Iocore, Tieto-X, JOT Automation Group, Elcoteq, Teleste, Tekla, Basware, AffectoGe-nimap, Aldata Solution, F-Secure, Okmetic, Evox Rifa, Perlos, Incap, Aspocomp, Done Solutions, Instrumenta-rium, Biotie Therapies, Vaisala, Elisa Communications, Yomi, Sonera, and Nedecon.

| | Share of tech companies of: | | | | |
Allocation year	Nr of issuing firms	Nr of option series	Nr of grantees	Nr of grants	Total value of grants
1997	0%	0%	0%	0%	0%
1998	14%	6%	61%	34%	62%
1999	36%	47%	84%	89%	99%
2000	50%	65%	81%	73%	96%
2001	44%	56%	66%	66%	70%
2002	51%	69%	84%	92%	45%
2003	49%	68%	89%	88%	58%
2004	42%	55%	22%	20%	3%
2005	49%	58%	33%	37%	7%
2006	43%	49%	15%	17%	2%
2007	43%	48%	12%	12%	7%
2008	42%	33%	11%	11%	8%
2009	47%	45%	16%	16%	13%
2010	43%	50%	18%	20%	21%
2011	50%	55%	14%	15%	14%
2012	41%	37%	6%	9%	3%
2013	31%	46%	9%	18%	14%
2014	20%	16%	5%	6%	27%

Figure 2. Share of technology firm grants by year
This figure reports the share of executive or employee option grants issued by technology firms in each sample year. For a given option series, only the first issuing year is considered. Technology firms are defined in Table 3.
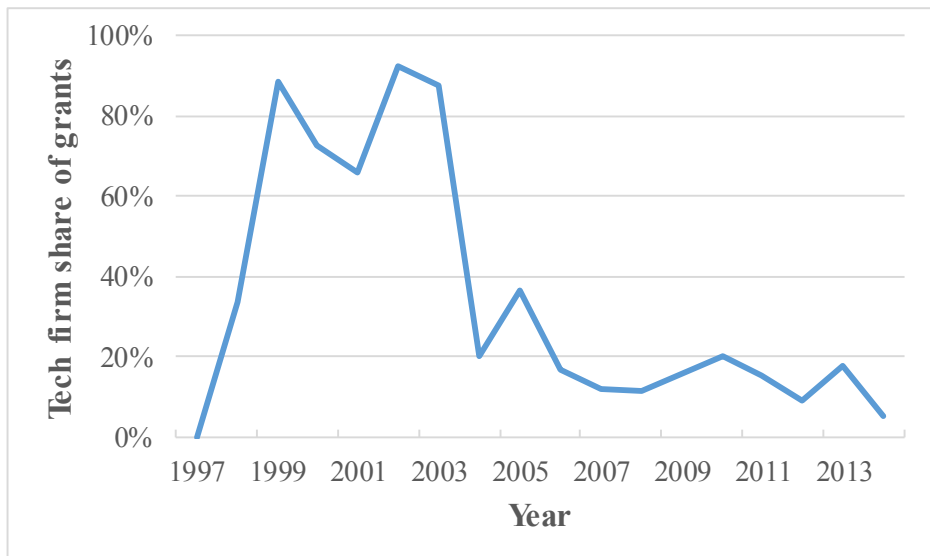
Table 4. Distribution of the number of plans, grantees, and firms
This table reports descriptive statistics of the plans, grantees, and firms across firms, plans, and grantees.

| | Percentile | | | | | | Standard | |
Variable	5%	25%	50%	75%	95%	Mean	deviation	N
Nr of plans across firms	1	3	5	6	15	7	6	637
Nr of grantees across plans	2	18	50	57	1,329	306	1,302	55,682
Nr of plans across grantees	1	2	3	3	8	3	2	637
Nr of firms across grantees	1	1	1	1	1	1	0	95

to the right. The third row reports the distribution of the number of plans each grantee has participated in. The median and mean grantee participate in three plans. The fourth row reports the distribution of the number of firms each grantee has received grants from. The mean is 1.01 plans. Only 1.2% of the grantees have received grants from more than one firm. This is consistent with the idea that individuals rewarded with grants do not switch their employers often.

3.5. Age, gender, and grants

Table 5 shows the joint distribution of age and gender for the entire Finnish population and for the grantees. Moreover, the table tabulates the gender and age distribution of the values of the grants. The mean age of both male and female grantees is 41 years, i.e. about the same as that for the population. The allocation-size weighted average ages of the grantees are higher than the unweighted ages reported above, 45 years for men and 44 years for women. This result is reflected in the fact that individuals who are less than 40 years account for 53% of the number of grantees, but for only 28% of the value of the grants.

The option grant patterns of men and women differ from one another. 74% of the grantees are men and 26% of them are women. Grant values are more skewed towards men than the likelihood to receive a grant: men account for 88% of the value of the grants, and for 90% of the grantees for whom the total value of the grants exceeds one million euros.

Table 5. Joint distribution of age and gender for the Finnish population, grantees, and grant millionaires
This table reports the joint distribution of age and gender for the Finnish population, grantees, and grant millionaires. Age is measured at the time of receiving the grant. Population age and gender distributions are calculated as equally weighted averages of their respective yearly distributions. Grant millionaires refer to individuals for whom the total value of grants exceeds one million euros. Population statistics are from Statistics Finland.

| | Population | | Nr grants | | Value of grants | | Grant millionaires | |
Age	Men	Women	Men	Women	Men	Women	Men	Women
0-24	15.2%	14.5%	0.6%	0.2%	0.1%	0.0%	0.0%	0.0%
25-29	3.2%	3.0%	7.8%	2.6%	1.6%	0.3%	0.6%	0.0%
30-34	3.3%	3.1%	15.5%	4.8%	7.3%	1.2%	4.6%	0.4%
35-39	3.4%	3.2%	15.8%	5.3%	15.3%	2.4%	15.8%	1.5%
40-44	3.5%	3.4%	12.0%	4.2%	20.3%	2.8%	23.0%	2.1%
45-49	3.7%	3.6%	9.2%	3.5%	17.3%	3.2%	19.3%	2.7%
50-54	3.7%	3.7%	7.0%	2.8%	15.2%	1.7%	15.4%	2.0%
55-59	3.4%	3.5%	4.4%	1.8%	7.7%	0.6%	8.4%	0.9%
60-64	3.0%	3.1%	1.4%	0.6%	2.6%	0.2%	2.7%	0.3%
65-	6.7%	9.9%	0.2%	0.1%	0.1%	0.0%	0.3%	0.0%
Totals, allocated	49.0%	51.0%	74.0%	26.0%	87.5%	12.5%	90.1%	9.9%
Totals, realized					87.7%	12.3%	90.1%	9.9%
Mean age	38.5	41.5	40.5	41.3	45.2	43.8	45.2	46.0

Figure 3. Median value of grant as a function of grantee age
This figure reports the median value of the grant as a function of grantee age. Grant values are calculated using the Black-Scholes formula at the time the option series is allocated to the grantee's account.
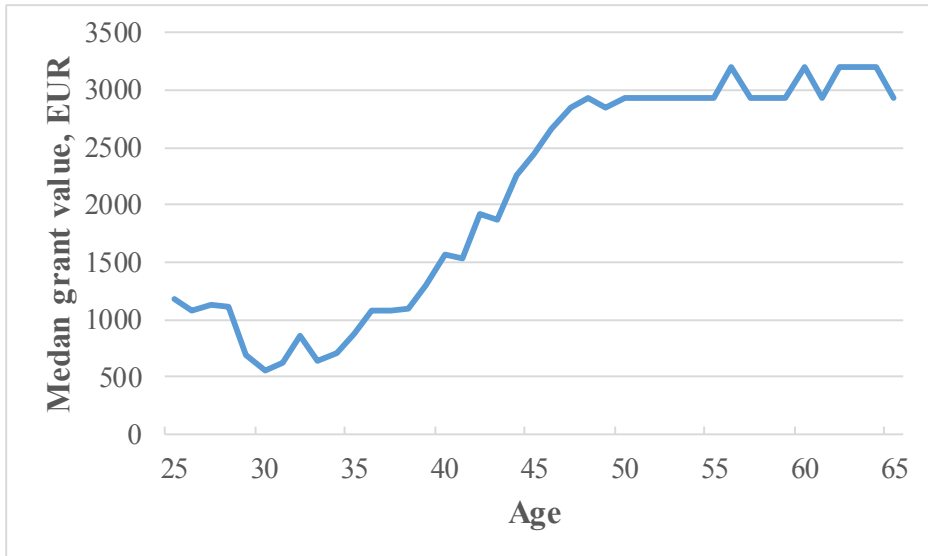
The value of realized grants follows a similar pattern across genders. There are altogether 1118 (990) individuals in the sample, whose combined value of allocated (realized) grants exceeds one million euros. 75% (66%) of these grant millionaires are due to Nokia.

Figure 3 displays the median value of the grant as a function of the grantee's age. Grant sizes increase as a function of age up to late 40s, after which they remain at about the same level for the rest of the career.

3.6. Grants by mother tongue
Table 6 investigates how mother tongue is

related to the allocation of stock options. The Finnish-speaking majority (about 88% of the Finnish population) is much more likely to have been granted options than the Swedish-speaking minority (about 5.3% of the population): the fraction of Finnish speakers who have been granted options is 1.07%, i.e. about 60% higher than the corresponding fraction for Swedish speakers (0.67%). This result largely stems from the lower prevalence of Swedish speakers in technology firms, which account for a bulk of the option grants.

Table 6 also shows that Swedish speakers receive on average about 50% larger option

Table 6. Distribution of grants by language
This table reports the language distribution of the grantees. Language distributions are calculated as equally weighted averages of the yearly numbers. We do not report the per inhabitant results for English speakers, for whom the language recorded in the data does not necessarily match the mother tongue. Data on the number of inhabitants by mother tongue are from Statistics Finland.

Language	Nr of grantees	Nr of grantees / Nr of inhabitants	Share of nr of grants	Mean value of grants when allocated, EUR	Median value of grants when allocated, EUR	Share of total value of grants when allocated	Share of grant millionaires when allocated	Share of total value of grants when realized	Share of grant millionaires when realized
Finnish	51,470	1.07%	91.7%	32,705	1,869	91.4%	90.8%	91.3%	91.4%
Swedish	1,943	0.67%	3.5%	49,243	2,690	5.2%	5.2%	6.1%	5.5%
English	2,220		4.7%	22,544	625	3.2%	3.8%	2.5%	2.9%
Other	49		0.1%	35,881	10,199	0.1%	0.1%	0.1%	0.2%

Table 7. Distribution of grants by region
This table reports the region distribution of the grantees. Region distributions are equally weighted averages of the yearly numbers. Data on the number of inhabitants by region are from Statistics Finland.

Region	Nr of grantees	Nr of grantees / Nr of inhabitants	Share of total nr of grants	Mean value of grant when allocated, EUR	Median value of grant when allocated, EUR	Share of total value of grants when allocated	Share of grant millionaires when allocated	Share of total value of grants when realized	Share of grant millionaires when realized
Greater Helsinki Area	22,738	2.25%	41.9%	46,734	2,545	62.5%	61.8%	63.4%	63.3%
Rest of Uusimaa	6,291	1.70%	10.3%	24,590	1,935	8.1%	8.7%	8.2%	9.2%
Varsinais-Suomi	4,315	0.98%	8.8%	34,016	1,566	9.6%	11.1%	10.4%	10.2%
Satakunta	572	0.25%	0.8%	13,466	2,545	0.3%	0.3%	0.3%	0.2%
Kanta-Häme	786	0.47%	1.4%	15,070	1,566	0.7%	0.7%	0.7%	0.9%
Pirkanmaa	6,234	1.35%	16.2%	15,241	1,190	7.9%	8.1%	6.9%	6.8%
Päijät-Häme	810	0.42%	1.2%	12,372	2,545	0.5%	0.3%	0.5%	0.3%
Kymenlaakso	448	0.25%	0.6%	12,802	2,934	0.3%	0.3%	0.3%	0.3%
Etelä-Karjala	658	0.50%	1.0%	15,571	2,934	0.5%	0.1%	0.4%	0.1%
Etelä-Savo	417	0.26%	0.7%	31,260	2,934	0.7%	0.5%	0.8%	0.7%
Pohjois-Savo	950	0.38%	1.5%	4,957	1,342	0.2%	0.0%	0.2%	0.0%
Pohjois-Karjala	382	0.23%	0.6%	15,837	2,012	0.3%	0.4%	0.4%	0.9%
Keski-Suomi	1,666	0.63%	2.8%	12,011	1,658	1.1%	0.4%	0.7%	0.3%
Etelä-Pohjanmaa	292	0.15%	0.4%	10,624	2,545	0.1%	0.1%	0.1%	0.1%
Pohjanmaa	486	0.28%	0.7%	15,974	2,934	0.4%	0.3%	0.5%	0.4%
Keski-Pohjanmaa	125	0.19%	0.2%	8,076	2,545	0.0%	0.0%	0.0%	0.0%
Pohjois-Pohjanmaa	3,935	1.03%	8.7%	21,061	616	5.9%	6.4%	5.2%	5.8%
Kainuu	545	0.68%	0.6%	16,328	2,934	0.3%	0.1%	0.2%	0.2%
Lappi	611	0.33%	0.9%	20,645	2,934	0.6%	0.3%	0.7%	0.2%
Ahvenanmaa	367	1.41%	0.8%	2,419	2,105	0.1%	0.0%	0.1%	0.0%

grants than Finnish speakers conditional on receiving a grant at all. The average grant for Swedish speakers is 49,200 euros, while the average grant for Finnish speakers is 32,700 euros. The median grant is also much higher for Swedish speakers (2700 EUR) than for Finnish speakers (1900 EUR). These results are consistent with the idea that Swedish speakers are in higher-ranked positions than Finnish speakers in the firms that grant options. As a result of the two opposite forces—lower likelihood to receive a grant but larger grants —Swedish speakers' share of the total value of grants at the time of allocation, 5.2%, is very close to their population share. Swedish speakers' share of the realized value of grants, 6.1%, is somewhat higher than their allocated share. This is because Swedish speakers are underrepresented among the grantees in technology firms and because the realized values of technology firm options are on average lower than the corresponding allocated values.

3.7. Grants by region

Table 7 shows how option grants are distributed across regions. There are sizeable differences in the relative frequency of grantees in different regions. The Greater Helsinki Area has the greatest prevalence of grantees: 2.3% of the population have been granted options. In the rest of Uusimaa, Ahvenanmaa, Pirkanmaa, and Pohjois-Pohjanmaa, grant holders account for more than one percent of the population, while for seven provinces the fraction is less than 0.3%. The national average is 1.0%.

Table 7 also reports the distribution of grant values by region. Owing to its large professional population, the Greater Helsinki Area accounts for 63% of the total value of allocated grants. The rest of Uusimaa (8%), Varsinais-Suomi (10%), Pirkanmaa (8%), and Pohjois-Pohjanmaa (6%) account for the bulk of the remaining value of grants.

Table 8. Allocation of grants to Greater Helsinki Area as a function of firm headquarters location
This table reports the allocation of grants to grantees residing in the Greater Helsinki Area and in the rest of the country as a function of where the firm is headquartered.

Headquarters location	Nr of firms	Share of total number of grants allocated to Greater Helsinki Area	Share of total value of grants allocated to Greater Helsinki Area
Greater Helsinki Area	69	47%	64%
Rest of country	26	7%	16%

3.8. Grants by headquarters location and grantee region

Table 8 reports on the geographical distribution of the number and value of grants as a function of headquarters location. We split the sample in two, firms headquartered in the Greater Helsinki Area ($N = 69$), and those headquartered outside of the Greater Helsinki Area ($N = 26$). The former allocate 47% of the number of grants and 64% of the value of grants to the Greater Helsinki Area. Firms headquartered outside of the Greater Helsinki Area allocate just 7% of the number and 16% of the value grants to the Greater Helsinki Area. These results are consistent with

the idea that firms tend to allocate relatively more grants to communities close to their headquarters, where the key executives and employees are likely to live. These results are not due to Nokia: excluding Nokia from the sample would have just a minuscule effect on the local value share of the firms headquartered in the Greater Helsinki Area.

3.9. Concentration of grant income

Table 9 shows the degree of concentration in the grants. The richest 0.1% of grantees, i.e. 56 individuals, receive 19% (21%) and the richest 1% receive 50% (58%) of the value of allocated (realized) grants. Calculating the

Table 9. Grant value concentration
This table reports the concentration of the grants across grantees. In the allocated column, grant values are calculated using the Black-Scholes formula at the time the option series is allocated to the grantee's account. In the realized column, grant values refer to the value of realized grants as defined in Table 1.

Percentile	Cumulative share of the value granted to the richest n% of grantees	
	Allocated	Realized
0.1	19.5%	20.7%
0.5	39.5%	46.1%
1	50.4%	57.8%
2	62.4%	70.1%
3	70.0%	77.8%
4	75.1%	83.2%
5	78.5%	86.7%
6	80.8%	88.9%
7	83.0%	90.6%
8	84.9%	91.9%
9	86.6%	93.0%
10	87.9%	93.8%
20	94.6%	97.6%
30	97.0%	98.9%
40	98.3%	99.6%
50	99.1%	99.8%
60	99.5%	100.0%
70	99.7%	100.0%
80	99.9%	100.0%
90	100.0%	100.0%

Table 10. Grantee portfolio characteristics
This table reports the distribution of grantee portfolio characteristics at the time of allocation. Nr of stocks is the number of stock exchange listed stocks in the grantee's portfolio. Same stock owner is a dummy variable indicating grantees who own the stock underlying the grant. Portfolio share is the ratio between grant value and the sum of the grant value and the value of the stock portfolio.

| | Percentile | | | | | | Standard |
Variable	5%	25%	50%	75%	95%	Mean	deviation
Nr of stocks	0.00	0.00	1.00	2.00	8.00	1.80	3.26
Same stock owner	0.00	0.00	0.00	1.00	1.00	0.28	0.45
Portfolio share	0.00	0.20	0.96	1.00	1.00	0.65	0.41

Gini coefficient at the time of allocation (realization) across individuals who have received option grants results a value of 0.91 (0.94). These coefficients are much higher than the corresponding coefficient for income, which ranged between 0.25 and 0.29 in Finland during the sample years. This suggests that option compensation is much less equally distributed than income in general.

3.10. Grantee portfolio characteristics
Table 10 reports on grantee portfolio characteristics at the time of the grant. Most grantees have poorly diversified stock portfolios. 28% of the grantees own the stock underlying the grant. The mean number of stocks in the portfolio is 1.8 and the median is one. On average, the grant accounts for about two-thirds of the value of the portfolio.

3.11. Grantee portfolio characteristics by grant outcome
Table 11 reports on the distribution of grant outcomes and grantee portfolio characteristics and trading behavior by outcome. Selling the grant is by far the most common outcome, accounting for about two-thirds of all outcomes. Grantees typically sell their options on the stock exchange, a unique institutional feature pertaining to Finnish option grants. In about one-quarter of the observations, the grantee's payoff is zero, either because the grants expire worthless (19%) or because the grantee leaves the company before the options are vested (5%). Exercises account only for 2.8% of the outcomes. Grantees exercising

their options typically have better diversified portfolios than those selling their shares at the time of the allocation. For example, these individuals have on average 3.0 stocks while those selling their shares only have 1.7 stocks. Individuals exercising their grants typically keep the stocks in their portfolios for long after the exercise. For example, only 30% of the grantees exercising their options sell the stock underlying the grant within one year from the exercise. Executives and other insiders may find option exercises a convenient way of buying a stock, because they do then not need to be concerned of being ex post alleged of having traded it using inside information.

3.12. Distribution of time between grant allocation, possibility to sell, and actual sell
The first row of Table 12 reports the distribution of the number of days between the allocation and the first opportunity to sell the options on the stock exchange. The median number of days is only five and the mean is 192. The short delay is probably due to some issuing firms' practice of registering the allocations only after the options have vested. The second row reports the distribution of the number of days between the first opportunity to sell the option on the open market, and the actual sell transaction. Here, the median is 716 days and the mean is 771 days. In other words, grantees tend to hold on to their option portfolios much longer than they have to. The third and fourth rows show that exercises follow a similar pattern as open market

Table 11. Grantee portfolio characteristics by grant outcome
This table reports mean grantee portfolio characteristics by grant outcome. Sold refers to grants sold on the stock exchange or in the OTC market. Returned options are surrendered to the company due to their holder leaving the company before the options have vested. Continues to hold refers to options held by the grantees at the end of the sample period. Firm event refers to option programs terminated by the company, often against compensation, due to a merger or acquisition or due to bankruptcy. Personal event refers to miscellaneous grantee-related outcomes such as option donations. A given grant may generate more than one outcome if, for example, the option is sold in more than one batch or if part of the holding is sold and part of it is exercised.

Grant outcome	Share of outcomes	Mean nr of stocks	Mean portfolio share	Mean nr of days held	Share of grantees selling same stock in 1 year
Sold	66.0%	1.73	0.73	945	0.11
Exercised	2.8%	3.00	0.57	772	0.30
Expired	19.4%	1.82	0.61	1458	0.16
Returned	5.2%	1.71	0.61	458	0.07
Continues to hold	1.1%	1.94	0.69	437	0.00
Firm event	4.9%	1.70	0.57	661	0.02
Personal event	0.6%	0.44	0.88	632	0.01

Table 12. Distribution of time between grant allocation, possibility to sell, and actual sell transaction
This table reports the number of calendar days between grant allocation and first sell or exercise opportunity, and between these opportunities and the first actual sell or exercise transaction. The analysis of sell opportunities is confined to actual sells of options listed on the stock exchange. The analysis of exercise opportunities is confined to actual exercises of options. Negative differences in the number of days are trimmed to zero.

| | Percentile | | | | | | Standard | |
Nr of days from	5%	25%	50%	75%	95%	Mean	deviation	N
Allocation to first sell opportunity	0	4	5	353	752	192	317	66,733
First sell opportunity to sell	14	330	716	1,277	1,576	771	519	66,733
Allocation to first exercise opportunity	0	1	5	299	873	190	335	6,849
First exercise opportunity to exercise	0	68	625	1,050	1,632	655	577	6,849

Table 13. Option exercises by institutional type
This table reports the institutional type of the investors exercising the options. The value of the options is calculated at the time of the exercise.

Investor category	Nr of exercise transactions	Total value of options, mill. EUR	Mean value of options exercised in a transaction, EUR	Proportion of exercise transactions	Proportion of total value of options
Finnish households	12,040	418	34,685	69%	6%
Finnish institutions	3,139	2,845	906,451	18%	40%
Foreigners	2,219	3,920	1,766,665	13%	55%
Totals	17,398	7,183	412,874	100%	100%

sells. Conditional on exercise, grantees hold on to their options on average for two years after the first exercise opportunity.

3.13. Institutional classification of investors exercising the grants

Table 13 reports on the distribution of the institutional type of the investors who end up exercising the options. The investors exercising the options are not necessarily the grantees, because many of them sell their holdings before the exercise. In our sample, households account for all the grants and for over two-thirds of the exercise transactions, but only for 6% of the value of these transactions. Finnish institutions make up 40% of the

total exercise volume and foreign investors for 55%. The size of the exercise transactions is also much larger for these investor categories: 906,000 euros for Finnish institutions and 1.8 million for foreign investors. The total value of the options at the time of exercise is 7.2 billion euros, i.e. about one-third more than the value received by the grantees. There are two potential reasons for the difference. On the one hand, the exercised grants also include grants allocated to foreign employees (whose holdings generally are nominee registered), which our study does not account for. The share of foreign grantees has probably been large in Nokia in particular. On the other hand, the value of the options may have increased between the time the grantee realized the allocation (usually by selling it) and the end investor exercised it.

4. Conclusion

Who receives stock option grants, and what do grantees do with them? We address these questions using comprehensive individual-level panel data on 195,000 grants worth 6.4 billion euros from 637 executive and employee stock option plans. Our data includes all stock option grants from Finland from 1995 to 2014 that are in securitized form and where the securities can be matched with option programs with known characteristics. Our results can be summarized as follows.

- 56,000 individuals, i.e. about one percent of the population, were granted options during the sample period. The grants were worth at least one million euros for 1118 sample individuals at the time of allocation and for 990 individuals when realized.
- The distribution of grant values is highly skewed to the right. The average grant is worth 33,000 euros while the median is worth 1800 euros. 69% of the combined value of allocated grants can be attributed to Nokia.

- The mean age of the grantees is 40 years, i.e. about the same as that for the population on average. Median grant value increases in age up to late 40s, after which it remains approximately flat. Individuals who are less than 40 years old account for 53% of the number of grants but only for 28% of the value of the grants.
- Men account for 74% of the number and 88% of the value of the grants, and for 90% of option millionaires.
- Individuals living in the Greater Helsinki Area receive over 60% of the total value of allocated grants. Other large concentrations of grants are in the remaining parts of Uusimaa, Varsinais-Suomi, Pirkanmaa, and Pohjois-Pohjanmaa.
- Finnish speakers are about 60% more likely to receive option allocations than Swedish speakers. However, Swedish speakers' grants are on average 50% larger than Finnish speakers' grants.
- Option grant income is highly concentrated. The top 1% of the grantees are allocated one-half of the value of all grants. The Gini coefficient for option grant allocations is 0.91.
- Grant holders are much more likely to sell their options than to exercise them. Individuals exercising their grants have better diversified portfolios than those selling them. 30% of the grantees exercising their options sell the stock underlying the grant within one year from the exercise.
- On average, grant holders hold on to the options two years longer than they have to.
- 94% of the options end up being exercised by foreign investors or domestic institutional investors.

References

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