An Analysis of the ESOP Protection Trust

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Abstract

Using data from publicly-traded firms that have an ESOP, I assess the likelihood that: (1) a firm that participates in an ESOP Protection Trust will experience a large loss (i.e., a stock return loss of greater than 50%) over five years, and (2) a firm that participates in an ESOP Protection Trust that does not experience a large loss, will receive at least a partial refund of its deposits after five years. I find that the likelihood that a firm experiences a large loss varies with the market conditions that arise over the five-year term of the trust. Specifically, if the market is expanding during the five-year term, the most likely number of ESOP firms to experience a large loss is zero or one out of ten firms. Conversely, if the market is in recession over the five-year term, the most likely number of ESOP firms to experience a large loss is two out of ten firms. Interestingly, the likelihood that non-large loss firms will receive at least a partial refund of their deposits at the end of the five-year term (1) is quite high and, (2) *does not* vary dramatically with market conditions, provided large loss firms experience the median large loss for a given year. The intuition behind the latter result is as follows. Although firms are more likely to experience a large loss during a recession, the median large loss is smaller during a recession. Thus, while the ESOP Protection Trust provides payouts to more firms during recessionary periods, those payouts tend to be smaller. In turn, the ESOP Protection Trust maintains a similar propensity to pay out at least partial refunds to non-large loss firms, irrespective of market conditions. I conclude my analysis by providing several caveats to the results.

[1] I provide a brief bio in Appendix B at the end of this paper.

I. Introduction

Employee Stock Ownership Plans (ESOPs) are ERISA-governed retirement plans designed to invest primarily in a single stock (company stock). Because of the risks associated with investing in a single stock, the ESOP Protection Trust has been developed as a unique risk management capability for ESOP portfolios. Designed to increase substantially in value if company stock declines substantially in value, the ESOP Protection Trust injects cash into an ESOP (up to ten or 20 times the amount of invested cash) if company stock should register a cumulative five- or ten-year total shareholder return less than a certain percentage. For an ESOP portfolio that may have all, or nearly all, of its assets invested in a single stock, the ESOP Protection Trust provides protection for the retirement savings of employee-owners.

While protecting against large losses is important for all investors, this protection is particularly important for employee-owners, because the returns on their human capital are positively correlated with the returns on their equity stake in the company. Thus, at one extreme, if their firm goes bankrupt, not only do employees lose their equity stake in the firm, they also impair that portion of their human capital that was firm-specific. This diversification risk leads to a heightened incentive for employee-owners to cap losses on their equity stake in the firm.

The ESOP Protection Trust that I model has a five-year term. If a firm experiences a large loss (i.e., a loss of greater than 50% of the firm's value over the five-year term), the trust pays out proceeds at the end of the five-year term. The actual amount that is paid out depends crucially on (1) the number of firms in the trust that experience large losses over the five-year term, and (2) the magnitude of each firm's losses. Finally, depending on the number and nature of the losses accrued by each firm, each *non*-large loss firm in the trust may receive a partial or complete refund of their deposits at the end of the five-year period.

My study attempts to empirically assess several elements of the ESOP Protection Trust design using data from actual companies. First, I assess the probabilities that no firms / one firm / multiple firms out of ten firms will experience a large loss over a five-year window, by using the return history of a large sample of publicly-traded firms that have an ESOP. The analysis is conducted yearly, and uses data on publicly-traded ESOP firms from 1999 to 2009. By conducting this analysis on an annual basis, I am able to infer what impact both recessionary pressures and expansionary pressures have on the propensity for firms to experience large losses at the end of a given five-year period. For example, I can compare the propensity for ESOP firms in 1999 to experience losses of greater than 50% by 2004 (a five-year period over which the market was generally expanding), with the propensity for ESOP firms in 2004 to experience losses greater than 50% by 2009 (i.e., a five-year period over which market returns were generally recessing).

I find that when the five-year term arises over a period of market expansion, the most likely number of firms that experience a large loss is zero or one out of ten firms. Conversely, when the five-year term encompasses a period of recession, the most likely number of firms that experience a large loss is two out of ten firms. These insights illustrate that (1) even in good times, there is always a chance that a firm will experience a large loss, and (2) there can be substantial variation in the number of firms that experience a large loss, depending on the macro-economic conditions that arise over the trust's five-year term.

Second, using the probabilities generated from the first analysis, I derive the likelihood that a company that participates in an ESOP Protection Trust will receive at least a partial refund of its deposits at the end of the five-year period. As above, because I assess the likelihood that firms will experience large losses during periods of both economic expansion and recession, I

also estimate the likelihood that non-large loss firms in the sample will receive at least a partial refund of their deposits in both good and bad times.

Interestingly, the likelihood that a participating company will receive at least a partial refund of deposits after five years is fairly high, *irrespective* of whether the five-year window occurs over an expansionary period or a recessionary period. This outcome arises due to two competing forces. Specifically, while the likelihood that a firm will experience a large loss is *greater* during a recessionary period, the median loss (conditional on experiencing a large loss) is also *lower* during recessions. I elaborate on this finding in Section IV. The general takeaway is that these two factors tend to offset each other, resulting in a similar likelihood that firms will receive at least a partial refund of deposits, irrespective of market conditions.

The analysis proceeds as follows. In Section II, I describe how the ESOP sample is created. In Section III, I derive the annual likelihood that an ESOP Protection Trust will observe zero / one / or multiple loss firms at the end of its five-year term. Building on the analysis from Sections II and III, I assess the likelihood that ESOP firms in the trust receive at least a partial refund of their deposits at the end of the five-year window in Section IV. In Section V, I discuss several caveats. Specifically, I discuss the differences between public and private ESOP firms and how those differences might impact the inferences generated from my analysis. Additionally, I discuss both adverse selection and advantageous selection and address how it might affect the inferences that are drawn from my analysis. Finally, in Section VI, I conclude.

II. The Sample

Given that the majority of companies that use ESOPs are private companies, it would be ideal to use data from private firms to conduct the analysis. However, data on privately held firms tends to be very limited, because there are no SEC requirements that mandate, for example,

the reporting of accounting data for private firms. Moreover, return data is not publicly available for private firms, which makes calculating five-year returns for private firms unfeasible.

As a result, I pursue a second best approach. Specifically, I attempt to draw inferences about privately-held companies that have an ESOP by conducting my analysis on a set of publicly-traded companies that have an ESOP. In section V, I discuss several caveats related to drawing inferences about private firms from analysis conducted on public firms.

I use a database that was compiled by members of the fellowship program at the Rutgers School of Management and Labor Relations. Using data on the amount of equity held in company common stock in a firm's ESOP (which is collected from a sample of form 5500 filings from publicly-traded companies from 1999 to 2009), I keep a large sample of publicly-traded firms that have both some positive amount of company common stock in an ESOP and at least partial return data from 1999 to 2009.[2] Thus, publicly-traded firms that do not have an ESOP are excluded from the analysis by construction. Note that the form 5500 filings can be quite messy. For example, in some cases, firms clearly have an ESOP over the entire sample period, but the data can be missing during various parts of the sample period. In these cases, the database infers what the ESOP's investment in employer stock is in period *t* (i.e., the missing period). So, for example, if data is missing for 2006 but the firm has an equity value in its ESOP in 2005 and 2007, the database infers the 2006 number from the 2005 and 2007 numbers. Thus the database includes both numbers from the form 5500 filings and numbers that are inferred. Some companies appear in every year in the sample, while other companies are present for only part of the sample (i.e., they either initiated an ESOP mid-sample, extinguished their ESOP, or left the sample for some other reasons related to delisting, acquisition, etc.).

[2] Additionally, only firms that were listed on either the NYSE or the NASDAQ were included in the sample.

I calculate the cumulative total five-year return for each firm by taking monthly returns (which are comprised of the total returns for the month including dividends) and compounding those returns over a five-year period. I calculate five-year returns for each firm with positive common stock in an ESOP in year *X*, from December 31st in year *X* to December 31st in year *X*+5. So, for example, the five-year return window for publicly-traded firms that have an ESOP in 1999 will run from December 31st, 1999 to December 31st, 2004.

Note that, while many firms have monthly returns over the entire five-year term, many firms will also have monthly returns for only part of the five-year period (e.g., an ESOP firm from the 1999 sample may only have returns from December 31st, 1999 – December 31st, 2001). This outcome arises mainly for two reasons. First, firms are often acquired, and thus disappear from the sample. Second, some firms delist from their respective exchanges. Consistent with how the ESOP Protection Trust would assess the returns of these companies, I calculate the cumulative returns of these firms for whatever portion of the five-year period the firm has return data, and use that cumulative return to assess whether the firm experienced a large loss over the five-year window. This is an important point, as firms often accrue losses of greater than 50% just prior to delisting.

Having constructed the sample, I assess the number of ESOP firms in a given year that suffered large losses at the end of the five-year term, where a large loss is a loss that is greater than 50% of the firm's stock price from the beginning of the five-year term to the end of the five-year term. My results are presented in Table 1.

Table 1
Descriptive statistics for the sample, by year

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total ESOP Sample											
Total firms	492	565	524	540	512	472	451	431	385	350	335
Number of Large Loss Firms	47	36	24	17	106	107	82	99	76	26	19
Prob < -50% Loss	9.55%	6.37%	4.58%	3.15%	20.70%	22.67%	18.18%	22.97%	19.74%	7.43%	5.67%
Large Loss ESOP Sample											
Average Large Loss	-80.81%	-81.96%	-80.69%	-76.88%	-72.24%	-77.06%	-79.89%	-79.45%	-76.28%	-79.34%	-74.83%
Median Large Loss	-80.00%	-85.90%	-81.91%	-84.00%	-68.58%	-78.38%	-82.99%	-80.63%	-81.70%	-82.58%	-73.55%

I provide some insight on Table 1, by highlighting the 1999 column. The first row represents the year from which we access the Form 5500 filings for data on ESOP firms. Thus, all of the firms represented in the 1999 column are publicly-traded firms with positive ESOP values for calendar 1999. I first assess the total sample of ESOP firms. The total number of publicly-traded firms in the sample with an ESOP in 1999 with both a positive value for equity and return data was 492. For each of these firms, I calculate the five-year holding return from December 31st, 1999 – December 31st, 2004. Of the 492 ESOP firms in 1999, 47 experienced returns of less than -50% over the five-year window from December 31st, 1999 to December 31st, 2004. Thus the probability that a random firm chosen from the 492 ESOP firms in 1999 experienced a large loss is 47/492 or 9.55%.

In the second part of Table 1, I include *only* those firms that experienced large losses. Thus, for the 1999 column, the second part of the table assesses only the 47 firms that experienced large losses from December 31st, 1999 to December 31st, 2004. For this subset of large loss firms, I calculate the average and median large losses. So for the 1999 sample, ESOP firms that accrued a large loss, accrued an average and median large loss of -80.81% and -80.00%, respectively.

I make two points using the analysis in Table 1. First, if the five-year window ends in a recessionary period, the propensity for firms to experience large losses increases dramatically. For example, while the likelihood of large losses appears to be quite small in the early, expansionary part of the sample, it becomes much larger when, for example, the five-year window starts in 2003 and ends in 2008 (i.e., the likelihood is closer to 20%).

Also of interest, note that, conditional on experiencing a large loss, the average large loss is *larger* during expansionary periods and *lower* during recessionary periods. Running a simple bi-variate correlation between the percentage of firms that record a large loss in a given year and the median large loss reveals a positive correlation of 0.33. In other words the average large loss is less negative (i.e., the loss is smaller) the larger the percentage of firms in a given year that experience a large loss.

This outcome suggests that during expansionary periods, large losses accrue mainly to those firms that have very poor returns for firm-specific, idiosyncratic reasons (i.e., poor strategies, fraud, technological obsolescence, etc.). As a result, when a firm has a large loss during an expansionary era, the loss is typically very large because the reasons for the loss are idiosyncratic and indicative that the firm is a "bad" firm in general. Of course, these sorts of "bad" firms also do poorly during recessionary periods. However, recessions also make healthy, more viable "good" firms less profitable, because recessions bring about negative systematic effects (i.e., illiquid capital markets, waning aggregate demand from consumers in general, etc.) that can also lead to large losses. These "good" firms often survive recessions, and while they may experience large losses during recessions, these losses are typically not as severe as the losses that accrue to firms that suffer losses for both systematic and firm-specific reasons. Taken together, because there are more "good" firms that suffer large losses during recessionary

periods, the average and median large loss during a recession is actually *smaller* than it is during a period of expansion. This result helps to explain the unique finding that when the number of large loss firms increase for a given year, the average and median large loss tends to *decrease*. This finding will play an important role in the refund of deposits analysis in Section IV.

Finally, in the J.P. Morgan publication, *The Agony and the Ecstasy: The Risks and Rewards of a Concentrated Stock Position*, the authors note that, "Using a universe of Russell 3000 companies since 1980, roughly 40% of all stocks have suffered a permanent 70%+ decline from their peak value." In comparing this statement to our analysis in Table 1, it would appear that the likelihood of large loss that I derive is lower than the likelihood found by J.P. Morgan. Specifically, the likelihood of experiencing a large loss in my sample ranges from 3% - 23%, depending on the starting point. I provide some insight to reconcile my results with J. P. Morgan's results below.

First, the J. P. Morgan analysis measures the likelihood of a large loss starting at the *peak* value of the firm's stock. In other words, the study appears to go back and find the point where a firm's stock price was at its highest, and then measures the ensuing returns. It follows that if you start measuring a firm's performance at its peak stock price, you will observe a decline in the stock price by construction. Conversely, my analysis places no restrictions on whether a firm's stock price is at a peak or a trough. I believe my assumptions are more realistic on this front, as presumably firms will not enter into an ESOP Protection Trust *only* when their stock price is at its peak. Moreover, if markets are efficient and relevant information has been impounded in to price, the firm should have no idea whether the stock price is at its peak when it enters a trust, nor should it know whether its stock price will increase or decrease when it enters the trust.

Second, the J. P. Morgan analysis appears to have no specific time horizon, as returns appear to be measured from the peak stock price until the end of the sample period. Conversely, my analysis looks at finite, five-year windows. Presumably, the longer the window of assessment, the greater the likelihood of observing large losses. Thus the assumption regarding the trust's term is important.

To provide some more insight on this point, I provide an example using human mortality rates. If we took a random twenty year old and tried to calculate the likelihood that he would die in the next five years, that likelihood would be fairly small. Conversely, if we calculated the likelihood that that same random twenty-year old would die in the next sixty years, the likelihood would increase dramatically. Similarly, given that the five-year term is comparatively small, the likelihood that the firm will accrue a large loss over five years is also comparatively small. Conversely, if we were to extend the term to fifty years, the likelihood of suffering a large loss (e.g., going bankrupt) would likely increase. To sum, I believe that my assumptions of a five-year term provides a more accurate reflection of the likelihood of large losses for an ESOP Protection Trust than the J. P. Morgan implicit assumption of a much longer term.

III. The likelihood that ESOP firms will experience large losses

An ESOP Protection Trust is comprised of at least ten firms. Thus, my analysis will assess the likelihood that *n* (where *n* can equal 0, 1, 2, …, 10) out of ten randomly selected firms from a given year will suffer losses of greater than 50% over the following five-year period. Because I choose ten firms randomly, the analysis implicitly assumes than none of the firms in the sample have private information regarding the likelihood of large losses in the future. In other words, I assume that markets are efficient, and that all private information has been

disclosed and impounded into the firm's stock price at the beginning of the five-year term (i.e., there is no adverse selection problem).[3]

To conduct the analysis, I use a hypergeometric distribution to generate the likelihood that *n* (where *n* can equal 0, 1, 2, …, 10) out of ten ESOP firms will experience a large loss for a given year. I provide some insight on how the hypergeometric distribution works by using the ESOP sample from 1999 as an example. For the 1999 ESOP sample, 47 out of 492 firms experienced losses of greater than 50% from December 31st, 1999 to December 31st, 2004. If I were to randomly draw ten firms from the full sample of 492 firms, I would like to calculate the likelihood that zero of those ten firms are large loss firms (i.e., none of the 47 large loss firms are randomly selected), that one of those ten firms is a large loss firm (i.e., one of the 47 large loss firms is randomly selected), etc.

Importantly, the hypergeometric distribution accounts for the fact that we are sampling *without* replacement. So, for example, if we draw a large loss firm randomly on our first draw out of ten, then the likelihood of drawing a large loss firm on our second draw changes subtly from 47 out of 492 to 46 out of 491. The hypergeometric distribution accounts for these changing probabilities by accounting for the fact that our first draw was not added back to the sample. I provide further insight on the hypergeometric distribution with an example in Appendix A at the end of this paper. I present the hypergeometric distribution for all years in Table 2 below.

[3] I relax this assumption in Section V.

Table 2
The probability that *n* out of 10 randomly drawn ESOP firms from a given year will experience a large loss after five years

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
# of firms											
0	36.2824%	51.4862%	62.3124%	72.4250%	9.6040%	7.4333%	13.1436%	7.1261%	10.7710%	45.7302%	55.3153%
1	39.1118%	35.6443%	30.4582%	23.9538%	25.6430%	22.3416%	29.9383%	21.8417%	27.2866%	37.7455%	34.2342%
2	18.5266%	10.7754%	6.4074%	3.3489%	30.4430%	29.8514%	30.2286%	29.7290%	30.5954%	13.4379%	9.0032%
3	5.0758%	1.8716%	0.7625%	0.2596%	21.1601%	23.3475%	17.8142%	23.6612%	19.9917%	2.7130%	1.3209%
4	0.8903%	0.2067%	0.0567%	0.0123%	9.5352%	11.8363%	6.7846%	12.1935%	8.4288%	0.3434%	0.1193%
5	0.1044%	0.0151%	0.0028%	0.0004%	2.9105%	4.0638%	1.7446%	4.2510%	2.3956%	0.0284%	0.0069%
6	0.0083%	0.0007%	0.0001%	0.0000%	0.6094%	0.9569%	0.3067%	1.0152%	0.4647%	0.0016%	0.0003%
7	0.0004%	0.0000%	0.0000%	0.0000%	0.0864%	0.1526%	0.0364%	0.1640%	0.0607%	0.0001%	0.0000%
8	0.0000%	0.0000%	0.0000%	0.0000%	0.0079%	0.0158%	0.0028%	0.0171%	0.0051%	0.0000%	0.0000%
9	0.0000%	0.0000%	0.0000%	0.0000%	0.0004%	0.0010%	0.0001%	0.0010%	0.0003%	0.0000%	0.0000%
10	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
SUM	100.0000%	100.0000%	100.0000%	100.0000%	100.0000%	100.0000%	100.0000%	100.0000%	100.0000%	100.0000%	100.0000%

I provide some intuition on Table 2 by focusing on the 1999 column. The 1999 column includes all firms with an ESOP in 1999. Given that there are 492 firms in the 1999 sample, 47 of which experienced large losses between December 31st, 1999 and December 31st, 2004, the percentages that follow assess the likelihood that *n* out of ten randomly drawn firms from 1999 will experience a large loss over the next five years. Thus, if ten firms are drawn randomly from the 492 ESOP firms in 1999, the likelihood that none of those firms will experience a large loss over the next five years (i.e., the likelihood that we do not draw one of the 47 large loss firms from our ten draws) is 36.28%, the likelihood that one of these firms will experience a large loss is 39.11%, and so on.

Also, note that the likelihood that all ten draws will be large loss firms is 0.0000%. The probability is actually slightly greater than zero, but it is so small that there were not enough decimal points to calculate it! Thus, while it is possible that ten out of ten firms could suffer large losses from a randomly drawn sample of ESOP firms, it is also highly implausible. Finally,

all of the probabilities for a given column must sum to 100%, and I observe this outcome across all columns.

Next, I shade three cells per column with progressively lighter shades of orange, where the darkest shade of orange represents the most likely number of large loss firms in a given year and the lightest shade of orange represents the third most likely number of large loss firms in a given year. So, for the 1999 sample, the most likely outcome is to have one out of ten randomly selected firms experience large losses (i.e., 39.11%), the second most likely outcome is to have zero out of ten firms experience a large loss (i.e., 36.28%), and the third most likely outcome is to have two of ten firms experience a large loss (i.e., 18.53%).

There are several interesting things to note in Table 2. First, there is substantial variation in the most likely number of firms that will experience a large loss for a given year. This outcome depends on whether the five-year term encompasses an expansionary period or a recessionary period. For example, for the sample years from 1999 to 2002, the periods are expansionary (e.g., 1999 to 2004 or 2002 to 2007). As a result, the likelihood that an ESOP Protection Trust will randomly draw a large loss firm is fairly small.

The distribution changes when the five-year period occurs over a recessionary era (e.g., 2003 to 2008, 2004 to 2009, etc.). Specifically, the likelihood of randomly drawing multiple firms that experience large losses increases dramatically, to two out of ten firms being the most likely number of firms experiencing large losses. The collective results suggest that there is substantial variation in the number of firms that will experience a large loss in an ESOP Protection Trust, conditional on the market circumstances that arise during the five-year term of the trust.

IV. The likelihood of receiving at least a partial refund

In this section, I attempt to assess the likelihood that firms will receive at least a partial refund of deposits at the end of the trust's five-year term if they *do not* experience a large loss. To do this, I first need to note some assumptions about the deposits that are collected, how large-loss firms are paid out, and in what circumstances the non-large loss firms in the sample might receive at least a partial refund of deposits at the end of the five-year period.

First, as I note above, I assume that each trust includes ten firms with an ESOP, and that the term of the investment contract is for five years. Additionally, each firm in the trust pays an annual deposit of $100,000 per year over five years to protect $5M worth of company stock in an ESOP. As the trust collects deposits of $100,000 annually from ten firms over five years, the trust collects total deposits across all firms of $5M over the five-year period.

Second, firms in the ESOP Protection Trust are covered for losses greater than 50%. In other words, payouts only occur for losses that are *larger* than 50% of the stock's value at the beginning of the five-year window. By way of example, if a firm loses all of its value (i.e., 100% of its value), the maximum possible payout to the ESOP is (100% - 50%) multiplied by the $5M of protected ESOP value, or $2.5M.

Finally, at the end of the five-year term, the trust can pay out losses to a maximum of the deposits that it has received from all ten firms over the five-year term, or $5M. If the trust pays out this maximum amount, there will be no partial refund of deposits for any of the remaining non-large loss firms. So, for example, if two firms in the trust suffer 100% losses in their value, the ESOP Protection Trust will pay out (100% - 50%) multiplied by the $5M of protected ESOP value. In other words, the trust will pay out $2.5M to each firm, for a total of $5M. In this setting, the $5M of deposits collected over the five-year term would be paid out to the two large

loss companies, and there would be no proceeds left for a partial refund of deposits to the non-large loss firms.

With these assumptions in mind, I use the data in Table 1 and 2 to: (1) assess how many firms in a given year need to experience the *median* large loss for that year before the ESOP Protection Trust has paid out the $5M maximum, and (2) use that information to, in turn, generate the likelihood that a non-large loss firm receives at least a partial refund in a given year. I present my results in Table 3, Panels A and B, below.

Table 3, Panel A: Annual payouts if *n* out of 10 firms experience median large losses

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
MEDIAN LOSS %	-80.00%	-85.90%	-81.91%	-84.00%	-68.58%	-78.38%	-82.99%	-80.63%	-81.70%	-82.58%	-73.55%
MEDIAN PAY $	$ (1,500,000.95)	$ (1,794,970.78)	$ (1,595,387.76)	$ (1,699,998.97)	$ (928,909.03)	$ (1,418,946.09)	$ (1,649,663.30)	$ (1,531,348.53)	$ (1,584,846.68)	$ (1,628,949.34)	$ (1,177,296.94)
# of firms											
0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1	$ (1,500,000.95)	$ (1,794,970.78)	$ (1,595,387.76)	$ (1,699,998.97)	$ (928,909.03)	$ (1,418,946.09)	$ (1,649,663.30)	$ (1,531,348.53)	$ (1,584,846.68)	$ (1,628,949.34)	$ (1,177,296.94)
2	$ (3,000,001.91)	$ (3,589,941.56)	$ (3,190,775.51)	$ (3,399,997.95)	$ (1,857,818.07)	$ (2,837,892.17)	$ (3,299,326.60)	$ (3,062,697.05)	$ (3,169,693.35)	$ (3,257,898.69)	$ (2,354,593.87)
3	$ (4,500,002.86)	$ (5,384,912.34)	$ (4,786,163.27)	$ (5,099,996.92)	$ (2,786,727.10)	$ (4,256,838.26)	$ (4,948,989.90)	$ (4,594,045.58)	$ (4,754,540.03)	$ (4,886,848.03)	$ (3,531,890.81)
4	$ (6,000,003.81)	$ (7,179,883.12)	$ (6,381,551.03)	$ (6,799,995.90)	$ (3,715,636.13)	$ (5,675,784.35)	$ (6,598,653.20)	$ (6,125,394.11)	$ (6,339,386.70)	$ (6,515,797.38)	$ (4,709,187.75)
5	$ (7,500,004.77)	$ (8,974,853.90)	$ (7,976,938.78)	$ (8,499,994.87)	$ (4,644,545.17)	$ (7,094,730.44)	$ (8,248,316.50)	$ (7,656,742.63)	$ (7,924,233.38)	$ (8,144,746.72)	$ (5,886,484.68)
6	$ (9,000,005.72)	$ (10,769,824.68)	$ (9,572,326.54)	$ (10,199,993.85)	$ (5,573,454.20)	$ (8,513,676.52)	$ (9,897,979.80)	$ (9,188,091.16)	$ (9,509,080.05)	$ (9,773,696.06)	$ (7,063,781.62)
7	$ (10,500,006.68)	$ (12,564,795.46)	$ (11,167,714.30)	$ (11,899,992.82)	$ (6,502,363.23)	$ (9,932,622.61)	$ (11,547,643.10)	$ (10,719,439.69)	$ (11,093,926.73)	$ (11,402,645.41)	$ (8,241,078.56)
8	$ (12,000,007.63)	$ (14,359,766.24)	$ (12,763,102.05)	$ (13,599,991.80)	$ (7,431,272.27)	$ (11,351,568.70)	$ (13,197,306.39)	$ (12,250,788.21)	$ (12,678,773.40)	$ (13,031,594.75)	$ (9,418,375.49)
9	$ (13,500,008.58)	$ (16,154,737.03)	$ (14,358,489.81)	$ (15,299,990.77)	$ (8,360,181.30)	$ (12,770,514.79)	$ (14,846,969.69)	$ (13,782,136.74)	$ (14,263,620.08)	$ (14,660,544.10)	$ (10,595,672.43)
10	$ (15,000,009.54)	$ (17,949,707.81)	$ (15,953,877.57)	$ (16,999,989.75)	$ (9,289,090.34)	$ (14,189,460.87)	$ (16,496,632.99)	$ (15,313,485.26)	$ (15,848,466.75)	$ (16,289,493.44)	$ (11,772,969.37)

Table 3, Panel B: Annual likelihood that a non-large loss firm will receive at least a partial repayment of deposits

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
# of firms											
0	36.2824%	51.4862%	62.3124%	72.4250%	9.6040%	7.4333%	13.1436%	7.1261%	10.7710%	45.7302%	55.3153%
1	39.1118%	35.6443%	30.4582%	23.9538%	25.6430%	22.3416%	29.9383%	21.8417%	27.2866%	37.7455%	34.2342%
2	18.5266%	10.7754%	6.4074%	3.3489%	30.4430%	29.8514%	30.2286%	29.7290%	30.5954%	13.4379%	9.0032%
3	5.0758%		0.7625%		21.1601%	23.3475%	17.8142%	23.6612%	19.9917%	2.7130%	1.3209%
4					9.5352%						0.1193%
5					2.9105%						
6											
7											
8											
9											
10											
SUM	98.9966%	97.9058%	99.9404%	99.7277%	99.2958%	82.9737%	91.1247%	82.3581%	88.6447%	99.6266%	99.9928%

I provide insight on Table 3, Panels A and B by again focusing on the 1999 column. I focus first on Table 3, Panel A. From Table 1, we know that, conditional on a firm in 1999 experiencing a large loss after five years, the median loss for those 47 firms is -80.00%. If a firm in an ESOP Protection Trust loses -80.00%, then the ESOP Protection Trust will reimburse the firm to a maximum of (80.00% - 50%) times $5M for a total of $1,500,000.95. Thus, I assume that if a firm in an ESOP Protection Trust experiences a large loss in 1999, then the firm will receive a maximum of the median payout for the year – or $1,500,000.95. So, if one firm experiences a large loss, the ESOP Protection Trust pays out $1,500,000.95. If two firms experience a large loss, the ESOP Protection Trust pays out two times $1,500,000.95 or $3,000,001.91, and so on. Again, once the ESOP Protection Trust pays out its maximum of $5M, there will be no partial refund for any of the non-large loss firms. Thus, in each year I assess the maximum number of firms that can achieve a median large loss *and where* the ESOP Protection Trust can still pay out proceeds of less than $5M.

In 1999, that maximum number of firms is three. If three firms experience the median loss for a large loss firm in 1999, the aggregate payout from the trust after five years will be three times $1,500,000.95 or $4,500,002.86. This number is less than $5M. Thus the remaining non-large loss firms will receive at least a partial refund of their deposits at the end of the five-year term. Conversely, if four firms experience the median loss for a large loss firm in 1999, the aggregate payout is greater than the maximum payout of $5M, the four large loss firms will receive a payout of less than the median payout for 1999, and the non-large loss firms will receive no partial refund. To sum, using the data from 1999, if three or fewer firms experience the median large loss for the year, the remaining large loss firms will receive at least a partial refund of their deposits. A similar analysis can be conducted for the remaining years, where the

threshold number of median large loss firms under which non-large loss firms receive a refund is highlighted in orange.

I provide several observations. In most cases, the threshold number of large loss firms under which aggregate payouts are less than $5M is the same – specifically, three large loss firms is typically the threshold below which non-large loss firms will receive a partial refund. 2003 provides for a notable exception. In 2003, up to five large loss firms could report the median large loss, and there would still be funds available to pay the non-large loss firms in the trust a partial refund. This outcome arises because, conditional on observing a large loss between December 31st, 2003 and December 31st, 2008, the median loss is *smaller* for the 2003 sample than it is for the rest of the sample years. As I discuss above, this outcome presumably arises because, over this recessionary period, not only do many "bad" firms go bankrupt, but also many "good" firms suffer poorer returns due to systematic issues (e.g., lack of market liquidity). As a result, the median large loss for firms in this recessionary period is *smaller* than it is during expansionary periods. This means that the ESOP Protection Trust's total payouts will still be below the $5M threshold even when five firms report the median loss. Interestingly, this result implies that during recessionary periods, the threshold number of large loss firms under which non-large loss firms will receive a partial refund of deposits is *higher* than it is during expansionary periods.

Finally, in Table 3, Panel B, I use information from the previous tables to assess the likelihood that a firm in an ESOP Protection Trust will receive at least a partial refund if the large loss firms observe a median large loss. Note that Table 3, Panel B first replicates the likelihood that *n* out of 10 firms will experience a large loss for a given year from Table 2.

However, in Table 3, Panel B, I only include the probabilities for the *n* large loss firms for which a partial refund will still be received by the non-large loss firms.

So for example, Table 3, Panel A illustrates that if three or fewer firms report the median large loss for 1999, then the remaining non-large loss firms will receive a partial refund as the aggregate payout will be less than $5M. Thus, the likelihood that non-large loss firms in the 1999 sample will receive a partial refund equals the likelihood that three or fewer firms out of ten ESOP firms will record large losses. Aggregating the percentages that zero, one, two, or three firms will record a large loss in the *SUM* row at the bottom of Table 3, Panel B reveals an aggregate likelihood of 99.00%. In other words, if we were to draw ten random firms from the 1999 distribution, the likelihood that between zero and three firms would experience large losses over the five-year term is 99.00%. Correspondingly, the likelihood that the non-large loss firms in the 1999 sample will receive at least a partial refund of deposits is also 99.00%, provided that large loss firms make the median large loss.

Interestingly, the likelihood of receiving at least a partial refund does not change dramatically from recessionary periods to expansionary periods. This outcome can be observed most clearly for the 2003 sample. The 2003 sample is made up of ESOP firms whose returns are calculated between December 31st, 2003 and December 31st, 2008. Thus, this five-year period encompasses a recessionary market. Unsurprisingly, Tables 1 and 2 illustrate that firms from 2003 are more likely to have large losses than firms in the early part of the sample, with the most likely number of firms to experience large losses being two out of ten.

However, as I discuss above, while more firms are expected to have large losses, the median large loss is smaller during recessionary periods. In turn, these two effects offset each other to some extent. In particular, if large loss firms suffer the median loss in 2003, the trust can

have up to *five* firms suffer large losses, and still have some proceeds leftover to pay out a partial refund to the non-large loss firms. Thus the large loss threshold under which non-large loss firms will receive a partial refund is generally *bigger* when the ESOP Protection Trust occurs over a recessionary period.

Looking at the *SUM* row in Table 3, Panel B for 2003, we can see that the likelihood that zero to five firms experience large losses is 99.30%. It follows that if large loss firms make the median large loss for 2003, then the likelihood of receiving a partial refund for the non-large loss firms *is also* 99.30%. Interestingly, this percentage is almost identical to the one derived for the 1999 sample, which had a five-year term that encompassed an expansionary period.

Finally, I take the average of the values in the *SUM* row in Table 3, Panel B. Doing so yields an average of 94.60%. Thus across both expansionary periods and recessionary periods, my analysis suggests that non-large loss firms in an ESOP Protection Trust should receive a partial refund 94.60% of the time on average, provided that large loss firms in a given year make the median large loss for that year. Next, I change the assumptions regarding the magnitude of the large loss. Specifically, instead of using the median loss, I use an extreme assumption and use the maximum possible loss. The maximum possible loss that can occur is -100% and this will happen presumably in cases where a firm goes bankrupt. If a large loss firm experiences the maximum possible loss, then the ESOP Protection Trust will pay out a maximum of (100% - 50%) times $5M or $2.5M. Thus, if a minimum of two large loss firms in a given year accrue the maximum possible loss, the ESOP Protection Trust payout threshold of $5M will be reached, and none of the non-large loss firms will receive a partial refund. In turn, the setting simplifies to assessing the likelihood that an ESOP Protection Trust from a given year will have zero or one firm experience a maximum loss. I present my results in Table 4, Panels A and B, below.

Table 4, Panel A: Annual payouts if *n* out of 10 firms experience maximum large losses

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
MAX LOSS %	**-100.00%**	**-100.00%**	**-100.00%**	**-100.00%**	**-100.00%**	**-100.00%**	**-100.00%**	**-100.00%**	**-100.00%**	**-100.00%**	**-100.00%**
MAX PAY $	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)
# of firms											
0	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)	$ (2,500,000.00)
2	$ (5,000,000.00)	$ (5,000,000.00)	$ (5,000,000.00)	$ (5,000,000.00)	$ (5,000,000.00)	$ (5,000,000.00)	$ (5,000,000.00)	$ (5,000,000.00)	$ (5,000,000.00)	$ (5,000,000.00)	$ (5,000,000.00)
3	$ (7,500,000.00)	$ (7,500,000.00)	$ (7,500,000.00)	$ (7,500,000.00)	$ (7,500,000.00)	$ (7,500,000.00)	$ (7,500,000.00)	$ (7,500,000.00)	$ (7,500,000.00)	$ (7,500,000.00)	$ (7,500,000.00)
4	$ (10,000,000.00)	$ (10,000,000.00)	$ (10,000,000.00)	$ (10,000,000.00)	$ (10,000,000.00)	$ (10,000,000.00)	$ (10,000,000.00)	$ (10,000,000.00)	$ (10,000,000.00)	$ (10,000,000.00)	$ (10,000,000.00)
5	$ (12,500,000.00)	$ (12,500,000.00)	$ (12,500,000.00)	$ (12,500,000.00)	$ (12,500,000.00)	$ (12,500,000.00)	$ (12,500,000.00)	$ (12,500,000.00)	$ (12,500,000.00)	$ (12,500,000.00)	$ (12,500,000.00)
6	$ (15,000,000.00)	$ (15,000,000.00)	$ (15,000,000.00)	$ (15,000,000.00)	$ (15,000,000.00)	$ (15,000,000.00)	$ (15,000,000.00)	$ (15,000,000.00)	$ (15,000,000.00)	$ (15,000,000.00)	$ (15,000,000.00)
7	$ (17,500,000.00)	$ (17,500,000.00)	$ (17,500,000.00)	$ (17,500,000.00)	$ (17,500,000.00)	$ (17,500,000.00)	$ (17,500,000.00)	$ (17,500,000.00)	$ (17,500,000.00)	$ (17,500,000.00)	$ (17,500,000.00)
8	$ (20,000,000.00)	$ (20,000,000.00)	$ (20,000,000.00)	$ (20,000,000.00)	$ (20,000,000.00)	$ (20,000,000.00)	$ (20,000,000.00)	$ (20,000,000.00)	$ (20,000,000.00)	$ (20,000,000.00)	$ (20,000,000.00)
9	$ (22,500,000.00)	$ (22,500,000.00)	$ (22,500,000.00)	$ (22,500,000.00)	$ (22,500,000.00)	$ (22,500,000.00)	$ (22,500,000.00)	$ (22,500,000.00)	$ (22,500,000.00)	$ (22,500,000.00)	$ (22,500,000.00)
10	$ (25,000,000.00)	$ (25,000,000.00)	$ (25,000,000.00)	$ (25,000,000.00)	$ (25,000,000.00)	$ (25,000,000.00)	$ (25,000,000.00)	$ (25,000,000.00)	$ (25,000,000.00)	$ (25,000,000.00)	$ (25,000,000.00)

Table 4, Panel B: Annual likelihood that a non-large loss firm will receive at least a partial repayment of deposits

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
# of firms											
0	36.2824%	51.4862%	62.3124%	72.4250%	9.6040%	7.4333%	13.1436%	7.1261%	10.7710%	45.7302%	55.3153%
1	39.1118%	35.6443%	30.4582%	23.9538%	25.6430%	22.3416%	29.9383%	21.8417%	27.2866%	37.7455%	34.2342%
2											
3											
4											
5											
6											
7											
8											
9											
10											
SUM	75.3942%	87.1305%	92.7706%	96.3788%	35.2470%	29.7749%	43.0819%	28.9679%	38.0576%	83.4757%	89.5495%

As in Table 3, Panel B above, Table 4, Panel B replicates Table 2 but only includes the likelihood of having zero or one firm out of ten recording the maximum loss, as anything more than one firm having a maximum loss will result in no partial refund of deposits for the remaining firms. Aggregating the probabilities in the *SUM* row gives us the likelihood of observing zero or one firm(s) reporting a large loss for a given year. This value also represents the likelihood that non-large loss firms will receive at least a partial refund of deposits for a given year, if the large loss firms report the maximum loss.

In this setting, I observe more variation than in the previous setting, which only assessed large loss firms making median large losses. Specifically, the likelihood of receiving a partial refund when large loss firms make the maximum loss ranges from 28.97% for firms from 2006 to as high as 96.37% for firms from 2002. Nevertheless, even in this extreme scenario, the average value in the *SUM* row is 63.62%. This result implies that, even when large losses are defined at an extreme (i.e., large loss firms go bankrupt), non-large loss firms should still receive a partial refund of deposits in nearly two out of three trusts on average.

Finally, we can ask what the likelihood of receiving a partial refund would look like if firms paid lower annual deposits during the term of the trust. For example, what would happen if each firm only paid $50,000 a year (instead of $100,000 a year) over five years to protect the same amount – i.e., $5M worth of ESOP value? In this setting, as the trust collects deposits of $50,000 annually from ten firms over five years, the trust collects total deposits across all firms of $2.5M over the five-year period.

I assess how this change in annual deposits impacts the likelihood of receiving a partial refund by once again assessing the maximum loss setting. As above, the maximum possible loss that can occur is -100%. If a large loss firm experiences the maximum possible loss, then the

ESOP Protection Trust will pay out a maximum of (100% - 50%) times $5M or $2.5M. However, in this setting the proceeds collected by the ESOP Protection Trust are $2.5M, not $5M. In turn, if a minimum of *one* large loss firm in a given year accrues the maximum possible loss, the ESOP Protection Trust payout threshold of $2.5M will be reached, and none of the remaining non-large loss firms will receive a partial refund. In turn, the setting simplifies to assessing the likelihood that no firms in an ESOP Protection Trust from a given year will experience the maximum loss. This likelihood is given by the "0" row in Table 4, Panel B. Taking the average of the "0" row reveals an average of 33.78%.

This result implies that, when large losses are defined at an extreme (i.e., large loss firms go bankrupt), non-large loss firms should receive a partial refund of deposits in approximately *one* out of three trusts on average. Recall that in the original setting where we assumed (1) a maximum loss and (2) firms paid $100,000 per year into the trust, the likelihood of receiving at least a partial refund of deposits was nearly *two* out of three trusts on average.

To sum, the general takeaway is as follows: if firms pay lower deposits during the term of the ESOP Protection Trust, then they clearly save money during the term. However, paying lower deposits also reduces the likelihood of receiving a partial refund of deposits at the end of the term. Thus, the ultimate decision on how high or low annual deposits should be represents a trade-off between lower (higher) deposits through the term of the product, but also a lower (higher) likelihood of partial refund at the end of the term.

V. Caveats

The reader should proceed with caution whenever we draw inferences about private ESOP firms using data from public ESOP firms, as there are fundamental differences between the two groups of firms that might affect the results. These differences include, but are not

limited to, the difference in firm size between public and private firms (public firms tend to be much larger than their private counterparts), the difference in employee-ownership levels between public and private firms (private firm employee-owners tend to own more of their respective firms than their public peers), and the difference in exposure to market forces. I address some of these differences and how they may affect the inferences drawn from my analysis.

First, there are reasons to believe that private firms may have either lower or higher returns in general than their public counterparts. Importantly, if private firms have lower returns than their public peers on average, then the likelihood of private firms accruing large losses will be *larger* than the percentages I document in the tables above. Specifically, Tables 1 and 2 would *understate* the likelihood that a private ESOP firm will experience a large loss.

One reason why private firms might exhibit lower returns than their public peers is because private firms are typically smaller, with more limited access to markets. With this point in mind, I attempt to assess the impact of firm size on future returns in my public sample. Specifically, I assess the correlation between firm size, as measured by the market value of a firm's equity in a given year, and a firm's five-year returns. Conducting this analysis yields a mild negative correlation between the two variables. This result implies that firm size has a *negative* impact on future returns, not a positive impact.

It should be noted that, while this correlation is statistically significant, its magnitude is very small. Delving further, this negative correlation appears to arise because larger firms from 1999 – 2001 generated lower future returns than their smaller counterparts. However, no statistically significant correlations between firm size and future returns are found in the ESOP sample from 2002 – 2009. Thus, at least in the setting assessed in this paper, firm size appears to

have a negligible effect on an ESOP firm's future returns. In turn, it is not clear that the disparity in firm size between private and public ESOP firms will necessarily lead to differences between each group's returns.

Interestingly, there are also reasons to believe that private ESOP firms will have *higher* returns on average than their public peers. For example, publicly-traded ESOP firms tend to have a much lower percentage of the firm owned by employees. In my sample, conditional on having funds in an ESOP, the median amount of equity held by employees as a percentage of total shares is below 5%. Conversely, the percentage of the company owned by ESOPs in private firms is much higher than it is in public firms, where some privately held firms are 100%-owned by an ESOP. Importantly, some of the benefits that accrue to the firm due to employee ownership – retention, incentive alignment, etc. – should be stronger when employees own more of the firm. As these benefits to the firm increase with the percentage of the firm that is owned by employees, returns should also presumably increase with these benefits, and in turn the likelihood of losses should decrease.

In an attempt to provide some insight on this issue, I assess the correlation between the size of employee equity stakes as a percentage of market value and future returns for firms in my public sample. I find a significant although small *positive* relationship between the percentage of share ownership and future returns. This result suggests that firms with more employee ownership tend to have higher, long term returns. However, while the results are statistically significant, note that the magnitude of the coefficient is also fairly close to zero. This indicates that the relationship is not overly strong. Thus, as with the previous analysis, this correlation should be viewed as only mildly supportive of a strong relationship between the two factors.

Additionally, I note that while the percentage of employee ownership is smaller for public ESOP firms relative to private ESOP firms, the market value of the equity stake held in an ESOP for a public firm is non-trivial. For example, the median ESOP firm holds enough company stock to warrant its inclusion in an ESOP Protection Trust. To sum, while there is some evidence to suggest that the returns I document in a public setting will be similar to the returns observed in a private setting, there may also be differences between the two classes of firms that would lead my results to either overstate or understate the actual probabilities for private firms, and readers should keep this in mind.

Finally, my analysis implicitly assumes than none of the firms in the sample have private information regarding the likelihood of large losses in the future. In other words, I assume that markets are efficient, and that all private information has been disclosed and impounded into the firm's stock price. However, if managers do have private and undisclosed information about an increased likelihood for large losses in the future, this may lead managers to have a *heightened* incentive to participate in an ESOP Protection Trust. If so, then the probabilities derived in Table 2 would *understate* the likelihood that a given number of firms would experience a large loss, because the firms that self-select into an ESOP Protection Trust wouldn't be equally likely to come from the population of ESOP firms overall, but rather would be *more* likely to come from the population of large loss ESOP firms in particular.

This is an example of the adverse selection problem that is perceived to be common to many insurance products. For example, in the case of life insurance, people who have been recently diagnosed with a terminal illness might display a heighted incentive to purchase insurance and hide the illness from insurers (in adverse selection terms, they hide their 'type'). To mitigate this adverse selection problem, insurance companies mandate a comprehensive survey

of medical conditions and medical tests before offering insurance, and can preclude the payment of insurance proceeds if they discover that material information was not disclosed on the application.

A similar issue may arise with the ESOP Protection Trust. For example, if a CEO had information about a decline in consumer demand for his product that the market was unaware of, he might also know that the firm has a greater likelihood of suffering a large loss in the future. In turn, he might also have a heightened incentive to both keep this information private *and* participate in an ESOP Protection Trust. As in the life insurance example, this sort of behavior represents an adverse selection problem for the ESOP Protection Trust because the CEO knows his "type" (he has a private signal about the future), but is not revealing that information to the insurer. This type of adverse selection, if it were prominent, could lead the probabilities derived in Table 2 to *understate* the likelihood of large loss relative to those observed in practice.

As an aside, while the adverse selection problem is a challenging problem to mitigate for many products that provide a payout that is contingent on bad news, I provide a suggestion on how to potentially mitigate this particular adverse selection problem. Specifically, note that the ESOP Protection Trustee will most likely have no idea if a manager is withholding negative private information from the market, as that information is private to the manager. Thus, having the *ESOP Protection Trustee* make decisions regarding the ESOP Protection Trust should, in turn, mitigate the ESOP Protection Trust's adverse selection problem, because an ESOP Protection Trustee has no private information to reveal to the insurer in the first place.

Note that the ESOP Protection Trust uses other methods to help mitigate the risk of adverse selection. For example, a participating company is required to demonstrate that its stock price is increasing or stable. Additionally, in an attempt to ensure good corporate governance,

firms are required to use reputable valuation and legal advisors. Finally, participating firms are asked for the results of their most recent Department of Labor audit, and must attest that they do not have any material adverse information. These screens should not only help to mitigate adverse selection, but may actually lead to advantageous selection.

Advantageous selection is the opposite of adverse selection, and arises when the firms that enter into an ESOP Protection Trust are *more* likely to be non-large loss firms than large loss firms. If firms in an ESOP Protection Trust display advantageous selection, the likelihood of large losses that I calculate in Table 2 will be *overstated* (i.e., the likelihood of large losses will be lower in practice). In turn, the likelihood that non-large loss firms will receive at least a partial refund of their deposits will be *understated* (i.e., the likelihood that non-large loss firms will receive at least a partial refund of deposits will be higher in practice).

VI. Conclusion

Using data from publicly-traded companies with an ESOP, I assess both the likelihood that ESOP firms will experience large losses and the propensity for non-large loss firms to receive a refund. My analysis documents variation in the likelihood that firms will experience a large loss depending on the macroeconomic conditions that arise over various five-year periods. Specifically, if the ESOP Protection Trust is started at the beginning of a market expansion, the most likely number of firms to experience a large loss is zero or one. Conversely, if the ESOP Protection Trust is commenced at the beginning of a recessionary period, the most likely number of large loss firms is two or more.

Interestingly, the likelihood that a non-large loss firm receives a partial refund at the end of the five year term is both fairly high (roughly 94.60%) and *does not* vary dramatically depending on how the market preforms during the five-year term, provided large loss firms make

the median large loss over a five-year term. This outcome arises as a result of two competing forces. While more firms are expected to generate large losses during recessionary periods, the median large loss is also smaller during recessionary periods. These two factors tend to offset each other, meaning that there are similar likelihoods of non-large loss firms receiving at least partial refunds – irrespective of the market factors that arise over the five-year term.

Finally, the reader should interpret the results with caution, as there is always a possibility that some factor may cause my results to either understate or overstate the actual likelihood of large losses for private ESOP firms. With this point in mind, the analysis above is best used as a starting point for discussion, with supplementary inferences added as more data on private firms becomes available.

Appendix A: Hypergeometric distribution

The hypergeometric distribution calculates the probability of *x* successes in *n* draws, without replacement, from a finite population of size *N* that contains exactly *K* successes, wherein each draw is either a success or a failure. In my setting a "success" occurs if the drawn firm is a large loss firm and a "failure" occurs if the drawn firm is a non-large loss firm.

$$\Pr(X = x) = \frac{\binom{K}{x}\binom{N-K}{n-x}}{\binom{N}{n}}$$

Expanding the equation above produces:

$$\Pr(X = x) = \frac{\left(\frac{K!}{x!\,(K-x)!}\right)\left(\frac{(N-K)!}{(n-x)!\,\big(N-K-(n-x)\big)!}\right)}{\left(\frac{N!}{n!\,(N-n)!}\right)}$$

I provide an example of how the probabilities are calculated, by calculating the probability that one out of ten firms from 1999 will be a large loss firm.

From Table 1, we know that the total number of ESOP firms, *N*, in 1999 is 492 firms, and the number of large loss firms, *K*, in 1999 is 47. Moreover, the number of firms in an ESOP Protection Trust (i.e., the number of draws), *n*, equals 10. Of those 10 draws we would like to calculate the likelihood that only 1 of those randomly drawn 10 firms suffers a large loss over 5 years (i.e., x =1). I provide the derivation of the probability below:

$$\Pr(X = 1\ in\ 1999) = \frac{\left(\frac{47!}{1!\,46!}\right)\left(\frac{445!}{9!\,436!}\right)}{\left(\frac{492!}{10!\,482!}\right)}$$

Further simplification results in the following probability:

$$\Pr(X = 1\ in\ 1999) = 39.11\%$$

Thus, when randomly drawing 10 firms from the sample of ESOP firms from 1999, the likelihood that only 1 firm out of 10 suffers a large loss is 39.11%. I repeat the same method to derive all of the values in Table 2.

Appendix B: Francesco Bova Bio

Francesco Bova is an Associate Professor at The Rotman School of Management at the University of Toronto whose field of research expertise is employee ownership research. He has been awarded numerous fellowships to conduct research on employee ownership including the Louis O. Kelso Fellowship and most recently, the Joseph Cabral Distinguished Scholar and Fellow Award. His work on employee ownership has been featured in several top management journals.