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Managerial incentives, net debt and investment activity in all-equity firms

Michael J. Alderson and Brian L. Betker
Department of Finance, Saint Louis University, St Louis, Missouri, USA

Abstract

Purpose – The purpose of this paper is to examine the impact of managerial risk exposure on capital structure selection (net debt, or debt minus cash) as well as return on assets, capital expenditures, research and development expenditures and stock price performance.

Design/methodology/approach – The paper compares a sample of 123 all-equity firms to a set of matching levered firms selected on the basis of industry, market cap and market-to-book assets. Managerial incentives are measured using the delta and vega of the manager's stock and option holdings.

Findings – Net debt levels decline as CEO wealth sensitivity to stock price changes (delta) increases. However, the paper finds no differences between the all-equity firms and their levered matching firms in terms of return on assets, capital expenditures, R&D expense, or long run stock price performance.

Research limitations/implications – Findings are consistent with the idea that managerial incentives drive net debt decisions even among all-equity firms. However, given that there are no differences between the sample firms and their matched firms in terms of investment or stock price performance, the effect of managerial risk aversion appears to be confined to financial policy.

Originality/value – The paper uses modern methods for measuring managerial risk exposure to revisit the literature on all-equity firms, and show that managerial risk exposure affects the net debt decision in these firms.

Keywords Managerial compensation, Capital structure, All-equity firms, Investments, Stock prices, Debts

Paper type Research paper

I. Introduction

This paper examines the choice of net debt (debt minus cash) and the subsequent investment activity of a sample of all-equity firms. Research on firms with very low leverage traces back two decades to an article by Agrawal and Nagarajan (1990). Their study examined 104 firms with no long-term debt over the period 1979-1983. In relation to a group of matched levered firms, the all-equity firms in their sample exhibit higher average levels of both managerial ownership and family relationships among top managers. The average level of cash held by the all-equity firms is also significantly higher.

Agrawal and Nagarajan observe that the high cash levels and exclusive reliance on equity capital appear to be aimed at reducing the risk associated with large, undiversifiable investments of personal wealth and family human capital. Their evidence is consistent with research on broader samples that finds a connection between firm attributes and managerial risk aversion[1].

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We revisit the Agrawal and Nagarajan study, utilizing recent advances in both financial statement disclosure and methods for the selection of control firms, in an examination of the cross-sectional relation between managerial risk exposure and capital structure selection in all-equity firms. There are several important differences between our approach and that of Agrawal and Nagarajan.

First, Agrawal and Nagarajan use the percentage of shares held by the top managers as a proxy for managerial risk exposure. In contrast, we directly estimate the level of managerial risk exposure with the delta and vega values of Chief Executive Officer security holdings (options and common shares). Delta is defined as the change in the CEO's wealth due to a one percent change in the firm's stock price, while vega is the change in wealth due to a 0.01 change in the stock's volatility. From an empirical perspective, these measures dominate CEO ownership percentage because they provide a direct estimate of how the wealth of the CEO changes in response to changes in both the level and volatility of the stock price. Delta and vega are preferred to ownership percentage from a theoretical standpoint as well, given the relation those parameters bear to the investment and financial policies of the firm[2].

A second refinement in our method of analysis concerns the selection of control firms. Agrawal and Nagarajan construct a control sample by selecting firms matched on the basis of size and industry. We instead benchmark our all-equity firms to levered firms matched on the basis of firm size, industry affiliation and the market-to-book assets ratio. By matching on market-to-book we seek to create a better match with respect to investment opportunities and by extension, debt capacity. Gardner and Trczinka (1992) and Minton and Wruck (2001) find that zero leverage and low leverage firms have higher market-to-book ratios than comparable levered firms.

Like Agrawal and Nagarajan, we confirm the differences between the two samples with respect to average cash levels and leverage. Bates *et al.* (2009) argue that if cash is negative debt, leverage is properly measured by net debt (borrowing less cash). By that standard, all-equity firms are even more extreme in their selection of financial policy. Thus, a third innovation is that we utilize the net debt measure to represent the financial position created by the cash/leverage combination of each firm. We examine whether differences in the net debt levels of the sample and control firms vary with managerial risk exposure in the cross-section, rather than just comparing averages between the sample and matched levered firms. We find that net debt levels decline as the sensitivity to stock price changes (delta) increases. We interpret this finding as stronger evidence of a relation between managerial risk aversion and the adoption of a high cash/all-equity balance sheet.

Having reexamined the underlying motivation for the high cash/all-equity financial position, we next turn our attention to the investment policy and operating performance of those same firms. Our logic is straightforward: knowing that our sample firms appear to structure a portion of their balance sheets to accommodate the high risk exposure of the managers, it is only natural to explore whether that same characteristic affects the structure of operating assets.

The influence of managerial risk aversion on investment policy has long been recognized (Jensen and Meckling, 1976; Amihud and Lev, 1981; Smith and Stulz, 1985; John and John, 1993). Shareholders experience a loss of value when the personal risk exposure of the managers causes them to select less valuable projects because they have lower risk. Of course, shareholders will naturally recognize their exposure to those

agency costs and write contracts to mitigate them (Jensen, 1986; Haugen and Senbet, 1981). It is an open question, however, whether the agency costs of equity are in practice minimized by those different combinations of policy choices. The issue is important here, given that all-equity firms tend to be small growth companies which by their nature need to make risky investments in order to earn their cost of capital – making any strong influence of managerial risk aversion an especially harmful attribute[3].

We therefore next examine the investment activity, operating performance and stock price performance of the all-equity firms for an extended period. In contrast to the significant differences that exist between the respective financial policies of the all-equity and matching levered firms, we find virtually the same capital expenditure activity, R&D intensity, and long run investment performance among the two groups. Holding other factors constant, the influence of managerial risk aversion appears to be confined to financial policy.

II. The data

Sample selection

Our objective is to examine a sample of all-equity firms. Here, "all-equity" means a company with no long-term debt on its balance sheet for a minimum of four consecutive years. Following Agrawal and Nagarajan (1990), we do not require zero short-term debt to qualify as an "all-equity" firm; however, our descriptive statistics show that the use of short-term debt among the sample firms is indeed minimal.

The sample selection process began with the identification of all COMPUSTAT firms with book assets (data item no. 6) of $100 million or more and a zero value for long-term debt (data item no. 34) during any year between 1980 and 2005. This created a group of 4,159 firm years. We then selected from this data set only non-financial firms that reported a balance sheet without any long-term debt for at least four consecutive years (the all-equity interval). This resulted in 471 "all-equity" companies. In order to ensure that our sample is not dominated by initial public offerings, we removed 299 companies that did not have either an observable book-to-market ratio and/or market capitalization figure during the year prior to the first all-equity year. The sample resulting at that point of the process consisted of 172 companies with at least $100 million in assets, no long-term debt for at least four consecutive years and membership in both a size and book-to-market decile for at least two years prior to the end of the first all-equity year.

The plan for the study is to report the delta and vega of CEO portfolios at the end of the first fiscal year of the all-equity interval. We measure those compensation variables at the end of the first all-equity year (the start year) to ensure that compensation policy is captured at the earliest point at which long-term debt becomes zero. For each of the 172 firms, we hand-collected data on current and prior option grants, CEO salary and bonuses, and CEO stock ownership. A firm was included in the sample if a proxy statement describing executive compensation was available for the start year and return data was available on CRSP over the prior 36 months to estimate the volatility of stock returns. Proxy statements with the necessary amount of disclosure were generally unavailable prior to 1993, thus further limiting the sample.

Once the data was collected, we used the method developed by Core and Guay (2002) to estimate the delta and vega for each CEO. Briefly, Core and Guay's method assumes that the option holdings of a corporate executive consist of three separate grants:

one received in the current year, and two received in prior years, one of which consists of currently unexercisable options and the other consisting of options that are currently exercisable. Black-Scholes values are estimated for each of the three grants.

The expiration date of the current grant is reported in the proxy statement; the times to expiration for the previously granted unexercisable and exercisable options are assumed to be one and four years lower, respectively, than that of the current grant. If no options are granted in the current fiscal year, unexercisable (exercisable) options are assumed to have a time to expiration of six (three) years.

The stock price as of the option valuation date is obtained from CRSP, along with an estimate of expected volatility (which is proxied by the historical standard deviation computed using the 36 monthly returns just prior to the valuation date) and the expected dividend yield (estimated by the dividend yield over the prior year). The riskless rate of return as of the option valuation date is approximated by the yield on the treasury security with a maturity date that is closest to the expiration date of the particular option grant (current, unexercisable or exercisable).

The exercise price of the current grant is reported in the proxy statement. The proxy statement does not report the average exercise price of previously granted options, but it does report the total realizable value upon exercise as of the fiscal year-end. Average intrinsic value is computed as total realizable value divided by the number of options. The average exercise price of the unexercisable (exercisable) previously granted options is then computed as the difference between the stock price and the average intrinsic value of the previously granted unexercisable (exercisable) options.

We were able to estimate the delta and vega parameters for 137 companies. For each of those companies, we searched for a levered matching firm. We looked at all firms with the same two-digit SIC code as the sample firm, and that belonged to the same market capitalization (size) decile. Next we confirmed that potential matching firms had both the requisite stock price data on CRSP and a long-term debt to assets of at least ten percent. From this remaining set of candidates, we selected as a levered match the firm whose market-to-book assets ratio at the beginning of the first all-equity year was closest to the all-equity firm's. Once a levered matching firm was identified, we collected the required proxy statement data and estimated the corresponding delta and vega values. The search resulted in the identification of 123 levered matching firms, thus completing the formation of the final sample. (For 14 all-equity firms, there were no levered matching firms either because of insufficiently high leverage, a lack of CRSP data, or a lack of other data needed to compute delta and vega for any potential match.)

Descriptive statistics

Table I contains descriptive statistics for both the 123 all-equity firms and their levered matching firms. Dollar figures are adjusted for price-level changes and reported in 2002 dollars.

Focusing on the medians, we find no significant difference between the all-equity and matched levered firms in terms of stock and option holdings, option delta, stock delta, total delta or vega.

Since the delta and vega measures are viewed as components of the compensation package, we computed the ratio of total CEO delta and vega to cash compensation (salary and bonus). The intent of this measure is to capture the relative magnitude of the option payoffs. For the all-equity firms, median delta-to-compensation was

	Mean		Median	
	All-equity	Levered match	All-equity	Levered match
Value of CEO options ($)	8,996,585	18,416,595	2,430,196	3,060,983
Value of CEO stock holdings ($)	27,539,355	50,685,033	6,253,938	4,780,620
Total value of securities ($)	36,535,940	69,101,628	16,033,502	10,326,872
CEO option portfolio delta ($)	106,171	211,923	30,625	39,208
CEO stock portfolio delta ($)	275,394	506,850	62,539	47,806
Total CEO delta ($)	381,564	718,773	166,987	119,210
CEO vega ($)	34,557	58,733	13,051	16,031
CEO salary ($)	344,676**	459,353	300,000**	396,667
CEO bonus ($)	221,548	316,043	85,000	160,000
Total CEO delta/(salary + bonus) (%)	96.6	51.6	38.4*	22.3
CEO vega/(salary + bonus) (%)	6.20	5.22	3.26	3.00
CEO ownership (%)	8.98	6.69	3.30	2.80
CEO age	53.9	54.0	53.0	54.0
CEO tenure as director	11.3	10.3	9.0	8.0
Officer and director ownership (%)	20.02*	15.80	13.50	10.82
Closely held (O&D% > 20%) (%)	43.1*	27.6		
Family/founder relationship (%)	49.6	39.0		
Long-term debt/assets (%)	0.0**	31.5	0.0**	29.7
Total debt/assets (%)	2.3**	35.1	0.0**	33.4
Cash/assets (%)	31.2**	13.8	26.7**	5.9
Net plant/assets (%)	19.8	23.6	15.1*	18.7
Capital expenditures/assets (%)	6.2	5.4	4.4	3.9
Research and development/assets (%)	6.9	4.8	2.6	2.2
EBITDA/assets (%)	13.7	11.7	15.1	12.0
Cash flow from operations/assets (%)	8.8	6.7	10.1	8.4
Market capitalization (millions)	$725.3	$2,091.1	$292.2	$333.4

Notes: Significantly different from levered match value at: *5, **1 percent levels; the sample consists of 123 all-equity firms that have no long-term debt for at least four years between 1980 and 2005; levered matched firms have long-term debt to assets of at least 10 percent, are in the same two-digit SIC code and market capitalization decile as their all-equity match, and are closest to their all-equity match in terms of market-to-book assets; data are reported for the end of the first all-equity year; dollar figures are expressed in 2002 dollars

Table I.
Descriptive statistics for the all-equity sample and levered matching firms

38.4 percent versus 22.3 percent for the matching firms. The difference is significant at the five-percent level. Median measures of CEO vega as a percentage of cash compensation were not different.

The chief executive officers of the all-equity and matching firms are similar in terms of age, tenure as a member of the board of directors, and percentage of common stock owned. Mean and median CEO salaries are both significantly lower among the all-equity firms, consistent with the predictions of Berk *et al.* (2010). Officer and director ownership is significantly different, however, with 20.0 percent average ownership among the all-equity firms and 15.8 percent among the matching firms. This is consistent with one of the main findings of Agrawal and Nagarajan. Note, however, that median O&D ownership percentages reported in Table I are much lower than the corresponding figures for the Agrawal and Nagarajan (1990) samples (32 percent for their all-equity firms and 16 percent for their matching firms).

We also examined several financial characteristics of the all-equity and levered match firms. The average leverage ratio of the matching firms is 31.5 percent (30 percent median), showing that they make substantial use of financial leverage. Both sets of firms are similar in terms of year zero investment activity (capital expenditures and research and development), operating profitability (EBITDA and cash flow from operations) and (by design) market capitalization.

The all-equity and matched levered firms differ with respect to their mix of assets, however; with the all-equity firms holding much more cash (consistent with the finding by Agrawal and Nagarajan) and fewer tangible assets. Median cash is 26.7 percent of assets for the all-equity firms, significantly higher than the 5.9 percent median for the matching group. Median net plant to assets for the all-equity firms is 15.1 percent compared to 18.7 percent for the levered match firms. The difference in medians is significant at the 5 percent level.

Guay (1999) suggests that firms with very high managerial ownership do not use option compensation for incentive purposes. However, Parrino *et al.* (2005) find that managers with high firm ownership in relation to their total wealth will accept only high value projects and that options are needed to offset the effect of managerial risk aversion.

We therefore explore the nature of ownership concentration in our samples by stratifying firms on the basis of their reported O&D ownership percentage. Adopting the standard of Helwege *et al.* (2007), we characterize a firm as "widely-held" if the O&D ownership percentage is below 20 percent; otherwise, the firm is referred to as "closely-held".

Table II contains data on CEO incentives and compensation for the widely and closely held all-equity firms. Focusing on median values, the results indicate that CEOs

	Mean		Median	
	Widely held	Closely held	Widely held	Closely held
Value of CEO options ($)	11,913,871**	2,360,673	5,443,343**	930,288
Value of CEO stock holdings ($)	17,147,321**	48,217,948	4,521,670**	21,700,824
Total value of securities ($)	29,061,193	50,578,621	12,954,835	22,787,401
CEO option portfolio delta ($)	138,802**	30,327	65,525**	14,113
CEO stock portfolio delta ($)	171,473*	482,179	45,217**	217,008
Total CEO delta ($)	310,275	512,506	151,426	228,869
CEO vega ($)	41,004**	11,924	22,472**	4,828
CEO salary ($)	347,106	318,890	313,433	266,772
CEO bonus ($)	270,142	142,685	124,500*	32,500
Total CEO delta/(salary + bonus) (%)	60.52*	165.88	24.97*	62.44
CEO vega/(salary + bonus) (%)	7.40**	3.00	4.36**	1.43
CEO ownership (%)	2.98**	19.57	2.20**	14.18
CEO age	52.75	55.56	53.00	54.00
CEO tenure as director	9.71*	14.22	7.50	14.00
Officer and director ownership (%)	8.27**	39.53	7.40	34.85
Family/founder relationship (%)	77.3*	37.0		

Notes: Significantly different from closely held value at: *5, **1 percent levels; the sample consists of 123 all-equity firms that have no long-term debt for at least four years between 1980 and 2005; widely held firms have officer and director shareholdings less than 20 percent; closely held firms report a figure of more than 20 percent; data are reported for the end of the first all-equity year; dollar figures are expressed in 2002 dollars

Table II.
All-equity firms stratified on the basis of O&D ownership percentage

of widely held firms hold less stock but more options than CEOs of closely held firms, but that the value of total security holdings does not differ significantly between the two groups. Not surprisingly then, CEOs of widely held firms have higher option deltas, lower stock deltas, similar total deltas and higher vegas when compared to CEOs of closely held firms. When scaled by total compensation, widely held CEO deltas are lower, and vegas are higher, compared to closely held CEOs. Closely held firms also have significantly more founders among their officers and more related family members among the officers and board of directors.

In summary, the descriptive statistics show that when compared to a control sample of matched levered firms, the all-equity firms hold more cash. They also have higher levels of insider ownership but demonstrate the same sensitivity of CEO wealth to changes in both equity value (delta) and firm risk (vega). Within the sample of all-equity firms, the subset that is closely held displays the same total managerial risk exposure as widely held firms, but the source of that exposure emanates from stock ownership, not option holdings. The frequency of family relations and the presence of founders are also significantly higher among the closely held firms. The potential empirical implications of these different characteristics for control purposes is discussed in the next section.

III. Empirical design and results

The objective of our primary empirical test is to determine whether the high cash/all-equity balance sheets selected by the sample firms can be attributed in part to higher levels of managerial risk exposure. We draw on the empirical findings of Coles *et al.* (2006) in the construction of our empirical design and utilize net debt to measure the amount of leverage (positive or negative) in both the all-equity and matched levered firms.

Coles *et al.* find that, conditional on a given set of investment opportunities, firms select a combination of financial leverage, manager delta and manager vega in order to encourage the proper level of expenditures for net plant and research and development (R&D). All other things equal, a firm will select a lower level of leverage when the delta of the manager is higher. By selecting matched levered firms on the basis of size, industry affiliation and book-to-market ratio, we hold investment opportunities constant and seek to determine whether differences in the net debt levels of the sample and control firms can be explained by differences in manager delta.

Determinants of net debt

We define net debt as long-term debt minus cash, divided by total assets. We define all variables as the value for the all-equity firm minus the value for its matched levered firm.

We regress net debt on the following relative or incremental explanatory variables:

- CEO delta, defined as the log of (all-equity firm's CEO delta divided by the log of the matched levered firm's CEO delta). Delta is measured in dollars.
- CEO vega, defined as the log of (all-equity firm's CEO vega divided by the log of the matched levered firm's CEO vega). Vega is measured in dollars.
- Officer and director ownership percentage (all-equity firm minus its matched levered firm).

- Free cash flow to assets, where free cash flow is cash flow from operations minus capital expenditures (all-equity firm minus its matched levered firm).
- Net operating loss carryforwards (NOLs) to assets (all-equity firm minus its matched levered firm).
- Total assets, defined as the log of (all-equity firm's assets to matched levered firm's assets).

The relative delta measure captures the extent to which the manager of the sample firm faces more or less personal exposure to changes in firm value. In an analogous fashion, the relative vega measure is included to reflect differences in the sensitivity of managerial wealth to changes in equity risk. Holding everything else constant, a firm will select higher levels of leverage the higher the vega.

Although delta and vega are more precise measures of the CEOs exposure to risk, we include officer and director ownership percentage as a control variable based on the results in Table II, where we found some significant differences in delta and vega between widely and closely held firms. We include incremental free cash flow as a control variable given that firms with greater free cash flow would have less need to borrow under the pecking order hypothesis. Incremental net operating losses are also accounted for given that firms with more NOLs (non-debt tax shields) may be less inclined to borrow because the tax benefits of debt are lower. Finally, we include relative total asset levels as a control variable given that smaller firms may borrow less because they find the capital markets less accessible than larger firms. Although the levered matching firms are in the same market cap decile as their all-equity match, there can be differences in total assets large enough to potentially lead to differing access to the debt markets between the two firms.

The regression results are reported in Table III. We find that as CEO delta rises relative to the levered match firm, net debt for the all-equity firm decreases relative to its levered match. The coefficient on CEO vega is not significant. Also, all-equity firms that are larger relative to their levered matches have relatively more net debt. The results provide further evidence to support the theory that managerial risk exposure is a significant influence in the selection of an all-equity capital structure.

Agrawal and Nagarajan (1990) point out that the high cash levels and exclusive reliance on equity capital could be aimed at reducing the risk associated with large, undiversifiable investments of personal wealth and family human capital. In order to guard against the possibility that our results are driven by only firms with very large concentrations of ownership and/or family wealth, we also run the regression separately on widely held and closely held firms as well as family and non-family firms. Here, we define a family firm as one with a founder CEO and/or two or more family members on the board of directors. As shown in Table III, the coefficient on delta is negative and significant in each case. Regardless of widely/closely held status or family firm status, all-equity firms with higher deltas relative to their matched levered firms have lower net debt.

Operating performance and investment

We next examine the return on assets (ROA), capital expenditures and research and development outlays by the all-equity firms, using the levels for the levered match firms as a benchmark. Although the all-equity sample does not demonstrate a higher absolute level of delta, delta as a percentage of salary and bonus is significantly higher. Our objective is to determine whether the more conservative financial policies selected

	All firms	Closely held firms	Widely held firms	Family firms	Non-family firms
Intercept	−0.474	−0.494	−0.433	−0.509	−4.415
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln(CEO delta)	−0.032	−0.032	−0.033	−0.024	−0.042
	(0.015)	(0.095)	(0.070)	(0.027)	(0.021)
Ln(CEO vega)	−0.005	−0.001	−0.004	−0.014	0.012
	(0.325)	(0.932)	(0.532)	(0.216)	(0.240)
O&D ownership	0.015	−1.241	0.051	−0.111	0.278
percentage	(0.908)	(0.042)	(0.718)	(0.501)	(0.189)
Free cash flow/assets	0.225	−0.121	0.551	0.373	−0.016
	(0.247)	(0.638)	(0.067)	(0.167)	(0.954)
NOLs/assets	−0.073	−0.131	−0.058	−0.286	−0.045
	(0.522)	(0.352)	(0.761)	(0.107)	(0.768)
Ln(assets)	0.048	0.041	0.088	0.109	0.042
	(0.036)	(0.170)	(0.026)	(0.015)	(0.139)
Adjusted R^2	0.102	0.175	0.097	0.161	0.063
F	3.12***	2.81**	2.08*	2.82**	1.61
n	123	53	70	61	62

Notes: Significance at: *10, **5, ***1 percent levels; this table provides OLS regression results for net debt, defined as (long-term debt − cash)/total assets; all variables are defined as the value for the all-equity firm minus the value for its matching levered firm; CEO delta is the dollar change in the value of CEO stock and options holdings, for a one percent change in stock price; CEO vega is the dollar change in the value of CEO stock and options holdings, for a 0.01 change in stock price volatility; O&D ownership percentage is the percentage of common stock owned by all officers and directors; free cash flow is cash flow from operations minus capital expenditures; NOLs are net operating loss carryforwards; assets are total assets; closely held firms have O&D ownership greater than 20 percent; widely held firm less than 20 percent; family firms have a founder CEO and/or two or more family members on the board of directors; p-values are in parentheses underneath coefficient estimates

Table III.
Regressions on net debt: all-equity firms minus levered matching firms

by the sample firms are also associated with lower levels of investment and operating and stock market performance.

We examine ROA (defined as earnings before interest, taxes, depreciation and amortization divided by total assets), comparing the sample firms with their levered control firms. Table IV presents the median ROA for the sample firms and the control firms for years 0-3, where year zero is the first all-equity year. In each year the sample firms have higher median ROA, but the difference is never significant.

As noted by Barber and Lyon (1996), it is important to control for the level of ROA prior to the event, since a difference in year 0 ROA may simply be a continuation of higher ROA in prior years that is unrelated to the event. Therefore, we also compute prior performance-adjusted ROA for each firm using Barber and Lyon's method. We find all firms in the same two-digit SIC code with year −1 ROA within 90 per cent to 110 per cent of the sample firms ROA; this defines the control group. Median control group ROA in years 0, 1, 2 and 3 is subtracted from the sample firm's ROA to obtain prior performance-adjusted ROA. As shown in Table IV, the all-equity firms continue to have higher ROA than their levered matched firms, although only the difference in year 0 is significant at the 10 per cent level. In sum, Table IV indicates that the all-equity firms do not underperform their levered matched firms; there is weak evidence that they in fact slightly outperform.

	Year 0	Year 1	Year 2	Year 3
All-equity median (%)	15.13	13.93	13.30	12.63
Levered match median (%)	11.98	11.57	11.40	12.38
p-value for difference	0.148	0.285	0.142	0.455
Prior performance adjusted all-equity median (%)	2.01**	3.04*	0.85	1.89*
Prior performance adjusted levered match median (%)	0.74	−0.08	−0.86	0.44
p-value for difference	0.053	0.151	0.165	0.183

Notes: Significance at: *5, **1 percent levels; this table presents median ROA for the four all-equity years, for both the all-equity firms and their levered matching firms; prior performance adjustment is based on the method of Barber and Lyon (1996); a Wilcoxon rank sum test is used to detect differences between medians

Table IV.
EBITDA to assets

Anderson and Reeb (2003a, b) find that family firms turn in better accounting performance with a less diversified asset base than comparable non-family firms. Thus, one possible explanation for the results in Table IV is that the all-equity firms are more likely to be family firms than the matched levered firms, as observed in Table II. However, we find no significant differences in ROA for any year between all-equity family firms and all-equity non-family firms, either when comparing raw data, subtracting matched levered firm ROA, or subtracting prior-performance control group ROA. Thus, the (modest) outperformance of the all-equity firms exists in both the family and non-family firms. Similarly, we find no difference in ROA between widely and closely held all-equity firms in any year.

Table V performs a similar analysis of capital expenditures to assets, and these results indicate that both the all-equity and levered matched firms invest at approximately the same rate – differences in medians are never significant, and on a prior-capex adjusted basis[4], capital expenditures are close to zero for both groups.

Table VI presents data on R&D expense to assets, and we again see no evidence that the all-equity firms invest less in R&D than their levered matched firms; on a mean basis there is weak evidence that the all-equity firms actually invest more in R&D in years 0 and 1. Note that there is no guidance in the literature regarding the best way to test for the significance of abnormal R&D expense, as there is for ROA and capital expenditures. We therefore examine differences in means, medians, and the proportion of firms that have R&D expense greater than zero.

	Year 0	Year 1	Year 2	Year 3
All-equity median (%)	4.35	4.15	3.63	3.10
Levered match median (%)	3.86	4.09	3.54	2.87
p-value for difference	0.490	0.383	0.683	0.512
Prior performance adjusted all-equity median (%)	0.02	0.25	−0.02	0.30
Prior performance adjusted levered match median (%)	0.04	0.20	−0.10	−0.25
p-value for difference	0.734	0.806	0.903	0.295

Notes: This table presents median capital expenditures to assets for the four all-equity years, for both the all-equity firms and their levered matching firms; prior performance adjustment is based on the method of Alderson and Betker (2006); a Wilcoxon rank sum test is used to detect differences between medians

Table V.
Capital expenditures to assets

	Year 0	Year 1	Year 2	Year 3
All-equity mean (%)	6.63	6.74	6.85	6.89
Levered match mean (%)	4.65	4.78	5.44	5.64
p-value for difference	0.078	0.095	0.241	0.338
All-equity median (%)	2.41	2.60	2.83	2.40
Levered match median (%)	1.78	1.99	2.59	3.01
p-value for difference	0.267	0.206	0.149	0.098
All-equity pct > 0 (%)	57.7	56.9	58.5	59.3
Levered match pct > 0 (%)	57.7	60.3	64.2	64.9

Table VI.
R&D to assets

Notes: This table presents mean and median research and development expense to assets for the four all-equity years, for both the all-equity firms and their levered matching firms; a *t*-test is used to detect differences in means, and a Wilcoxon rank sum test is used to detect differences between medians

Finally, we note that in unreported regressions we find no relation between capital expenditures, R&D expense, or ROA with delta or vega. In summary, we can find no evidence that all-equity firms underperform their levered matched firms on an accounting basis, and we find no evidence that the all-equity firms undertake more "safe" investment (capital expenditures) or less "risky" investment (R&D).

Stock price performance

Finally, we examine the stock market performance of the sample firms. As in Eberhart *et al.* (2004) we compute calendar time abnormal returns to zero investment portfolios. For every calendar month between 1994 and 2006, we compute the stock return for each all-equity firm that is within 60 months of the end of its first all-equity year. Like Eberhart *et al.* (2004), we wait four months before including a firm in order to allow time for the accounting information to become public. Thus, if a firm's 12/31/2003 balance sheet is the first all-equity balance sheet, we start including that firm's returns in April of 2004. Results are not sensitive to this assumption (waiting zero, one, two or three months yields similar results).

We then subtract the return on the stock of the matched levered firm, and compute the average (both equal- and value-weighted) of these zero-investment returns each month. Like Eberhart *et al.* (2004), we wait four months before including a firm in order to allow time for the accounting information to become public. Thus, if a firm's 12/31/2003 balance sheet is the first all-equity balance sheet, we start including that firm's returns in April of 2004. Results are not sensitive to this assumption (waiting zero, one, two or three months yields similar results).

Next we estimate three-factor and four-factor alphas by regressing the calendar time returns on the Fama-French factors, and the Fama-French factors plus Carhart's (1997) momentum factor[5].

The results are in Table VII. α are not significantly different from zero, indicating that the all-equity firms have similar stock price performance relative to their matched levered firms.

IV. Conclusion

The purpose of this paper is to re-examine the capital structure choice of all-equity firms. We use net debt (debt minus cash) to gauge financial leverage and CEO delta

	Intercept	b	s	h	m
Three-factor model					
Equal weight	0.006 (0.171)	−0.166 (0.120)	−0.091 (0.403)	−0.125 (0.374)	
Value weight	0.012 (0.101)	−0.136 (0.459)	0.471 (0.013)	−0.118 (0.629)	
Four-factor model					
Equal weight	0.005 (0.257)	−0.136 (0.221)	−0.107 (0.331)	−0.109 (0.442)	0.072 (0.347)
Value weight	0.008 (0.261)	0.010 (0.958)	0.390 (0.037)	−0.045 (0.851)	0.345 (0.008)

Notes: We compute the monthly return on a firm that is within 60 months of its first all-equity year, and subtract the return on its industry, size and book-to-market matched levered firm; then we compute the cross-sectional average of these zero-investment returns each month; to test for long run abnormal returns after the initiation of all-equity status, we use the Fama-French three-factor model:

$$R_{pt} - R_{ft} = \alpha + b(R_{mt} - R_{ft}) + sSMB_t + hHML_t + \varepsilon_{pt}$$

where R_{pt} is the average return on stocks in calendar month t, where a sample stock is included if it is within 60 months of its first all-equity year; R_{ft} is the one-month T-Bill return, R_{mt} is the CRSP value-weighted index return, SMB_t is the return on small stocks minus the return on large stocks, and HML_t is the return on value stocks minus the return on growth stocks

We also estimate abnormal returns with a four-factor model that includes a momentum factor (UMD, the return on high momentum stocks minus the return on low momentum stocks):

$$R_{pt} - R_{ft} = \alpha + b(R_{mt} - R_{ft}) + sSMB_t + hHML_t + mUMD_t + \varepsilon_{pt}$$

Monthly factor returns are obtained from Ken French's web site. The intercept (α) is the abnormal return; p-values are in parentheses below the coefficient estimate

Table VII.
Calendar time regressions of long-run stock returns

and vega parameters to measure managerial risk exposure. The empirical results show that even in firms with no long-term debt, net debt declines (relative to a carefully selected control firm) when managers have greater exposure to changes in the stock price. This result holds when we separately examine widely held firms, where CEOs get large option grants, and closely held firms, where CEOs are more heavily compensated with common stock.

The fact that managerial risk aversion has such a strong influence on the financial policies of our sample firms leads us to explore whether that trait also has an impact on investment policy. Our sample is dominated by small growth firms with high levels of managerial ownership; firms which in general have a need to invest heavily to realize the value of their growth options (Klasa, 2007). Thus, underinvestment by this sample of firms could be especially costly.

However, we find no differences between the all-equity firms and their levered matching firms in terms of ROA, capital expenditures, R&D expense, or long run stock price performance. We conclude that the effect of managerial risk aversion is confined to financial policy and does not negatively impact the all-equity firms' operating or investment performance.

In this way, our study complements Anderson and Reeb (2003a, b), who examine founding family firms and find that potential agency costs that might harm the interests of the minority shareholders appear to have no detrimental effect on the valuation and performance of those companies. In a similar vein, the bottom line of our study is that, in spite of concerns over agency costs related to both high managerial risk aversion and

the absence of fixed claims, an all-equity capital structure appears to be an effective organizational form for our sample of firms. Further investigation of the relation between founding family status, executive compensation, capital structure and firm performance is an avenue for future research.

Notes

1. Lewellen (2006) demonstrates in a large sample analysis that firms use less debt when managerial volatility costs are greater. Sunderam and Yermack (2007) find that the riskiness of a firm's external debt is lower when the pension package of the CEO is more heavily weighted toward fixed (as opposed to residual) claims. Tufano (1996) shows that the degree of risk management at the corporate level is related to the personal risk exposure of the managers. Cronqvist *et al.* (2012) show that CEO personal and corporate financial leverage are positively related.
2. Recent articles that relate managerial incentives to firms' investment and/or financial policies include Coles *et al.* (2006), Billett *et al.* (2010), Brockman *et al.* (2010) and Hayes *et al.* (2011).
3. Klasa (2007) observes that if manager/owner wants to sell remaining interest in the firm, it is essential that growth options be exercised. A natural consequence of that objective would be for the firm to award options and avoid debt in order to mitigate underinvestment.
4. Here we define the control group as all firms in the same two-digit SIC code with year -1 capital expenditures to assets within 90-110 percent of the sample firm, as recommended by Alderson and Betker (2006).
5. Monthly factor returns are obtained from Ken French's web site at: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

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Corresponding author
Brian L. Betker can be contacted at: betkerbl@slu.edu