Fall 2020

How Stock Compensation Effects Analyst Projections for New Firms

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HOW STOCK COMPENSATION EFFECTS ANALYST PROJECTIONS FOR NEW FIRMS

by

Ryan Greenough

A thesis submitted in partial fulfillment of the requirements
for graduation with Honors in the Accounting

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Cristi Gleason
Thesis Mentor

Fall 2020

All requirements for graduation with Honors in the
Accounting have been completed.

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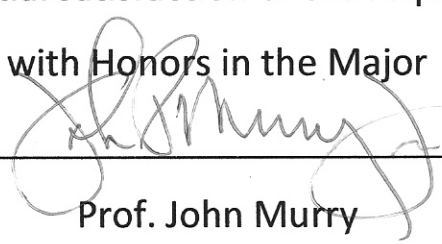
A thesis submitted in partial fulfillment of the requirements for graduation with Honors in the Tippie College of Business

Prof. Cristi Gleason

Thesis Advisor

Fall 2020

Thesis received in partial satisfaction of the requirements to graduate with Honors in the Major



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Section I: Introduction

Stock based compensation has experienced growth as a form of non-cash compensation to employees. Equity compensation is used to align management's long-term objectives with those of the company. Stock-based compensation gives management incentives to grow the company responsibly over a somewhat longer term versus making short-term decisions to meet bonus requirements. The longer-term incentive is due to the vesting period of stock options. However, many scholars and practitioners, including Warren Buffet, argue stock options provide shorter-term incentives than shares. Current accounting treatment of stock compensation by investors and analysts alike, however, draws the ire of many business world. Analysts treat stock compensation as a non-cash add back to free cash flow and ignore the costs or dilutive effects. Thus, stock compensation is linked to overvaluation (Mohanram, White and Zhao 2020).

This study examines whether equity research analysts who treat stock compensation as a pro forma add back to free cash flow produce statistically different price target prices than those who do not. If considering stock compensation explicitly in valuing a firm improves the accuracy of analysts' valuation, then I expect analysts that adjust for stock compensation have more accurate price targets. Alternatively, adding stock compensation back to calculate free cash flow may inflate valuation because it ignore the true cost of the options.

The sample includes reports from analysts covering a subsample of companies in the technology sector. I compare the forecast error of earnings per share and revenue forecasts for analysts who explicitly consider stock compensation relative to those who do not.I find that the accuracy of analysts' price targets does not differ significantly based upon stock compensation treatment. This finding implies that the overvaluation effects of stock compensation might not be significant enough to result in higher price targets by analysts who adjust for it.

Section II: Background

Stock compensation is a, non-cash, operating expense that is allocated to multiple summary accounts on the income statement, including cost of goods sold, research and development expense and selling and administrative expense, but typically has its own line-item on the indirect cash flow statement as a reconciliation from net income to cash flow from operations. Stock option expense is calculated by finding the fair value of the option on the grant date, regardless if these options are vested or not. So, even though the options are issued, they are not exercised immediately which is a good thing for the employers and employees. Employees receive equity compensation as an incentive to perform well while employers save cash. When in-the-money options are exercised, the firm is obligated to issue the stock for less than the market price. If firms purchase shares on the open market, they will repurchase the shares at a higher price than what the employee paid. A benefit of stock compensation is that firms are able to compensate employees in the current period without burning cash. Stock compensation is a "non-cash" expense because in the grant year, the employee received an equity option rather than cash, which is why the expense is added back on the indirect cash flow statement to get Cash Flow from Operations (CFO). However, this scenario creates a dilemma for valuation and analyst forecasts.

When these stock options are exercised the majority of firms repurchase circulating shares to satisfy option holders. The repurchase of common shares for cash is reflected in the Cash Flows from Financing Section of the cash flow statement. There is no additional expense on the income statement when the options are exercised. This classification in cash flow for repurchased shares is part of the flawed valuation concept. A standard equation to calculate free cash flow is:

$$FCF = CFO - Capital\ Expenditures$$

The addback of stock compensation to get CFO is included in this calculation, but the cash outflow in the future when the options are exercised and satisfied with repurchased shares is never reflected in free cash flow. This equation functions under the assumption that stock-based compensation is permanently a cash free expense, which is not true for most firms.

Prior research already shows the link between overvaluation and stock compensation. Mohanram, White and Zhao (2020) find that the exclusion of stock compensation as an expense and adding it back to free cash flow is associated with systematic overvaluation of firms. Further, they find that higher levels of stock compensation are associated with higher levels of stock repurchases. This finding supports the position that stock compensation is not a true non-cash expense and that the current exclusion of it from DCF valuations is faulty. Higher levels of repurchases requires more cash outflows. This same study also finds that the size of stock compensation across all firms and industries has increased over the past 15 years (Mohanram, White and Zhao 2020).

Free cash flow is a key figure that investors focus on when evaluating a company and a vital component of common valuation techniques. Bhojraj (2020) finds that for the 750 largest market capitalization firms, on average, stock compensation increases free cash flow by about 10%. This impact becomes as large as 25% for firms with the largest market capitalization. These large adjustments in the free cash flow equation play a large role in asset mispricing.

This issue extends further than just free cash flow calculations. Zhang, Zheng (2011) finds that pro forma earnings miscalculations are negatively correlated with future abnormal returns. Stock based compensation is a common adjustment in metrics, such as Adjusted EBITDA, used in valuation. This finding implies that investors are mispricing assets when they remove the cost of stock options and it is negatively affecting their forecast accuracy.

Literature shows that the current use of stock compensation in valuation and forecasting is not accurate. The scope and impact of stock compensation adjustments is increasing but its effect on price target accuracy has not been researched extensively. I extend the literature by examining a sample of recent IPOs. The benefit of this sample is that analysts have little prior history to guide the valuations. I examine the analysts' reports to identify the valuation methodology each analyst uses and how they address stock option expense.

Section III: Sample Design and Rank Methodology

My sample includes 50 different equity research reports covering 6 different companies that operate in the technology industry. Technology companies were selected because this industry is well-known for firms going public with negative net earnings and cash flow but with high levels of stock-based compensation. First, this is important because literature shows that stock compensation as percentage of operating expenses has increased from 2.6% in 2006 to 3.8% in 2018 (Mohanram, White and Zhao 2020). Second, the Equilar Institute finds that in 2015, technology companies had the largest number of options issued at 2.8 million, with the next closest industry at 1.1 million (2015). These two factors led to the emphasis on technology companies. These six different companies are drawn from a list of 2018 Technology Initial Public Offerings (IPO) with an emphasis on larger firms with a significant level of stock-based compensation. All 50 analyst reports were obtained from the Thomson One database and are all "Initiating Coverage" reports written soon after each respective firm's IPO. I used initial coverage reports because they tend to contain more details and to reduce differences in analyst effort across report types.

I obtain or calculate the following metrics from each "Initiating Coverage" report: price target, price forecast error, revenue forecast error, numerator/denominator adjustments related to stock-based compensation, valuation methodology and the associated rank given to each

report. Price target is the initial price target. The price forecast error is the difference between the analyst's target and the firm's actual stock price a year from the IPO date. The revenue forecast error is the difference between the analysts' revenue forecast (in dollars) and the firm's revenue for fiscal year 2019. Each report was analyzed to see what adjustments were used to account for stock-option effects. Examples of adjustments would be whether stock-based compensation was added back or subtracted in calculating Free Cash Flow or if a dilutive effect on shares outstanding was implemented. Any report that contained such an adjustment would be designated with a "Yes" and a "No" for reports that did not adjust all. The valuation methodology is based upon how each analyst describes arriving at their price target and whether it was a DCF, relative valuation multiple, or a mix of both. DCF and sales multiples are two of the most common valuation techniques employed analysts, with other common methods being price-to-earnings ratios, relative price-to-earnings ratios, EBITDA multiples, Economic Value Added, and price-to-book ratios. Asquith, Mikhail and Au (2005) examines whether use of any of the prior mentioned valuation methods is systematically more accurate than others. They found no association between valuation method and price target accuracy, implying that it does not matter which valuation method an analyst uses to arrive at a price target.

To facilitate comparisons across firms, I rank relative absolute accuracy within firm. Rankings from most accurate (1=most accurate) are assigned for all the reports for a given company and rankings of reports for different companies are completely independent. Ranks are then standardized by subtracting one and dividing by the number of analysts minus one, so that standardized ranks range from 0 to 1. In cases where two analysts have the same price target, the error for revenue is the tiebreaker since there are no adjustments for revenue.

I perform two sample t-tests on the rank, price forecast error, and revenue forecast error to determine if there are statistically significant differences between reports with adjustments for stock compensation and those with no adjustment. I expect that if adjusting for stock

compensation improves analysts' forecasts, analysts with adjustments will have significantly smaller price errors.

Section IV: Results

Exhibit A: Valuation Methodology

Valuation Methodology	Sales			
	DCF	Multiple	Both	Unclear/Neither
Number of Timed Used	11	19	12	*8*

This table gives a breakdown of the different valuation methods used by the analysts in the sample. The "Both" column means the analyst's price target put a weighting on both a DCF model as well as a Sales Multiple calculation. This total is excluded from the DCF and Sales Multiple totals so that they only show analysts who focused solely on those methods. The "Unclear/Neither" column is for reports that did not explicitly say what methods were used or if a different method was used (e.g., PEG ratio).

Most analysts utilize a sales multiple for part or the entirety of the calculation of their price target. This finding is consistent with prior research. Asquith, Mikhail and Au (2005) find that most analysts report that they use a simple earnings multiple to derive their valuation. In the case of this sample where many of the firms are not profitable, it is logical to expect these analysts would shift to a revenue multiple. Sales multiples are applied to forecasted sales – ignoring expenses. This avoids problems with negative income forecasts but also ignores stock compensation. Using relative valuation models like sales multiples could mean that any overvaluation effects are not recognized. DCF models are more rigorous but are difficult to implement for firms reporting losses. Moreover, if analysts add back stock options expense in

projective revenue in their DCF models, then valuations might be overly optimistic. The prominent use of sales multiples in my sample reduces the effect stock option treatment might have on price targets since DCFs are not the main form of valuation method cited by the analysts.

Exhibit B: Revenue and Price Forecast Error by SBC Treatment

	Adjusts for Stock compensation	**No Adjustment**
Price - Average	34.12%	25.61%
Price - Median	29.90%	16.30%
Revenue - Average	-10.80%	-12.13%
Revenue – Median	-12.10%	-12.10%

This table presents means and medians forecast error of analyst price target to actual price and analyst revenue projections to actual revenue. Analysts that made an adjustment for stock-based compensation had higher average target price error than those that do not. However, these analysts have a lower revenue forecast error. Although the average difference in price target forecast errors is large, it is due to one firm having poor stock performance over the 1-year post-IPO period and thus causing negative price forecast errors. There are 6 reports for this firm that did not adjust for SBC vs only 2 reports for analysts that did adjust. The larger number of negative reports where analysts did not adjust skews the figures in favor of analysts

who adjust. The rank test in the next section accounts for these errors by ranking based off absolute difference instead of raw forecast errors.

Exhibit C: Rank test for SBC Treatment

	Adjusts for Stock Compensation	Does No Adjust for Stock Compensation
Rank - Average	0.51	0.49
Rank - Median	0.50	0.50

I conduct a rank test to see if analysts who adjusted for stock compensation and those that did not had differences in the average rank of their respective reports. Lower ranks indicate higher accuracy. Analysts who adjusted for stock-based compensation were ranked slightly better than those who did not. This test implies that analysts who did adjust for stock-based compensation had reports that were ranked higher than those who did not. Next, I test the statistical significance of these results.

Exhibit D: Statistical Analysis of Select Metrics

Rank Forecast Error by SBC Treatment
t-Test: Two-Sample Assuming Unequal Variances

	No Adjustment	*Adjusts*
Mean	0.494285714	0.50571429
Variance	0.087078609	0.13416619
Observations	25	25
Hypothesized Mean Difference	0	
df	46	
t Stat	-0.12148577	
P(T<=t) one-tail	0.451917718	
t Critical one-tail	1.678660414	
P(T<=t) two-tail	0.903835437	
t Critical two-tail	2.012895599	

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Price Forecast Error by SBC Treatment
t-Test: Two-Sample Assuming Unequal Variances

	No Adjustment	*Adjusts*
Mean	0.256138279	0.34115129
Variance	0.149226729	0.11391452
Observations	25	25
Hypothesized Mean Difference	0	
df	47	
t Stat	-0.8286305	
P(T<=t) one-tail	0.205750941	
t Critical one-tail	1.677926722	
P(T<=t) two-tail	0.411501881	
t Critical two-tail	2.011740514	

Revenue Forecast Error by SBC Treatment
t-Test: Two-Sample Assuming Unequal Variances

	No Adjustment	*Adjusts*
Mean	-0.10638872	-0.1080432
Variance	0.005977501	0.03772145
Observations	24	25
Hypothesized Mean Difference	0	
df	32	
t Stat	0.039459719	
P(T<=t) one-tail	0.484384516	
t Critical one-tail	1.693888748	
P(T<=t) two-tail	0.968769031	
t Critical two-tail	2.036933343	

First, I test whether the variances are equal by performing a F-Test for Two-Sample for Variances. The F-Test for each of three metrics indicates that the variances are unequal. Next, I use a two-sample t-Test for unequal variances to test the differences in rank, price, and revenue forecast errors for statistical significance. In all three tests, I find no significant difference between analysts who adjust for stock options and analysts who do not. This test implies that whether an analyst makes an adjustment for stock-based compensation or not does not have an impact on the accuracy of their projections. This conclusion implies that while the treatment of stock-based compensation for new firms is inaccurate, it does not have a large enough effect on cash flow to overvalue a company enough to change analyst's price target. The DCF analysis could be giving a value too high but it does not differ enough from other forms of valuation to significantly shift a price target upwards.

Another possible takeaway is that stock-based compensation does have an impact on analyst projections in the broader population, but this sample does not reflect the ongoing challenges in forecasting the effect of stock compensation. IPO firms require different treatment from analysts

since there is no prior public history of the company. This could mean stock compensation does not play as big a role as it might for established firms. The six companies in this sample are all companies with limited earnings and cash flow. Companies with poor cash flows are poor candidates for fundamental valuation, like a DCF. This reason could be why many analysts in this sample used a sales multiple as the sole or part of price target calculation. Forecasting revenue growth may be more critical in young firms. Since there is reduced weighting on free cash flow and fundamental analysis in this sample, the effect of stock-based compensation on valuation accuracy could differ from the impact for more mature firms.

Section V: Conclusion

This study finds that there is no evidence to suggest that analysts who add back stock-based compensation to free cash flow in DCF valuation produce significantly different price targets than those who do not. Previous research shows stock-based compensation add backs are associated with overvaluation and a negative correlation with abnormal returns. However, for IPO firms, the impact of stock compensation has little impact on price target accuracy. It is possible that even though free cash flow is inflated, it does not have a large enough impact on analysts' valuations. Also, most analysts in this sample relied upon relative valuation techniques due to the unprofitability of some of the firms in the sample. This different valuation method could reduce the likelihood of errors due to ignoring stock compensation expense in DCF models.

One topic that is not clear after research is if whether analyst who uses a relative valuation technique in conjunction with a DCF was able to reduce the overvaluation influence of stock compensation add backs. Most analysts in this sample placed full or partial weighting on sales multiples. If these multiples produced a lower target price than a DCF, it could reduce

overvaluation. Future research should analyze how the use of multiple valuation methods impacts asset pricing and analyst forecasts.

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