Polynomial Ventures

Creating Alpha by Solving a Polynomial

By Steve Valentor

It is a well-known phenomenon that large companies trade at higher multiples of earnings than smaller companies. I outline this in detail in another paper, published on LinkedIn. It would follow then that investing in growing companies when they are small will statistically result in greater returns. Venture capital has arguably been doing this for more than 50 years with some notable success. According to Cambridge Associates[3], VC has delivered annual returns of 28.63% net of fees, expenses and carried interest over the last 25 years, with returns trending upward over the last four years. Over that same period, the S&P 500 returned approximately 10.5% annually. The difference can be thought of in terms of alpha (α), which is defined as excess returns above market indices.

> "When an accretive acquisition is made, the value created is proportional to the acquirers value rather than the acquired. Alpha is created."

Both the Capital Asset Pricing Model[1] and the Fama-French[2] extensions include alpha (α) as measure of the excess return above public markets after all other factors have been considered. In the case of VC, this is certainly a risk-adjusted, but quite real return.

Many investment managers, especially hedge fund managers consider α to be the additional value that they add through active management of their portfolios. Regardless of the exact interpretation, excess returns are a good thing in investing.

Venture capital managers have a unique advantage regarding alpha. Rather than having to capture it through cleverly-timed derivative transactions and risk hedges, we can create it as a byproduct of the goods and services that our portfolio companies produce. These are genuinely newly created additions to the GDP and are arguably far more valuable than returns earned through manipulating prices by trading strategies. Incremental value is created beyond any zero-sum-game measure. The benefits to society are clear. The earnings seem a bit more meaningful.

This value unfortunately is temporarily locked in illiquid securities. Our goal then is to convey these diamonds-in-the-rough through their growth stages into the nirvana of liquidity with unambiguous, defendable valuations.

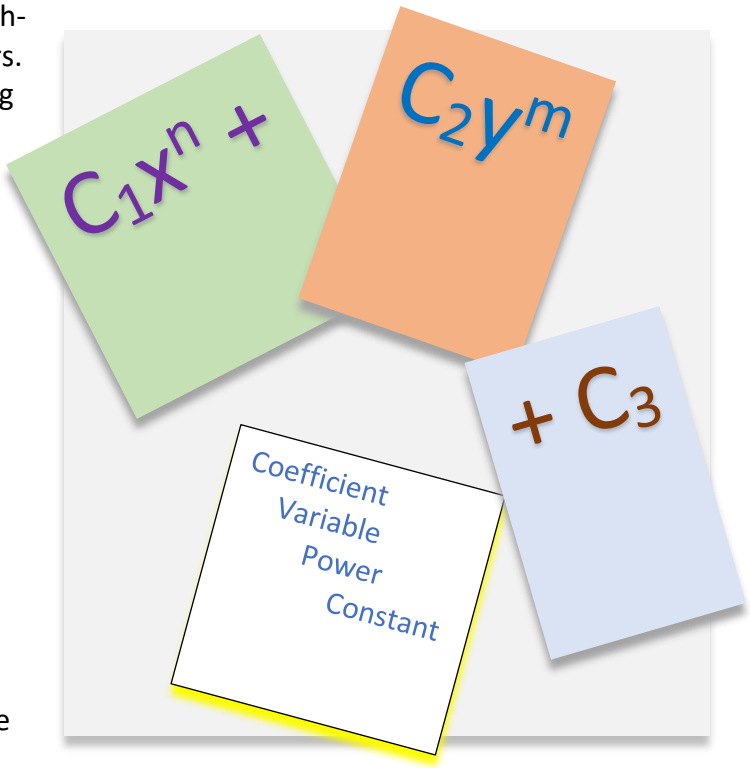
To do so, we must understand why larger companies are valued at higher multiples of earnings than their junior contemporaries.

Calculating Valuation

A large part of this solution to this intricate puzzle can be found by analyzing the methods used by the corporate credit and bond rating firms Moody's, Fitch and Standard & Poor. These trusted firms seek to predict the target company's ability to generate free cash flows in order to service debt, or pay dividends. They do so with remarkable accuracy. Meanwhile, Wall Street quants use similar algorithms to spot nuances in public securities on which that they can capitalize.

These established methods can be applied to our portfolio companies. Ultimately, their ability to generate free cash flows which will determine the valuation.

There are at least three attractive, high-liquidity exit strategies for VC investors. The ultimate is an initial public offering (IPO). Second best is to merge with or be acquired by a publicly traded strategic acquirer. Third is to sell to a private equity firm which will continue to invest in order to groom the portfolio companies for IPO or strategic sale.

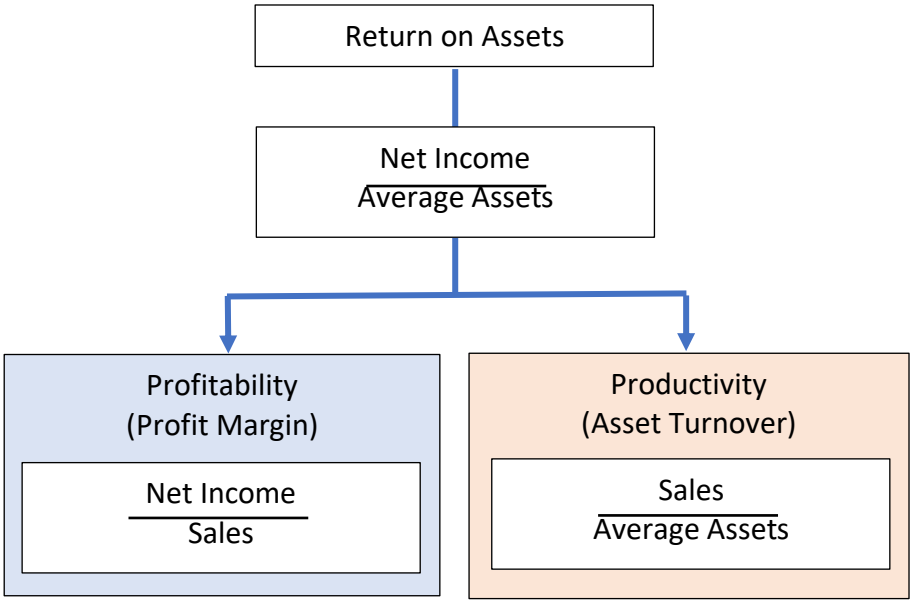


At Polynomial Ventures, we have focused our passion for mathematics on creating alpha in a way that is obvious to prospective acquirers.

Nearly 30 financial ratios are derived from the financial statements of our portfolio companies. Similar ratios are then developed from the financial statements of public companies in related market segments. Averages of a number of companies in a given industry generally produce consistent ratios for that entire industry.

These ratios provide insight into many facets of the target companies operations. Additional information is available through disaggregation of these ratios.

For example, Return-on-Asset (ROA) is computed as earnings divided by assets. This yields vital information about the overall operation of the company, but much more information can be gained by disaggregating the ROA formula into its components: profitability and productivity.



Profitability relates profits to sales. Productivity relates sales to assets. There are an infinite number of combinations of profit margin and asset turnover combinations that yield the same return on assets. However, the specific ratios computed for our portfolio companies can be contrasted to those of target acquirers or industry averages. Armed with this data, we can create very specific metrics and set clear objectives for our portfolio company managers.

The comprehensive list of financial ratios which constitute the terms we consider in our polynomial include:

EBIT - Income + Debt + Leases	Cash from ops to Total Debt
EBITDA	Total Debt to Equity
EBITDA Coverage	Altman Z-Score
EBITDA/Average Assets	Gross Margin
EBITDA/Interest Expense	MBIT
Retained cash flow/net debt	Asset Turnover
Debt/EBITDA	Price to Book
Debt/Book Capitalization	Return on Assets
CAPEX/Depreciation	Return on Total Capital
Revenue Volatility	Net Income
NCI - Non-controlling Interest	Net Income Percent
EPS - Earnings Per Share	Net Operating Profit After Tax
NOPM - Net Operating Profit Margin	Financial Leverage
OAT - Operating Asset Turnover	Spread RNOA - NNE%
ROPI - Residual Operating Income	Non-Operating Return (NOPM)
ROE - Consolidated Net Income / NCI Ratio	Operating Asset Turnover
P/S - Price to Sales PPE Turnover	RPP = NOPM*OAT*(1-tax)

Current Ratio	Operating income to revenues
Quick Ratio	Operating Margin
Liabilities to Equity	EBITDA Margin
Predictability of cash flow	ROCap
Times Interest Earned	EBIT Interest coverage
Total Liability to Equity Asset Turnover	EBITDA Interest Coverage
Accounts Receivable Turnover	EBITA Interest Coverage
Days Sales Outstanding	Debt to EBITDA
Days Inventory Outstanding	Debt to equity
AP Turnover	Debt to book capitalization
RPP = NOPM*OAT*(1-tax)	EBITA to average assets
Liabilities to Equity	Altman Z-Score = 1.2A + 1.4B + 3.3C + 0.6D + 1.0E Where: A = working capital / total assets B = retained earnings / total assets C = earnings before interest and tax / total assets D = market value of equity / total liabilities E = sales / total assets

Defending the Valuation

It is a great deal of work to compile these ratios for each publicly traded prospective acquirer. It is even more work to normalize the calculations for averages of companies in a particular segment.

The result of the analysis however reveals a plethora of information that is neither apparent nor directly available through public financial statements. Using the "Return on Assets" example above, we can use the disaggregation to compare the "Sales Efficiency" of two different companies that we have analyzed.

Once we have computed ratios, disaggregated them to reveal deeper information, we can arrange them into an equation form. Each ratio becomes a term, or variable of interest. We can apply a coefficient to tune the relative importance of each term.

We now can construct a series of these terms which can be expressed (with abbreviations) as:

$$(Reference\ Coefficient_0)\frac{Reference\ Numerator_0}{Reference\ Denominator_0} + (RC_1)\frac{RN_1}{RD_1} + (RC_n)\frac{RN_n}{RD_n} \ldots$$

Exactly the same analysis can be performed on data derived from the financial statements of our portfolio companies.

$$(Portfolio\ Coefficient_0)\frac{Portfolio\ Numerator_0}{Portfolio\ Denominator_0} + (PC_1)\frac{PN_1}{PD_1} + (PC_n)\frac{PN_n}{PD_n} \ldots$$

This makes it clear that we can compare each matching term. When this is done on actual data from different companies, the differences begin to emerge and glare. Invariably, we find deficiencies in our portfolio companies.
There is a perfectly logical explanation for this. In their earlier stages, companies should be focused on their customers and their products. This is especially true for technology companies. It is quite common for a young company to relegate Human Resource department functions to the founder, or some trusted leader who happens to be the most empathetic. Similarly, Program Management might be assigned to Engineering, Quality Control to the Production Manager, and Accounting to the Purchasing Manager.

These examples of assignments of convenience create a number of people who fit the title "Chief Cook and Bottle Washer."

It is absolutely appropriate for a company in its early stages to operate this way. As Gino Wickman points out in his book "Traction," every company starts out with the founding entrepreneur occupying every seat in the management team. It is perfectly acceptable to have one person in multiple seats. This can continue only up to the point that there is not enough time to do all the jobs. Then "Delegate and Elevate." At that point, it is easy to fall into the trap of overstaffing.

What is needed is a way to know how many people to hire and how quickly the company can handle growth. The answer to this difficult question can be found in the detailed analysis of the ratios of prospective acquirer or industry averages. As is usually the case, the answer is in the math.

By comparing the portfolio company's polynomial to that of the prospective acquirer, the differences can easily be identified. This analysis yields many important comparison elements.

Once the differences are identified, the goal is to steer the portfolio company to converge its measurements with those of the target. This can be done by creating key performance indicators (KPI) which drive convergence. It can also be done through organizational change to parallel the target company.

This process yields a result which is much more valuable than simply guiding appropriate accounting ratios. By making it the objective of the management of the portfolio companies to converge their measurable ratios with those of a prospective acquirer, a much more valuable result is achieved. Once the ratios have converged, the position can easily be defended that the portfolio company would be accretive to an acquirer in every meaningful measure.

When an accretive acquisition is made, the value created is proportional to the acquirer's value rather than the acquired. The value of the acquired portfolio company is now measured in terms of the much larger acquirer. The unit of measure is the higher earnings multiples of acquirer. True alpha is created!

Polynomial Ventures is a Registered Investment Adviser managing a venture capital fund with the following advantageous differentiations:

Attribute	**Benefit**
• Registered Investment Adviser	No Venture Capital Exemptions
• Focused on early-stage technology companies	Statistically better returns to offset higher risk, mitigated by our deep experience
• Emerging managers	Statistically better returns
• Outside Silicon Valley and Boston	Better returns because a greater number of startups compete for a smaller number of investors
• Evergreen (Open-ended) Fund	23% improvement in returns, all other variables being equal.
• Polynomial	We use a proven empirical method to increase the valuation of our portfolio companies

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Steve Valentor is a 30-year technology industry veteran who has worked in computer engineering, semiconductor R&D and software development for companies ranging from startups to the Fortune 200. He has held positions from entry level engineer to senior technical management, CEO and board chair. Currently the managing partner of Polynomial Ventures and an adjunct professor at DePaul University, Valentor holds an M.B.A. in finance and a bachelor's degree in math, both from the University of Illinois at Chicago.

Polynomial Ventures invests in early stage technology companies outside of Silicon Valley and Boston. The Chicago-based firm is an emerging, registered investment adviser (RIA) operating an evergreen fund.