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Fixing Active Management: Why Value Investing Works (or At Least *Has Worked*)!

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Introduction

- One of the most widely accepted concepts in modern equity investing is that "value oriented" active strategies tend to outperform other active strategies. In many cases these strategies appear to produce a statistically significant risk-adjusted excess return, contrary to the expectations of the Efficient Market Hypothesis.
- We will argue that this apparent anomaly does not arise because value strategies are innately superior. The way in which equity valuation methods are used *has been oversimplified to the point of being consistently and materially biased.*
- The major result of these biases is that active management as a whole appears ineffective compared to passive strategies.
- Value strategies are merely the least impacted among popular thematic approaches (e.g. smart beta, factor tilts, etc.) to equity investing, so as to appear superior to other strategies.

Sources of Bias

- We will focus on four aspects of traditional equity valuation methods that are the key sources of the bias.
  - The first issue is the *assumption* embedded in classical valuation models (e.g. dividend discount models) that companies exist in perpetuity when they obviously do not. Some companies go bankrupt and many others are acquired for minimal value in periods of distress.
  - The second issue is that projected future cash flows are discounted without regard to the shape of term structure (and the implications of that term structure for forward interest rates). Clearly, the daily operation of bond markets is a clear rebuke to this view.

More Sources of Bias

- The third source of bias is the lack of mathematical distinction between mean arithmetic returns and mean geometric returns which is implicit in the single period of nature asset pricing models (CAPM, APT).
- The final issue is that average company level growth projections produced by fundamental analysts routinely imply future levels of national GDP growth that are often multiples of consensus expectation for growth in the economy as a whole.
  - Just as not every child can have above average school grades it is impossible for the average company to grow faster than the economy as a whole in perpetuity.
- Proper consideration of these issues is highly explanatory of the purported value anomaly through history.

Has "Value Investing" Worked in the US?

- For the 90 years period from 1927 through 2016, the return associated with the US market HML "value" measure from Fama and French had an associated monthly return of .40%, or 5.1 annually with compounding.
  - The first few months of 2017 were mostly negative for HML so the monthly return average drops to .38%
  - **T stat is 3.4**
- In the Northfield US Fundamental Model there are four factors that valuation related (E/P, B/P, DivYield, and Rev/P)
  - For the nearly 30 year period from January 1989 through June 2017, the aggregate monthly factor return to the four valuation factors is .41% per month
  - **T stat is 5.04**

Has Value Investing Worked Globally?

- The evidence is positive but a lot weaker
  - For the 15 years from June 2002 through June 2017, the MSCI World Value Index provided an annual return .30% better than the MSCI World Index in US$ terms
  - For the period from period from January 1990 through June 2017, the average monthly factor return to the Northfield Global Model was .045%, but was not statistically significant.
  - The FTSE Global Value Factor Index is summarized

Table 1. Factor Returns and t-stats

Factor	Absolute		Relative to Industry		Relative to Country	
	Return	t-Stat	Return	t-Stat	Return	t-Stat
Earnings Yield	0.24%	1.10	0.20%	0.89	0.21%	0.89
Book to Price	0.16%	0.62	0.14%	0.56	0.18%	0.66
Cash Flow Yield	0.22%	0.89	0.21%	0.77	0.22%	0.86
Sales to Price	0.19%	0.75	0.14%	0.50	0.24%	0.93
Dividend Yield	0.11%	0.34	0.08%	0.22	0.13%	0.37

Source FTSE: FTSE Developed, mean, monthly factor return and cross-sectional t-statistic; March 2000 to December 2013. Past performance is no guarantee of future results. Returns shown may reflect hypothetical historical performance. Please see the disclaimer page for important legal disclosures.

Valuing Equity Securities

- The classic valuation method for the stocks is the dividend discount model (DDM).
  - The most chaste form of DDM is known as the Gordon model (named after Myron Gordon of the University of Toronto).
  - Assumptions: *firms exist in perpetuity, business growth rates are fixed in perpetuity, and investors discount future dividends to present value without regard to the term structure of interest rates*

$$\text{Value} = D / (k-g)$$

D = annual dollar dividend

k = investor required rate of return

g = expected growth rate of dividends

Assumption: Firms Exist in Perpetuity

- The first issue is the *assumption* embedded in classical valuation models (e.g. Gordon DDM) that companies exist in perpetuity when they obviously do not.
  - Some companies go bankrupt and many others are acquired for minimal value in periods of distress.
- diBartolomeo (JOI, 2010)
  - Merton style contingent claims style model
  - Quoted values are half firm Half-lives in years implying annual extinction rate over 3%

EXHIBIT 1

Summary of Sample Period at the End of the Study (as of March 31, 2010)

	N	Median	CapWtMean	StDev	RevWtMean
All	5,068	20	23.88	10.28	23.29
Financial	1,132	22	18.01	17.11	11.41
Non-Financial	3,936	20	25.31	9.93	24.72

EXHIBIT 2

Summary Results for the Full Period (220 months, December 31, 1991–March 31, 2010)

	Full Sample				
	N	Median	CapWtMean	StDev	RevWtMean
All	6,586.73	16.90	18.14	8.05	17.48
Financial	1,630.93	22.28	17.06	16.80	7.86
Non-Financial	4,954.80	14.74	18.42	7.79	17.60

Results of the Incorrect Perpetuity Assumption

- The value of equities is persistently overestimated relative to other asset classes
  - Equity strategies that provide more bond-like attributes (low volatility, high dividend income) should outperform.
  - In the Northfield US factor model, a combined strategy of low volatility and high yield provided a factor return of .57% per month over the full available history.
- Stocks where expected cash flows are further in the future are overvalued more, because there is a greater likelihood that the firm will not exist long enough to generate those cash flows.
  - High dividend yield and value tilts should produce positive alpha as already demonstrated.
  - Return to the earnings growth rate factor in the Northfield model close to zero

Assumption: The Yield Curve Is Flat

- In the Gordon DDM, the investor's required rate of return is constant irrespective of whether a dividend cash flow is expected tomorrow or fifty years from now.
  - The routine operations of world bond markets illustrate that there is a term structure to interest rates
  - In the vast majority of countries and time periods, yield curves are upward sloping indicating that near term cash flows should be valued at lower discount rates, and cash flows further in the future should be discounted to present value at a higher rate.
  - Using a flat yield curve, under-values firms with higher dividend payouts and overvalues firms with intention of internally reinvesting cash flows for future growth.
  - The Fama French CMA factor has a .30% per month return for July 1963 through May 2017.

Interest Rate Volatility Also Plays a Role

- In yield terms short term interest rates (e.g. Treasury Bills) are move volatile than long term interest rates (e.g. Treasury Bonds).
- This means that when rates fall, short term rates tend to fall more, resulting in a steeper yield curve. This exaggerates the valuation bias associated with using a flat yield curve.
- Given that interest rates have fallen very dramatically on a global basis over the past thirty to forty years, we would expect that value stocks with near in cash flows would have been even more advantaged.
- Muijsson, Satchell and Fishwick (2014) show that the purported outperformance of popular "smart beta" strategies can be attributed to the pervasive decline in interest rates over the available history.
  http://sydney.edu.au/business/__data/assets/pdf_file/0003/214356/DP-2014-008_Taking_The_Art_out_of_Smart_Beta.pdf

Assumption: The Future is One Long Period

- The CAPM and APT are single period models (*which precludes the possibility of compounding*) and therefore says there is *a* linear relationship between arithmetic average returns and systematic risk (beta).

- The relationship between geometric (with compounding) returns and risk (beta) **must be a convex function if the relationship of arithmetic returns and risk is linear**
  - If returns are a random walk, the compound rate of return will be the arithmetic average minus half the variance,
  - Messmore (1995),
  - Wilcox (2003) extends this to include higher moments

Forming Expectations by Abusing the CAPM

CAPM as put forward by Sharpe (1962) has a lot of important assumptions

- Transaction costs and taxes are zero
- All information is available to all investors
- There are no limits on cross-border investing
- The market clearing portfolio consists of all risky assets (including bonds, real estate etc.), not just a subset of equities that are capitalization weighted
- **The future consists of one long period** and we know what the risk free rate is for that period
- All investors can borrow at the risk free rate
- Beta values for securities are known (not estimated)

General Implications of the CAPM Assumptions

None of these assumptions hold true in the real world so there is no reason to believe that a capitalization weighted equity index should be mean-variance efficient. *All the related biases suggest low beta portfolios should outperform.*

See Grinold (1992) for a good summary

A variety of papers have tried to better model CAPM by making one or more of the assumptions more realistic (e.g. borrowing costs above the risk-free rate). All the fixes suggest a flatter flat security market line

Empirical tests of return premiums to beta risk are joint tests of CAPM and our ability to estimate beta accurately.

Our Basic Algebra

$$E[A_i] = R_f + B_i\,(R_m - R_f) \qquad (1)$$

$$B_i = ((S_i / S_m) * P_{im}) \qquad (2)$$

$$E[A_i] = R_f + ((S_i / S_m) * P_{im})\,(R_m - R_f) \qquad (3)$$

$$E[G_i] = E[A_i] - S_i^2/2 \qquad (4)$$

$$E[G_i] = R_f + S_i * ([P_{im} * (R_m - R_f) / S_m] - S_i/2) \qquad (7)$$

More Algebra

For the special case $P_{im} = 1$

$$S_i = B_i S_m \qquad (8)$$

$$E[G_i] = R_f + B_i S_m * ([(R_m - R_f) / S_m] - B_i S_m / 2) \qquad (9)$$

We can multiply all this out and take the first derivative of this expression with respect to B_i to calculate where the critical value of B_i^* where G_i will be expected to peak.

The higher the Sharpe ratio of the market portfolio, the higher the value of B_i^*. See Klepfish (2013)

The General Case

- For any values such that $(S_i/2) > (P_{im} * (R_m-R_f)/ S_m)$, the expected value of G_i will be a decreasing function of S_i and the expected geometric return will be *below the risk-free rate.*
- For any values such that $(S_i /2) < (P_{im} * (R_m-R_f)/ S_m)$ the expected value of G_i will be an increasing function of S_i
- This assumes S_m and R_f are always positive.
  - If markets are rational, the expected value of R_m will always be positive and larger than R_f.
  - CAPM says the P_{im} for any reasonable portfolio should be positive and is **bounded at 0 and 1**
  - You can solve for the peak geometric return as function of beta

"Low Vol" and the Market Portfolio

- CAPM defines a "market portfolio" that consists of all risky assets (not just stocks)
  - This would include all of the bond market that is not risk free for whatever you are defining as the single period
  - There is the messy problem of double counting because of securitization of lots of fixed income securities
  - The "multi-asset class" market portfolio will include some stuff that is illiquid

- A typical stock portfolio would look quite high in volatility compared to the revised market portfolio.
  - Depending on the correlation you assume across asset classes, it is likely that typical stock portfolios would have a pretty high beta **(i.e. probably higher than B_i*)**

Adjusting for Lack of Liquidity

- Lo, Getmansky and Makarov (2004) argues that for financial markets to operate rationally, they should not be predictable.
  - To the extent that trading costs inhibit trading, the changes in observed market prices will lag their true economic values so the volatility we calculate from the return data will be understated
  - In 2008, Anish Shah (Northfield) created an algebraic correlation for this downward bias. For example, to correct for the serial correlation in the monthly returns of the Barclay's High Yield bond index, you need increase the perceived volatility by 27%
  - For real estate, the correction can *triple* conventional risk values
  - If multi-asset class market portfolio includes some illiquid assets, we would need to upward adjust the expected volatility of the market portfolio, **again pushing B_i* to the left**

Higher Moments of Returns

- Almost all empirical studies show that financial market returns have negative skew and positive excess kurtosis
  - We could also consider the impact of skew and kurtosis on the difference between the geometric and arithmetic means of returns as in Wilcox (2003). Given the standard deviation, skew and kurtosis values (in decimal forms) we can calculate the value of the volatility that would provide the same degree of arithmetic difference between the two forms of the return mean.

$$V \sim (S_m^2 - (2/3)^* MS_m^3 + (1/2)^* KS_m^4)^{.5}$$

- V = adjusted volatility, S_m = market volatility, M = skew, K = excess kurtosis
- Since $M < 0$ and $K > 0$, $V > S_m$, **so B_i* moves to the left**

A Bit More on Higher Moments

- The calculation on the prior page assumes that investors are growth optimal and are all trying to maximize their geometric return
- The composition of the market portfolio suggests that as a whole investors are more risk averse than growth optimal, so we may need to adjust more strongly for higher moments so **B_i* moves downward more**

- $V \sim (S_m^2 + (200/RAP)\,(-(2/3)^*\, MS_m^3 + (1/2)^*\, KS_m^4))^{.5}$

  In the absence of explicitly stated risk aversion we approximate

  $RAP = 6 * S_m$

Estimation Error in Beta and Market Volatility

- CAPM assumes beta and market volatility values are known, not estimated
  - To the extent that real world beta values are just estimates, the overall return dispersion associated with a given beta value increases
  - Michaud (1998) argues that near the top of the efficient frontier, this additional estimation risk can dominate the problem turning the efficient frontier downward.
- Consider a beta value of 1 with a standard error of .2 and $S_m = 20$ and $P_{im} = 1$

  If we have a 50% chance that the true beta = .8 and a 50% chance that the true beta = 1.2, we get an effective $S_m = 20.4$ not 20, so **B_i* moves left again**

Assumption: Companies Can Grow Forever

- The final issue is that average company level growth projections produced by fundamental analysts routinely imply future levels of national GDP growth that are often multiples of consensus expectation for growth in the economy as a whole.
  - Just as not every child can have above average school grades it is impossible for the average company to grow faster than the economy as a whole in perpetuity.
- When one enterprise grows faster than the economy as a whole, it must do so by taking economic activity away from other companies.
  - If the competing companies are driven out of business, the growth of the high growth firm must slow down to the growth rate of the economy.

The Amazon Effect

- In the May 31, 2017 data set of the Northfield Single Market Risk Model transient factor 1 showed an interesting anomaly
  - The highest exposure to Transient Risk Factor 1 was Amazon with a "beta" of 4.2.
  - Many traditional retailers were at other end of the spectrum for this factor, with high magnitude *negative* exposure values.
  - Macys, Staples, Dollar Tree, Dollar General, Foot Locker, AutoZone, Advanced Auto Parts are among the firms that the model sees being impacted by Amazon.
  - This was before the announcement of the Whole Foods acquisition.
  - *We thank our client Matarin Capital for pointing out this insight.*

Conclusions

- Both finance textbooks and industry conventions have influenced investment practitioners into thinking the Gordon DDM is sufficient for equity valuation.
- We assert that the Gordon DDM is an extreme oversimplification and that the specific nature of the four key *simplifying assumptions* biases the valuation of equity securities upward in general.
- We also assert that "value" and statistically related strategies such as "low volatility" are relatively less impacted by the aggregated upward bias and hence appear to outperform on a relative basis.