Valuation, Without a Value Bias

By Jia Ye, Ph.D. and Robert D. Arnott

Many "quants" have used value metrics, such as the discount cash flow model,[1] as a means of gauging whether the price of a stock is justified by its likely business prospects. Most such approaches have not one but two "Achilles' heels". First, they are only as good as the inputs that are assumed (therefore they can be classic "garbage in, garbage out" models); Second, they introduce a pronounced value bias to the investment process, which leads to "feast or famine," depending upon whether the capital markets are rewarding growth or value. The former can be dealt with, in part by using consensus data, so that the opinions of a single investor do not compromise the objectivity of the process, and in part by screening the data to try to avoid errors before these errors affect our investment decisions. The latter problem is trickier. How can you have a valuation model without a value bias? Not only is it possible to do so, but the resulting model is considerably more powerful and more reliable than a "raw" valuation model with a value bias.

The discount cash flow model is defined in the following equation:

$$V_t = B_t + \sum_{i=1}^{\infty} \frac{E_t[EPS_{t+i} - rB_{t+i-1}]}{(1+r)^i}, \quad (1)$$

where V_t is the value of the firm at time t; B_t is the book value at time t; r^t is the cost of equity capital; and EPS_t is the earnings per share at time t. Assuming the firm is applying clean surplus accounting, the book value at time $t+1$ can be written as:

$$B_{t+1} = B_t + EPS_t - DIV_t,$$

where DIV_t is the dividend per share at time t.

The discount cash flow model is an elegant way of balancing future return prospects against current stock price to objectively gauge whether the market is sensibly or nonsensically pricing those growth prospects. After all, ultimately for a stock to succeed, it must deliver business results sufficient to justify its current price. If it fails to do so, then eventually, its performance must reflect its true business results. This means that the investor counting on investment success without depending on business success is relying on the "greater fool" theory: "someone will come along who values the 'story' more highly than I will, and therefore I will be able to resell at a profit". This is very dangerous. Indeed, one of the beauties of a discount cash flow model is that it is "correct" in forecasting the exact internal rate of return (IRR) that an investor can expect, ***if*** the forecasts of future earnings and dividends are correct. That's obviously a big "if," since the forecasts will surely be either too conservative or too aggressive.

The discount cash flow model is very flexible. It can be used to assess "fair value." It can be used to assess IRR. It can be reverse-engineered to test how much growth is needed for a stock to match the IRR or NPV of the market as a whole. Our first-cut forecast is the ex-ante cost of equity (or IRR) derived from the discount cash

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(1) The model is sometimes called the Edwards-Bell-Ohlson (EBO) valuation equation. Under the assumption of "clean surplus" accounting (i.e. the change in book value is equal to earnings minus dividends.), the discount cash flow model is equivalent to the dividend discount model.

Table 1
First Quadrant Discount Cash Flow Model vs DAIS Result
(Mar 1985 - Mar 1997)

	DAIS EBO Model		FQ Model	
Holding Period	IC	T-stat	IC	T-stat
1-month	0.027	0.72	0.031	3.31
6-month	0.039	1.04	0.050	4.20
12-month	0.044	1.16	0.059	5.33
24-month	0.073	1.91	0.074	7.61

Table 2
First Quadrant Discount Cash Flow Model vs Orthogonalized Version
(Feb 1985 - Apr 2000)

	FQ IRR		Orthogonalized IRR	
Holding Period	IC	T-stat	IC	T-stat
1-month	0.019	2.00	0.027	3.99
6-month	0.019	1.59	0.048	7.09
12-month	0.033	3.03	0.071	14.14
24-month	0.060	6.09	0.107	23.46

flow model. Our forecasts generate fairly good predictive power compared to the Edwards-Bell-Ohlson (EBO) model of DAIS, as shown in Table 1. Both the information coefficient and t-statistics of our forecast are superior.

Note that if we use the IRR of the discount cash flow model to forecast future stock return, we are assuming implicitly that the ex-ante cost of equity between a high-tech company such as Cisco and a retail store such as Wal-Mart can be directly comparable. While one could find support for such an assumption, we think it may be more reasonable to compare the IRR of companies within an industry or companies that share similar characteristics. It means we compare the valuation IRR of value stocks with value stock, growth stocks with growth stocks, high-turnover stocks with high-turnover stocks, low-beta stocks with low-beta stocks, leveraged stocks with leveraged stocks, and so forth. It compares like stocks with one another. What does it imply? It implies that the model is no longer reliant on a value-driven market in order to garner alpha. The model can perform well in a growth market, a value market, an up market and a down market. One way to derive such a comparison is to orthogonalize the IRR derived from the discount cash flow model against the factors given by BARRA. In other words, we regress the IRR against the BARRA factor and use the residual of the regression as the forecast of future stock returns (we call the new forecast the *Orthogonalized IRR*). The empirical results in Table 2 show that the orthogonalized IRR has better predictive power than raw IRR of the discount cash flow.

Table 3
Orthogonalized IRR vs. FQ Asset-Specific Model and Combined Models
(Jan 1990 - Apr 2000)

	Orthogonalized IRR (OIRR)		Asset-Specific Forecast		ASF Combined with OIRR*	
Holding Period	IC	T-stat	IC	T-stat	IC	T-stat
1-month	0.017	1.95	0.073	14.93	0.077	13.34
6-month	0.032	3.73	0.139	28.56	0.142	29.46
12-month	0.056	8.67	0.187	31.16	0.192	29.73
24-month	0.100	18.40	0.245	32.59	0.251	31.24

** 0.8' ASF + 0.2'OIRR*

Another encouraging fact about the orthogonalized IRR is that it provides addition information to our existing asset specific forecast, as can be readily seen in Tables 3 and 4.

The year-by-year information coefficients presented in Table 4 show that the orthogonalized IRR gives better and more stable forecasts for longer-term returns than for short-term returns. This is not surprising because short-term returns may be driven more by market sentiment than by company foundamentals.

The one kind of market this model can *not* be expected to work well in is a market that is paying very little attention to value or to underlying fundamentals. Arguably, we have just been in such a period. Why would we add something that would not have helped us over the past two years? Because we believe, very strongly, that these have been aberrant markets, that managing to long-term success is better than pretending that we can refight last year's battles.

Table 4
Orthogonalized IRR, Asset-Specific Forecast, and Combined Forecast: Year-by-Year 6-Month, 12-Month and 24-Month Information Coefficient

	Orthogonalized IRR (OIRR)			Asset Specific Forecast (ASF)			ASF combined with OIRR*		
	6-month IC	12-month IC	24-month IC	6-month IC	12-month IC	24-month IC	6-month IC	12-month IC	24-month IC
1990	0.046	0.058	0.096	0.116	0.144	0.150	0.113	0.136	0.134
1991	0.017	0.015	0.066	0.133	0.141	0.195	0.118	0.120	0.177
1992	0.039	0.044	0.070	0.156	0.177	0.207	0.154	0.179	0.233
1993	0.014	0.054	0.122	0.124	0.155	0.253	0.124	0.154	0.259
1994	0.143	0.159	0.145	0.150	0.220	0.309	0.145	0.217	0.318
1995	0.031	0.022	0.076	0.156	0.236	0.308	0.166	0.238	0.310
1996	0.073	0.101	0.135	0.195	0.286	0.344	0.194	0.296	0.355
1997	0.049	0.082	0.101	0.157	0.204	0.216	0.161	0.222	0.234
1998	-0.014	0.020	0.081	0.127	0.174	0.211	0.149	0.213	0.224
1999	-0.083	-0.053		0.079	0.084		0.100	0.104	
Average	0.032	0.056	0.100	0.139	0.187	0.245	0.142	0.192	0.251

** 0.8´ASF+0.2´OIRR*

So, Where Are We Going with This?

We believe that the First Quadrant equity process is a very solid multi-factor process for stock selection, rooted in two sets of key drivers: style management and issue selection by way of issue-specific models. The style management focus on forecasting future style rotations is based mostly on macro economic variables and industry level information, while the issue-specific forecast emphasizes the impact of company level news and information. But, we also have long had a concern that there was no valuation component to our work. If a stock had attractive *attributes* we would buy it at any price; if the attributes were unattractive, we would sell at any price. To be sure, some of those attributes were price sensitive, so that we would like almost any stock more at a lower price than at a higher price and vice versa. But, there was no *explicit* valuation discipline.

The problem with a valuation discipline is that it typically comes with a strong value bias. In eliminating the value bias of the discount cash flow model through orthogonalization, we can introduce a valuation metric to the process without *structurally* tilting our portfolios towards value.

As it happens, the discount cash flow model is not a powerful model over short time spans, but it provides respectable predictive power over an accumulation of time. The one-month IC is 0.03, compared with 0.14 for our current models, but it has a reasonably consistent 0.11 IC for two-year results, where our existing models have a somewhat less consistent, but more powerful, 0.30 IC for two-year results. Because it is not as powerful historically as our current models, it gets a modest 11% weight in our aggregate equity model. But, because it lengthens the half-life of our current models, it reduces the turnover of our current models, and it provides a value anchor that was previously absent. As such, it has benefits disproportionate to its modest short-term IC.

Since the standard deviation of issue specific returns is around 5000 basis points over a two-year span, a 11% IC is worth around 550 basis points of positive "alpha" for a one-sigma "bet," or 275 bp. per annum, *less trading costs*. For market neutral, the "alpha" doubles to 550 bp. per annum. The key here is trading costs. This is not a large enough alpha to trade on, for any high-turnover model. Fortunately, this particular model has low turnover and, far more importantly, serves to *reduce* the turnover of our existing model. If we add a model that can boost pre-trading-cost alpha by 2.75% for core strategies and 5.50% for MN strategies, and if trading costs actually go down in the process, the consequence for our alpha can be significant.