Portfolio123 Virtual Strategy Design Class
By Marc Gerstein

Supplement 4 – Cost of Capital; (4) Thinking Outside the Box

In the first three parts of this WACC series, we saw how we could calculate a viable cost of capital. The method wasn't simple or elegant. But in this area, and many others, simplicity and elegance bring heartache; in the form of truly bizarre WACC computations you wouldn't dream of using in the real world – assuming you were aware of them; i.e., as would be the case if they weren't buried in the guts of the model.

The approaches I offered, and others I've seen, have an important element in common. They focus on the marketplace, on stock returns. And why not: the approach has a Nobel Prize winning pedigree. But data on stock returns is simply a record of what's been done. What if the stock was or is mis-priced? Is that possible? That's certainly a great area for debate, but on portfolio123, there should be no debate. Mis-pricing is what gives us the opportunity to earn market-beating returns and generate alpha.

So if you believe in the potential for stocks to be mis-priced by the market, as you likely do given that you're here, then why should you have any confidence in a cost of capital the calculation of which is driven by stock-market returns? Bear in mind the gurus who created these approaches did not believe in mis-pricings. They presumed that stocks were all correctly priced based on the parameters they used (the risk-free rate, the equity-market risk premium, and beta). So if you're on portfolio123 and reject the idea of market efficiency – i.e., if you believe you can profit from stock mis-pricing – you should reject the entire body of conventional wisdom regarding cost of capital and one of its important elements, risk. That means Beta. That means Standard Deviation. That means Sharpe. And that means Sortino. (All are naïve statistical report card that record what happed in a chosen period of time.

Use Company Factors, Not Market Data

So what can you use to measure company risk and cost of capital? Answer: Do exactly what a casual observer well-armed with common sense who thinks about risk probably thinks is being done – until he considers the topic carefully and realizes all he's been getting are statistical stock-market report cards. Work with company characteristics that make situations more or less risky. That means looking at the company, directly (at the fundamentals) and/or indirectly (through sentiment gauges).

Why Hasn't Such a Great Idea Already Been Discovered?

Actually, it has been. I wish I could take credit for inventing this approach, but I can't. In truth, it's been in use for a while now by sophisticated professional investors, thanks to boutique operations that have figured out that this was a better way to go.

The most prominent brand in this area may be Barra (actually, by now it's so well established, it may be wrong to classify it as a boutique) an outfit that is now part of MSCI. If you aren't an investment professional, you may not have heard of Barra or any other such firm. That's because none of them are interested in making a public splash. There were some discussions between some of the smaller shops, such as startups driven by Barra-envy, and some individual-investor web sites. But nothing really came of that. The web site decision-makers, many of whom came from journalism and knew little if anything about investing, could not grasp risk as something separate from return and that risk, viewed on its own, could not produce a clear-cut buy-sell decision. And the boutiques some of which did actually go up on the web for a time, figured out that advertising was not a great money-making opportunity for them. So those firms that are still around tend to disseminate their content among professionals who pay (and pay a heck of a lot).

Moreover, the clients who pay for risk content are very hostile to having even little bits of this stuff shared with the broader investment community. And there's a good reason for that. They believe these approaches work, that they help them in assessing risk and producing alpha. And they don't want to see their opportunities watered down by dissemination of the good stuff to the point that their trades get crowded.

And they are absolutely right. Some of my best hits over the years came from situations where I jumped into stocks widely scorned as being way too speculative, not because I chose to increase my tolerance for risk but because my analysis of the situation told me that in fact, risk was moderate at most and sometimes, even low. The reverse also happens; i.e., where there's much more risk than is recognized by those using conventional metrics. Risk is an area in which individual investors have been bombarded with a lot of well-intentioned teaching that quite frankly, stinks. If you can use Portfolio123 to get better at recognizing company risk, you can wind up very happy. So although the approach I'll present here will seem terribly clunky, that's where there's opportunity. Go where the Yahoo! Screener crowd, or even the FinViz, etc. crowds won't or can't go. Confronting cost of equity is a good way to jump in.

Ideas We Can Apply

There's good news. Barra et. al. may have intellectual property rights over their own work products, but the idea of using company factors to measure risk is fair game for everybody. We can use, as a starting point, a paper, "Toward an Implied cost of Capital" published by William R. Gebhardt, Charles M. C. Lee, Bhaskaran Swaminathan (Journal of Accounting Research, Vol. 39, no. 1, June 2001).

The authors start by identifying for each of a large sample of companies a discount rate that causes the value of a stock under a discounted-cash-flow-type model to come in equal to the actual stock-market price. (Note: Because the valuation model they used was based on a measure of cash flow that represented wealth available only to common shareholders, these discount rates were deemed costs of equity, as opposed to full blown cost of capital or WACC.)

The next part of the paper is where the really good stuff, from our vantage point, is. After computing their "market implied" costs of equity for the stocks in their universe, the authors studied the relationships between ex-ante (historical) firm characteristics and future market-implied risk premiums. They found strong correlations for seven factors:

1. Company Beta (in this context, historic Betas are functioning as a sentiment indicator had were shown to have been associated with higher future risk premiums)
2. Long-term Debt to the market value of equity (higher leverage was associated with higher future risk premiums)
3. Size (larger size was associated with lower future risk premiums)
4. The dispersion of analyst forecasts (lower dispersion was associated with higher future risk premiums)
5. The consensus long-term analyst growth forecast (higher forecasts were associated with higher future risk premiums)
6. Book-to-market ratios (academicians tend to think in terms of book-to-market rather than market or price-to-book, it's something one has to get used to if one studies this literature; anyway, higher BM ratios, indicating more modest valuations, were associated with higher future risk premiums)
7. Industry mean risk-premium for the prior year (higher historic premiums are associated with higher future risk premiums)

Gebhardt, Lee, and Swaminathan went on to run multi-factor regression models involving various combinations of these factors and found that only the last four remained significant in that context. Interestingly, Beta and Size, factors we might have expected to loom large, did not make the grade. Ultimately, they wound up with a regression in which historical factors 4, 5, 6 and 7 explained 58 percent of the variations in future market-implied costs of equity. (Recall that the eliminated factors – 1, 2 and 3 – Beta, Leverage and Size, did show good correlations with risk premium when viewed on their own. But it turned out that the combination of the other factors had more explanatory power.)

Let's consider the logic behind the factors used in the final regression.

- Dispersion of analyst forecasts: The fact that less dispersion – i.e., more agreement – was associated with greater risk seems like a bit of a puzzle. We might well have expected the opposite to be true. But on reflection, we could say that greater investment community conviction means investors are demanding more from the companies. That would lead to greater potential for adverse reaction if things go wrong. That, in turn, would justify higher risk premiums.
- Consensus long-term growth rate forecast: The association between higher expectations and greater risk has been documented often in academia. Higher levels of uncertainty attach to companies for which expectations are greatest (i.e. for which forecasts of long-term growth are highest) thus fitting right in with what we observed regarding concentration of forecasts – great expectations associated with greater consequences that flow from disappointment leading to investors demanding higher risk premiums.
- Book-to-market ratios: Sentiment toward stocks with lean valuations is generally negative, or at least less positive than is the case with others. Often, this stems from lackluster historical company performance. Whether or not this is wise, whether investors would be better off scooping up such stocks, is not an issue when we are considering cost

of capital. All we need to think about is the likelihood that the Street will demand higher premiums for capital supplied to companies regarding which they rightly or wrongly are bearish.

- Mean historic industry risk premium: We can intuitively grasp the notion that the capital markets regard certain kinds of businesses as being inherently riskier. But it's worth noting that this paint-with-a-broad brush tendency, while statistically significant in the study, was less so than the other factors.

Be aware that this study was published in 2001, and that it was based on data from 1979 through 1995. Can it still be relevant? This specific piece of research, sensible as it sounds, poses a challenge for us because it is not something that lends itself to replication using Portfolio123. But there are reasons to be encouraged: (i) I have had occasion to more closely adapt other research, some from these particular professors and others that worked in similar manners, and found impressive amounts of long-term out-of-sample relevance even notwithstanding some important structural changes in the market since the sampling periods. There is something to be said for the timelessness of good sound ideas. (ii) By associating risk premium with company factors, Gebhardt, Lee, and Swaminathan aren't inventing the wheel. As noted, this is a general direction being taken even now by high-end research boutiques and their institutional clients. So the idea that the Gebhardt, Lee, and Swaminathan would have long-term legs is not something that should shock us. (iii) Finally, I have been able to stand on my head, so to speak, and find a way to create something on Portfolio123 that, while not actually following the Gebhardt, Lee, and Swaminathan approach dose at least take inspiration from them and which, by the way, produced satisfying results.

I'll share my spit-and-chewing gum Gebhardt, Lee, and Swaminathan inspired model. It's not necessarily the be-all and end-all when it comes to risk premium and cost of equity. But I believe it's a gigantic leap in the right direction and that you can use it as a template for your own creative efforts.

Experimenting With a Nouvelle Portfolio123 Approach to Cost of Equity

As noted, the Gebhardt, Lee, and Swaminathan (GLS) regression does not lend itself to use on Portfolio123. But I am going to borrow the ideas they use and adapt them to what Portfolio123 does have: screening (or buy/sell rules) and ranking.

You may have caught that indirect measures of company fundamentals, sentiment gauges, are being used here. That's fine. I like use of indirect factors. They can often capture qualitative considerations we'd be otherwise unable to tap into. But we don't have to lock in for all time on the specific GLS factors. It's most convenient to use them now, for this template. But if you want to explore this topic on your own, as I hope folks will do, you can certainly experiment with direct and/or indirect factors or formulas.

The way I set this up, I'm using the GLS factors for a ranking system. This is not intended to be a ranking system that would be used to pick the top 15 stocks, top 25 stocks, etc. for a portfolio. Instead, it's intended to be accessed as part of a screen using the Rating() function and then combined with other rules (making liberal use of ShowVar programing) to wind up with an item called @CostEq whch you can combine with costs of debt, cost of preferred and weights to compute WACC in them manner we've seen before.

Build a "GLS Cost of Equity" Ranking System

As noted, for purposes of this template, we're going to adapt not literally but as best we can the factors that were significant in the GLS regression. For ranking-system weights, we're going to select levels that give each factor a level of importance similar to what it had in the GLS model. When you pursue your own approach, feel free to experiment with your own weights.

Here's the main challenge, and source of complexity, in doing this:

> Our goal is to have higher rank scores signify higher risk premiums. That will make it much easier later for us to visualize and work with this. But by default, Portfolio123 assigns low factor scores to firms for which a particular data item is NA. That setting could, of course, be changed to result in a neutral score for NAs. But what we really prefer is to assign a high score in order to increase the risk premium for companies that have NAs for necessary data. So what we'll do is build a reverse ranking system sorting the factors such that the riskiest factors (including those for which key data is absent) are assigned the lowest scores. Then . . . in the screen, rather than using the rank scores directly, we'll use 100 minus the score. (Hence a high risk company with a score of 12 in our reverse ranking system will be evaluated in the screen with an adjusted score of 88.) Remember, this rigmarole is done only once. After that, it's all save-as or copy-and-paste!

So here are the factors and weights for the reverse ranking system:

> Rank factor: ZScore("LTGrthMean"), weight 28%, sort lower is better
>
> Rank factor: Estimates Dispersion, defined as ZScore("ln(abs(CurFYEPSStdDev)/abs(CurFYEPSMean))"), weight 11%, sort higher is better
>
> Rank factor: ZScore("ln(Pr2BookQ)"), weight 55%, sort higher is better
>
> Rank factor: Zscore("BetaInd"), weight 6%, sort lower is better

Again, don't sweat the factors or weights right now. Nail down the template (including the screen, to be presented below). Once you've got it, you can use any set of factors/weights that seems sensible to you as measures of company risk (debt, deficits, earnings quality, deteriorating trends in ROE, liquidity, short interest . . . . whatever you want to work with).

Creating the Screen

Here's the logic for cost of equity:

- First, decide on an acceptable range for cost of equity. For purposes of this template, Consistent with assumptions used in other WACC formulations I presented, I'll set the minimum at the risk-free rate plus 3.5 (which is an assumed minimum beta of .70 multiplied by a five percent equity risk premium). I'll set the maximum the risk-free rate plus 15 (which is an assumed maximum beta of 3.00 multiplied by a five percent equity risk premium).

- Next define range as maximum minus minimum

- The, define a multiplier as 100 minus the cost of capital rank as computed per the "GLS Cost of Equity" ranking system described above, and then divide the product by 100 to put it into suitable decimal form. So if a high-risk company has a rank score of 12, the multiplier will wind up as 0.88; based on 88 (which is 100-12) divided by 100.

- Finally, we'll compute Cost of Equity as: Minimum plus the product of range times the multiplier: CostEq = Min + (range * multiplier).

Once we have our factor-based cost of common equity, we can combine it with cost of debt and cost of preferred equity, and the respective weights of each capital component, to calculate WACC.

Here are the cost-of-equity screening rules:

- ShowVar(@CEmin,close(0,#tnx)/10+(5*.7))
    - *This defines the minimum acceptable cost of equity, which we'll name CEmin*
- ShowVar(@CEmax,close(0,#tnx)/10+(5*3))
    - *This defines the maximum acceptable cost of equity, which we'll name CEmax*
- ShowVar(@multiplier,(100-rating("GLS Discount Rate"))/100)
    - *This rule articulates the multiplier, which is described above; we' name it @multiplier*
- ShowVar(@range,@CEmax-@CEmin)
    - *Now, we define range, named @range in the screen*
- ShowVar(@CostEq,Eval(EqTotQ<=0,@CEmax,@CEmin+(@range*@multiplier)))
    - *Here it is, our factor-based cost of equity, @CostEq, which is @CEmin+(@range*@multiplier)*

  - *Notice that the main computation is nested inside an EVAL (if-then) function. What I actually did here was start by testing to see if the company reports a deficit or zero common equity figure. If so, I automatically assign the maximum cost of equity. I compute a factor-based cost of equity only if the common equity figure is positive.*

Voila – That's the Template

For reference, I provide an Appendix below with a full-out WACC computation with cost of debt (and by implication preferred) established using boundaries to protect against overly crazy numbers and the factor-based cost of equity. Between this, and the simplified approach provided in Part 3, you can now go forward calculating things that require cost of equity or cost of capital. And possibly of greater importance, you have some templates you can use as a springboard for creating something completely new on your own.

Going forward with future Fundamental Ideas postings, on occasions when I need a cost of equity or a WACC, I'll most likely use the simplified approach from Part 3. As to other topics, stay tuned . . . .

Appendix

- // Establish Cost of Debt
- ShowVar(@Int,ISNA(IntExpTTM*.65,0))
- ShowVar(@Dbt,ISNA((DbtTot(0,qtr)+DbtTot(1,qtr)+DbtTot(2,qtr)+DbtTot(3,qtr)+DbtTot(4,qtr))/5,0))
- ShowVar(@DbtCost,ISNA((@Int/@Dbt)*100,0))
- ShowVar (@DbtCost1,Eval(@DbtCost>((close(0,#tnx)/10)+10),(close(,0,#tnx)/10)+10,@DbtCost))
- ShowVar(@DbtCost2,Eval(@DbtCost1<((close(0,#tnx)/10)+3),(close(,0,#tnx)/10)+3,@DbtCost1))
- ShowVar(@DbtCost3,Eval(@Int=0 and @Dbt!=0,((close(0,#tnx)/10)+3),@DbtCost2))
- // Establish Cost of Preferred Equiyy
- ShowVar(@PfdCost,@DbtCost3+1)
- // Establish Cost of Common Equity

- ShowVar(@CEmin,close(0,#tnx)/10+(5*.7))
- ShowVar(@CEmax,close(0,#tnx)/10+(5*3))
- ShowVar(@multiplier,(100-rating("GLS Discount Rate"))/100)
- ShowVar(@range,@CEMax-@CEmin)
- ShowVar(@CostEq,Eval(EqTotQ<0,@CEmax,@CEmin+(@range*@multiplier)))
- // Compute Capital
- ShowVar(@Capital, DbtTot(0,qtr)+ PfdEquity(0,qtr) + ComEq(0,qtr))
- // Compute Capital-Structure Weights
- ShowVar(@DbtWt,DbtTot(0,qtr)/@Capital)
- ShowVar(@PfdWt,PfdEquity(0,qtr)/@Capital)
- ShowVar(@EqWt,ComEq(0,qtr)/@Capital)
- // Finish by computing Cost of Capital (WACC)
- ShowVar(@CostCap,(@DbtWt*@DbtCost3)+(@PfdWt*@PfdCost)+(@EqWt*@CostEq))