*InvestorLit Review* **2011(1)**

# "Equity Duration and the "Franchise Factor" Model

**Extensive work by Martin Leibowitz and his collaborators, using concepts from "The Franchise Model", explain equity duration – an often misunderstood and important topic in both financial analysis and portfolio management.**

## Introduction

This review is about equity duration using the innovative concepts of Martin Leibowitz and Stanley Kogelman (2004) in their book "Franchise Value", plus the research of Leibowitz and many other collaborators over some thirty years. It may seem like an esoteric topic to pick for *InvestorLit Review* 2011(1), but it was selected for several reasons which hopefully characterize *InvestorLit*. It reviews relevant research literature on this topic (in both in fixed income and equities), the topic is important in financial analysis and portfolio management, the review provides insight (correcting a widely held misunderstanding), and it provides a review of literature which one might not otherwise encounter in their day-to-day reading.

Fixed income duration - which assumes constant rates - is readily calculable and is widely used as a measure of bond risk. Equity duration, however, while equally desirable as a measure of risk, is far more complicated – depending on non-constant interest rates plus a wide range of other factors. Modelling the quite different nature of equity duration is a major contribution of Martin Leibowitz and colleagues, and I believe theirs is the leading research in this field.

In this paper we:
1/ Review the traditional definitions of bond duration,
2/ Outline the paradox of the dividend discount model,
3/ Discuss the resolution of this paradox,
4/ Discuss several important aspects of the Franchise Factor model, and
5/ Illustrate equity duration with two stocks - one value and one growth.

Finally, we suggest some implications of equity duration for value vs. growth styles – a topic which I briefly discussed with Martin Leibowitz and one which he thinks is a useful area for future research.

## Bond Duration – Macaulay and Modified

"Macaulay duration" is credited to Canadian economist Frederick Macaulay (1938), whose work was a result of searching for a better measure of "longness" than simply term to maturity. For example, a zero coupon bond and a jumbo coupon bond with the same term have quite different cash flow patterns, reliance on reinvestment rates, and sensitivity to interest rates.

Macaulay duration is defined as:

*The weighted average time to receipt of all payments, where the weights are the present values of the payments*.[1]

"Modified duration" was conceived by a number of economists (think elasticity) shortly thereafter, initially Hicks (1939), and later more fully developed by Fisher and Weill (1971) as a measure of price sensitivity to interest rates.

Modified duration is defined as:

*The percent change in price for a given change in yield.*[2]

Although they look and sound quite different, Modified and Macaulay duration are mathematically identical - with the addition of a factor converting payment frequency from continuous to periodic. Modified duration is much more commonly used though, no doubt because it represents a bond's sensitivity to interest rate changes, i.e., a bond's risk, while Macaulay duration represents a measure of term.

We review the definitions of bond duration in order to provide some background and context for the discussion of equity duration, since the two have similarities and are often compared. The greatest difference in bond and equity durations (and the cause of some confusion) is that the cash flow patterns of equities are highly uncertain, whereas the cash flow patterns of bonds are taken as certain, assuming non-default.

Perhaps worth noting in this discussion are some characteristics of bond duration: Firstly, the longest bonds have durations of about 13 years currently. I say currently because duration varies inversely with interest rates (i.e., convexity) and today's durations are the longest they have been since the early 1950's[3]. While term adds to duration, duration levels out as term lengthens, and a 40 year bond has only slightly longer duration than a 30 year bond. Secondly, the duration of a perpetual bond is the inverse of its yield.

---

[1] Developed as a measure of time to receipt of payments, Macaulay duration can be viewed as a fulcrum with a balance point. Spaced along the beam by time to receipt, are all the payments (regularly spaced coupons plus principle at the end), with each weighted by its present value. Thinking about it this way, one can see that a zero coupon has the same duration as it's term – a relevant concept in considering equity duration.

[2] Modified duration can be thought of as the slope of a bond's price-yield curve (price on y axis, yield on x axis). This curve slopes from upper left to lower right, reflecting the inverse relation between a bond's price and yield. The slope has a slight bulge towards the origin, reflecting the fact that the slope changes (also inversely) with changes in interest rates (this is convexity). The slope of the curve at any point is Dp/Dy, and (Dp/Dy)/P is the percent change in P for a given change in Y – which is modified duration.

Having now contemplated duration as a fulcrum and then duration as the slope of a curve, readers might ask how can that be? The explanation is not that bad, though: both Macaulay duration and Modified duration involve the sum of all payments discounted by their present values. Hopewell and Kaufman (1973) explain this very eloquently.

[3] Convexity is an important topic not just for assets but also for liabilities – a future *InvestorLit* may include a review entitled something like "Pension Liabilities Have Convexity Too."

A perpetual bond yielding 4% has duration of 25, while one yielding 2% has duration of 50 years – both quite long compared to regular bonds.

Finally, coupons have durations equal to their term – which can be as long as the term of the host bond, i.e., up to 40 years or more. Perhaps it goes without saying, but a coupon that represents a single payment in the future, has a much longer duration than a regular bond precisely because it has no interim payments which shorten duration significantly. As per zero/jumbo example: the larger the coupon - the shorter the duration.

**The Paradox of the Dividend Discount Model (DDM)**

"Equity duration", like modified duration, is the price sensitivity of a stock to interest rates (or alternatively, discount rates). If one *Googles* "equity duration", one will find much written on this topic, but you may also notice the first reference listed is to a 1989 paper by Martin Leibowitz, Eric Sorensen, Robert Arnott, and Nicholas Hanson – this is, in my opinion, the lead article to all the excellent research written on this topic, lead by Martin Leibowitz with various collaborators over many years. A 1993 paper by Martin Leibowitz and Stanley Kogelman entitled "Resolving the Equity Duration Paradox" and the book by these two - "Franchise Value" - give one an excellent framework for the topic equity duration.

The Leibowitz and Kogelman 1993 paper, "Resolving the Equity Duration Paradox" notes that early attempts to measure stock sensitivity to discount rates using the DDM lead to very long durations - of 20 up to 50 years. Empirical measures of equity duration have found, however, to be actually much shorter - in the order of two to six years. This paradox persists today as some sources continue to publish estimates of these longer equity durations. These long DDM durations are unusual: as previously noted, long bonds are at most 13 years in duration, and one has to look to zero-coupons or perpetual bonds to get durations as long as 20+ years. A stock's price according to the DDM (also known as the Gordon model (1962)) is :

*Price = Current Dividend/ (Discount Rate – Dividend Growth Rate) or P=D/ (k-g).*

The assumptions of perpetual and constant growth in dividends is precisely the reason for such long duration. The DDM model is a perpetual stream of dividends, whose duration, for a dividend of 1, is the inverse of (k-g). The key insight into resolving the paradox of the DDM was Leibowitz' and Kogelman's 1993 paper which pointed out that the DDM assumptions of constant dividend growth rate and constant discount rate are in reality quite variable. They are affected by factors which the authors set forth in their book "Franchise Value", in particular the Franchise Factor model- discussed below.

**Resolution of the Paradox – the Franchise Factor (FF) Model**

The FF model separates the earnings from <u>current business operations</u> and <u>future business operations</u>, called respectively: tangible value (TV) and franchise value (FV). The price of the firm is the sum:

*Price = TV + FF*[4].

[4] The proportion of TV and FV vary, depending on the business.

The reason for separating TV and FV is that they respond quite differently to inflation.

TV is reasonable to estimate, is somewhat "bond-like" in nature, and as it is simply the present value of future earnings from current business.

FV is quite a bit more complex to estimate. According to the FF model, FV is a function of:

- Profitability of new investments: their excess of return over the firm's cost of capital (this variable impacts the firm`s PE ratio, as more profitable investments increase the PE ratio),
- Growth of new investments: the magnitude or dollar value of all new investments, over today's book value,
- Present earnings base: the same annual earnings used in TV (these can be used along with funding at the cost of capital) to finance new business.

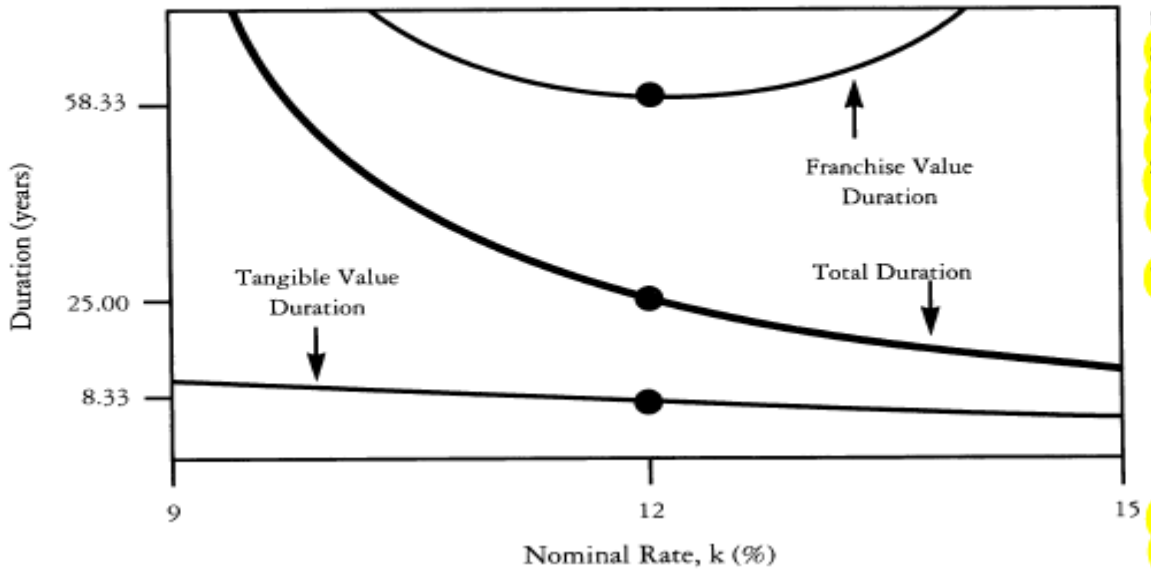
TV`s duration is a fairly low number, such as 6- 10 years, reflecting moderate sensitivity to interest rates. TV duration when plotted against interest rates has a fairly flat, slightly negative sloped curve, reflecting TV duration's decline with increasing interest rates.

FV`s duration is quite high though. Since the long-term nature of earnings is highly sensitive to the discount rate, the FV produces much greater durations than the TV duration, and can be 30+ years.

The total duration (weighted by the relative sizes of TV and FV is therefore a more moderate number than that produced by the DDM. It is typically in the range of long bonds and fits much more closely with what empirical observations of equity duration.

The following is reproduced from the 1993 paper and illustrates TV, FV, and Total duration:

**Figure D** Tangible Value, Franchise Value and DDM Duration vs. the Nominal Discount Rate



In summary, the FF model explains equity duration using the price of the stock`s sensitivity to two separate components – current businesses and future businesses. The current businesses assets (TV) have moderate, bond-like duration, while the future business assets (FV) have very long perpetual-like duration. The sum of these two, according to the FF model is a long-bond-like equity duration, more consistent with empirical evidence. The DDM is a special case of the FF model, which assumes current and future business have the same constant and perpetual dividend growth.

**Important Aspects of the FF Model**

We would like to briefly comment on several of the most important aspects of the FF model:

1/ The differing effects of real vs. inflation - induced changes in nominal rates,
2/ The ability of firms to "flow-through" inflation into earnings and dividends, and
3/ The impact on P/E multiples of the profitability of future earning power.

1/ Whether nominal rate changes are due to changes in real rates or inflation rates affects stock prices differently[5]. Inflation induced changes in nominal rates can flow-through into higher earnings and, at high flow through rates, have very little effect on stock price. Real rate induced inflation is different – it tends to raise costs, slow growth, and have a negative effect on earnings growth.

The 1989 paper "A Total Differential Approach..." is so named it uses a partial differential equation approach to model the affect of both real and inflation induced changes on nominal rates.

2/ "Flow-through" is the firm's ability to grow earnings and dividends with inflation.[6] A high flow-through rate produces lower duration for both TV and FV businesses, as interest rate increases due to inflation have less impact if the firm's earnings rise with inflation. However, because FV businesses start with very high duration, the effect of flow-through on FV duration can be quite significant. As discussed, TV durations are similar to bond durations (e.g., 6-10 years), while FV durations are similar to DDM durations (e.g., 20- 50 years). Higher flow-through rates shortens duration and can reduce duration to zero at 100% flow-through. Because FV durations are quite high to begin with, the impact of high flow-through in FV businesses can dramatically shorten FV duration and hence the FF model's duration. While the flow through rate is hard to forecast, nonetheless, as a component of the FF model, it makes sense. A firm should strive to invest in areas where it has pricing power and inflation translates into growth in earnings and dividends. Overall, the flow-through rate concept provides an additional argument why empirical durations are lower than DDM durations. It is worth noting the TV and FV businesses can and usually do have different flow-through rates. We discussed this with Marty Leibowitz and he points: "The TV is largely based on existing investments where the product pricing and cost structure may be pretty sticky and not very responsive to new inflation regimes. In contrast, the FV represents new investment opportunities that are elective and would presumably be shaped to reflect both the accumulated inflation as well as the future inflation prospects."

[5] This is discussed in the 1989 paper by Martin Leibowitz, Eric Sorensen, Robert Arnott, and Nicholas Hanson.
[6] This is discussed in the 1993 paper by Martin Leibowitz and Stanley Kogelman.

3/ The impact of the profitability of future earning power on P/E multiples has various facets.[7] Low growth firms tend to have low P/Es, while high growth firms have high P/Es, enhanced by new projects with sustainable above-market returns. The P/E impact depends on the size of the investment, the duration of the payouts, and the degree of leverage employed.

**Examples of TV and FV Businesses and Implications of the FF Model for Style**

We have chosen two stocks to illustrate the FF model and attempt to make some comments on the implications for style – i.e., growth and value.[8]

A classic value stock - WD40 - hopefully illustrates a TV business (tangible value, the value of current business operations). WD40 is product name is also the firm's name. It is, of course, the well-known household lubricant in the bright blue can, capable of doing everything from unfreezing sticky screws and removing rust, to dissolving whatever needs dissolving. Apparently it is used more often that dental floss.

WD40 occupies a prominent chapter titled *A Wonderful Little Franchise* - in the book "Value Investing Today" by Bruce Greenwald, Judd Kahn, Paul Sonkins, and Michael van Biema. WD40 came to mind because it represents a company with 100% TV and conversely 0% FV – i.e., it`s asset price has unusually low equity duration. The company's characteristics include: 1/ very low growth in sales, earnings, and dividends, and 2/ very high ROE, margins, dividend payout, and dividend yield. It spends most of net income on advertising and protecting it good name to consumers and has such a good name, that competitors (like Dow, DuPont, and Exxon) have basically given up on trying to replicate its success. From a value investor's point of view, WD40 is a favourite: it is straightforward to analyse, provides a very attractive margin of safety if bought cheaply enough, and does depend on unknown and/or unpredictable future business plans.

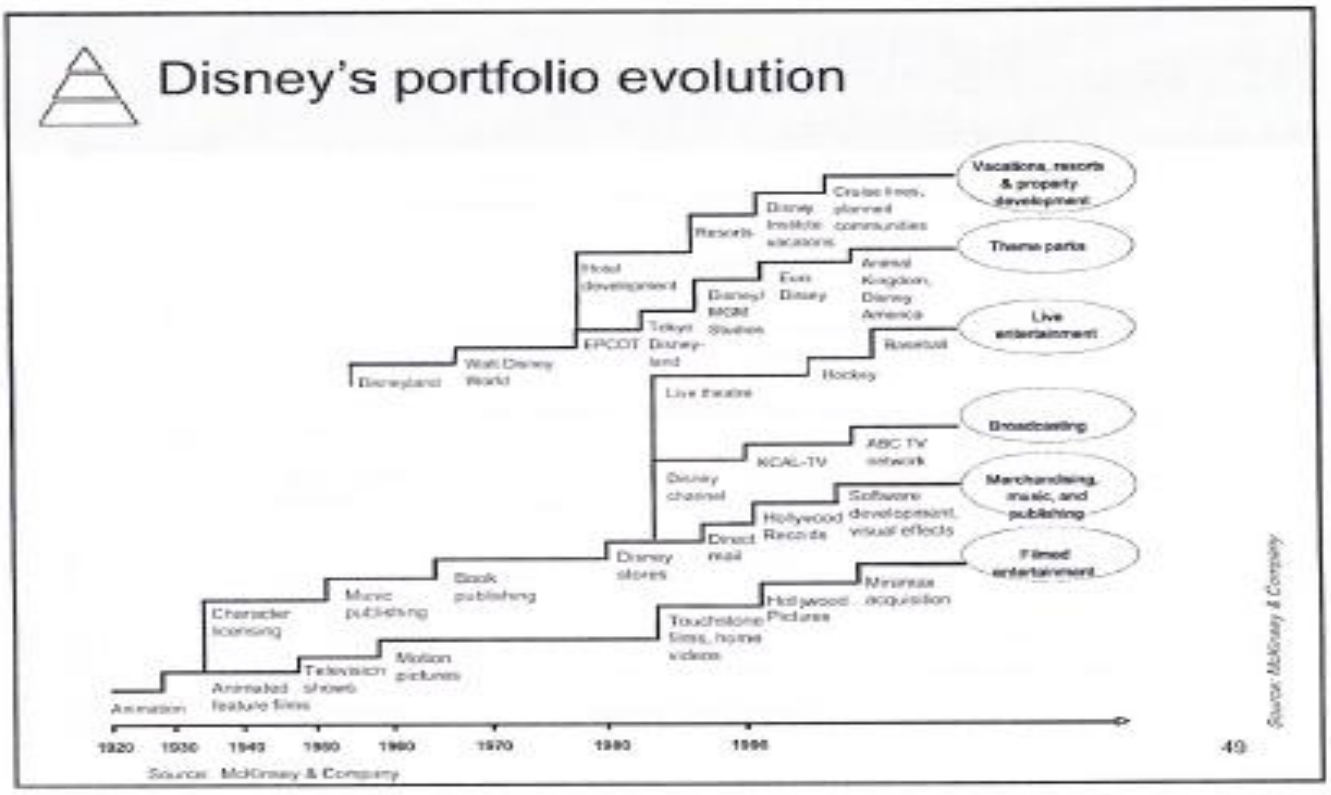
In terms of the FF model's implications for style, I suspect that value investors are more prone to favour stocks with high TV. Indeed, it is hard to fathom a growth investor liking WD40. Typically value investors like: margin of safety (a discount in the order of 40% to intrinsic value), low Price/Book, low P/Es, and high dividend yields. The dot com stocks of 2000-2002 were exactly what value investors did not like. They also are wary of making forecasts. Warren Buffet apologized to his shareholders when he took a view on the US$, saying it was most unlike him to forecast the US$`s weakness. Value investors simply are much more comfortable relying on tangible and known earnings and asset values.

Walt Disney hopefully illustrates an FV business (franchise value or future growth of business operations). While WD40 is definitely a value stock, Disney appears to be a growth stock, although I have been told by analysts that it could be either growth or value, depending on its price.

[7] This is discussed in the 2004 book, "Franchise Value" by Martin Leibowitz and Stanley Kogelman.

[8] I am a value investor. As new equity analysts at Confederation Life many years ago, seated at our grey steel desk (what else do value investors sit at?) we were handed Benjamin Graham's "Security Analysis", which quickly became the Bible for our work. Notwithstanding my roots, in this paper, I have tried to be open-minded to the concepts discussed herein – as the authors of the FF model certainly have. They actually say little about style and are very careful not to draw conclusions without empirical evidence. I discussed this with martin Leibowitz and he suggested this would be a worthwhile area for future research.

I ran across Disney in a case study on growth dynamics, capabilities and competencies and it seems to exemplify the key variables of the FV model. The following table shows Disney's evolving businesses from inception.




Walt Disney has grown from animation in the 1920s, theme parks in the 1950s, broadcasting in the 1980s, and cruise lines in the 1990s, to business model consulting today. Disney, of course, has at any point in time a TV component, but its FV component has continuously evloved over its entire 90 year history and I would think in retrospect it is much larger than its TV component. The growth of Disney's FV business raises the question: how does an analyst predict the course of future business. To be fair, the FF model never assumes that the variables - Profitability and Growth - are predictable. It simply says they are the appropriate variables to model in order to price of the FV component of the business.

Whatever the implications are for value and growth style, they probably relate to TV vs. FV. Disney's operations have evolved enormously over its history. Disney is the opposite of a TV company such as WD40. Even Disney's TV component has never been a constant in its entire history. The three key factors: 1/ real vs. inflation cause of nominal rate increases, 2/ flow-through rate, and 3/ the profitability of future business, all affect TV and FV quite differently. Overall, though I cannot help but suspect that TV dominated companies tend to be more value-like and FV dominated companies tend to be more growth-like.

**Conclusions**

The Franchise Factor model resolves the DDM paradox – that being, the DDM suggests much higher durations than are empirically observed.

The FF model makes sense as it separates current (tangible value) businesses and future (franchise value) business, whose asset prices are functions of quite different variables. The two types of businesses have quite different durations: current business produces fairly low duration, and future business fairly high. Their proportions in making up the total asset value of the firm, combined with their respective durations, provide a credible model to explain equity duration.

Our brief observations of two firms – one largely current business, and one largely future business – suggest that there are relationships between equity duration and style, although they are clearer for TV stocks than FV stocks. Value stocks generally appear to have TV assets. They may have less pricing flexibility, in relation to inflation and therefore have lower flow through and hence lower equity duration. Growth stocks, on the other hand can have a range equity durations, from very long to even shorter than TV duration, depending on their flow-through rate. We suggest these only tentatively and would fully agree with Martin Leibowitz, who indicated in correspondence this is a worthwhile area for further research.

**References**


Fisher, L. and R. L. Weil. 1971. "Coping with the Risk of Interest Rate Fluctuations: Returns to Bondholders from Naive and Optimal Strategies". *Journal of Business*, (October).

Gordon, M. 1962. "The Investment Financing and Valuation of the Corporation". Richard D. Irwin.

Greenwald, B., Kahn, J., Sonkin, P.D., and van Biema, M. 2001. "Value Investing: From Graham to Buffet and Beyond", Wiley Finance.

Hicks, J. (1939). "Value and Capital". Clarendon Press.

Hopewell, M. and Kaufman, G. (1973), "Bond Price Volatility and Term to Maturity: A Generalized Respecification", *American Economic Review*.

Leibowitz, M.L., Sorensen, E.H., Arnott, R.D., and Hanson, H.N. (1989) "A Total Differential Approach to Equity Duration". *Financial Analysts Journal*.

Leibowitz, M.L., Kogelman, S. 2004. ``Franchise Value: A Modern Approach to Securities Analysis``. John Wiley & Sons, Inc.

Macaulay, F. (1938), "The Movements of Interest Rates. Bond Yields and Stock Prices in the United States since 1856", National Bureau of Economic Research.