

JPMorgan Fleming Asset Management

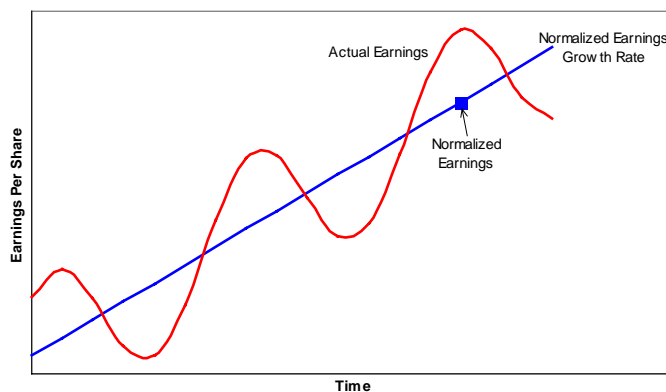
The Dividend Discount Model

The processes, tools, and algorithms described in this paper are a general representation of the process as it exists on January 30, 2003, and only on this date. We would expect the tools and algorithms to evolve going forward as they have, successfully, in the past. The tools and algorithms used in the future to achieve our investment goals may differ, perhaps substantially, from those used today and described in this paper. JPMorgan Fleming Asset Management makes no representation that these processes will continue as described, and the reader should not rely on JPMorgan Fleming to advise them should any of these procedures change in the future.

While we have taken considerable care to accurately represent the process here, we recognize that there may be errors or omissions in this paper for which the reader holds JPMorgan Fleming Asset Management harmless.

The Dividend Discount Model

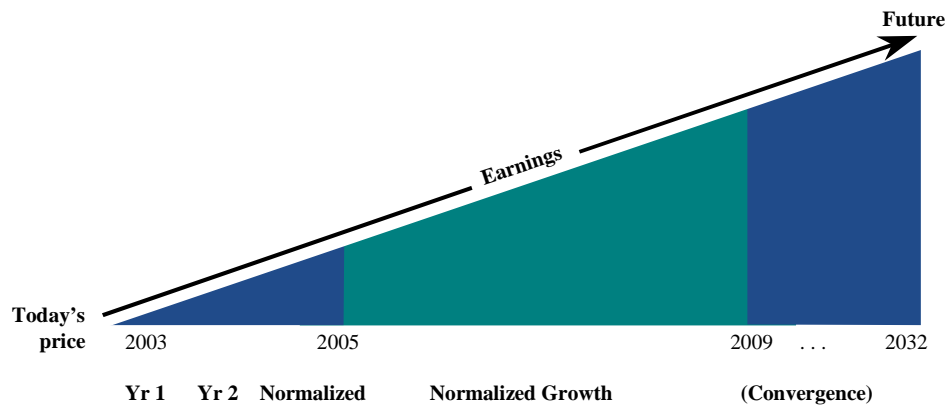
The **Dividend Discount Model**, our fundamental valuation model, incorporates both the current price of a stock and our analysts' estimates to derive each stock's Dividend Discount Rate (DDR) – a measure of its internal rate of return. To ensure that we do not value companies based on peak or trough earnings, our analysts focus on intermediate-term “normalized” estimates, reflecting each company's sustainable level of earnings.



The following illustration is a depiction of this philosophy. While this process is not necessarily unique, it is our analysts' earnings, cash flow and dividend forecasts that represent the key differences between our valuation and those calculated by other investors in the marketplace.

Each analyst constructs detailed models of each company, from which four numbers are distilled: Spot estimates for earnings in years one and two, a normalized (mid-cycle, placed at year 3) earnings number, and a normalized (years 3-8) growth rate. It is the normalized earnings estimate and normalized growth number which has the greatest impact on the DDR. We focus our attention on the normalized period (years 3-8) for two reasons. First, we approach company valuation as if we were literally buying the company, and sustainable earnings are best suited for this purpose. Second, since most analysts, especially the sell-side, are focused on the short term

outlook, we can achieve a greater competitive advantage in focusing on the intermediate period.



Plus/
Minus

Year One

Normalized
Earnings

Normalized
Growth

FIN. YEAR	EPS	EPS RATE	DPS	DPS RATE	PAYOUT	BOOK ADD	BOOK	ROE
2003	2.00	0.00	0.00	0.00	0.00	0.00	15.00	15.00
2004	1.75	-15.00	0.00	0.00	0.00	0.00	15.30	11.85
2005	1.68	-5.88	0.00	0.00	0.00	0.00	16.80	10.00
2006	1.68	0.00	0.90	0.00	58.25	0.00	17.50	9.33
2007	1.68	0.00	0.95	0.00	58.46	0.00	18.15	9.15
2008	1.68	0.00	1.01	0.00	58.75	0.00	18.53	9.00
2009	1.73	0.00	1.07	0.00	63.13	0.00	19.46	8.87
2010	1.73	0.00	1.14	0.00	65.81	0.00	20.05	8.77
2011	1.77	0.00	1.20	0.00	68.38	0.00	20.62	8.69
2012	1.83	3.35	1.22	1.16	68.80	0.00	21.23	8.74
2013	1.90	3.83	1.24	1.43	66.19	0.00	21.89	8.79
2014	1.97	3.71	1.26	1.68	63.91	0.00	22.40	8.94
2015	2.04	3.78	1.28	1.92	62.76	0.00	23.36	8.88
2016	2.12	3.85	1.31	2.14	61.73	0.00	24.17	8.92
2017	2.20	3.91	1.34	2.34	60.80	0.00	25.03	8.95
2018	2.29	3.95	1.37	2.53	59.96	0.00	25.95	8.98
2019	2.38	4.01	1.41	2.71	59.20	0.00	26.92	9.01
2020	2.48	4.05	1.45	2.87	58.53	0.00	27.95	9.03
2021	2.58	4.10	1.49	3.00	57.82	0.00	29.03	9.05
2022	2.68	4.18	1.54	3.15	57.37	0.00	30.18	9.07
2023	2.80	4.17	1.59	3.28	56.87	0.00	31.38	9.09
2024	2.92	4.21	1.65	3.39	56.43	0.00	32.66	9.11
2025	3.04	4.24	1.70	3.49	56.05	0.00	33.99	9.13

Model Detail: The JPMFAM Dividend Discount Model

JPMFAM uses three variants of the DDR calculation for different methods of portfolio construction across the firm's portfolios.

The "Raw" DDR is the purest measure of the process, it is process outlined above, taking into account only the analyst earnings and earnings growth assumptions, terminal growth (year 30) rate and ROE assumptions (implying a terminal dividend payout rate).

The "Active" DDR is the Raw DDR plus the numerical expression of a subjective adjustment called the "+/-" made to stocks by the analyst.

The "Structured DDR" is the Active DDR plus a calculated adjustment derived from consensus earnings revision data for each stock.

JPMFAM's active processes use the Raw and Active DDRs in their process, while the Structured Equity portfolio optimization process uses Structured DDRs.

Raw DDR

The dividend discount rate is the internal rate of return that equates a stock's price to a forecasted stream of future dividend payments. JPMFAM dividend forecasts, and the earnings forecasts on which they are based, are the key difference between JPMFAM dividend discount rates and those calculated by other asset managers.

In JPMFAM's dividend discount models, the estimates of earnings and dividends for the current fiscal year and the next year are "point estimates" -- i.e., the analyst's best estimates of each company's actual earnings and dividends, given expected economic, industry, and company conditions at each point in time. Starting in the third year, however, JPMFAM's dividend discount models rely on "normalized" rather than point estimates of earnings and dividends. As illustrated in the chart on the next page, these normalized estimates reflect the underlying trend in each company's earnings and dividends, and keep us from valuing companies based on peak or trough earnings. In most cases, the normalized forecasts are expressed as an initial (third-year) figure, followed by a growth rate applicable to the next five years.

The Terminal Convergence process for most sectors

After the end of the normalized forecast period, a company's earnings and dividend payout rate are projected based on the assumption that its ROE and payout ratio will converge over time to market-wide "terminal" ROE and payout values. This ROE convergence assumption is rooted in the belief that, over time, competition tends to erode differences in company profitability. Capital tends to be attracted to activities

that offer above-average returns, increasing competition and ultimately making those activities less profitable. Likewise, capital flows away from activities earnings below-average returns, lowering competition and eventually boosting profitability. Company financial policies, including payout ratios, are likely to converge as part of the same competitive process that pushes profitability toward the mean.

The model assumes that company ROEs and payout ratios converge to their terminal values by the 30th forecast year. This convergence point is necessarily arbitrary, but is intended to be far enough into the future for competitive forces to have had time to work. The model assumes that the gap separating the ROE and payout ratio from their respective terminal values narrows by 10% per year during the convergence period:

$$ROE_t = ROE_{t-1} + 0.1 \cdot (ROE_{Terminal} - ROE_{t-1})$$

$$Payout_t = Payout_{t-1} + 0.1 \cdot (Payout_{Terminal} - Payout_{t-1})$$

The terminal ROE is 7% plus the long-term inflation assumption. The terminal payout ratio is derived from the following relationship:

$$Terminal\ Payout = 1 - (Term\ Growth / (Term\ ROE * (1 + Term\ Growth/2)))$$

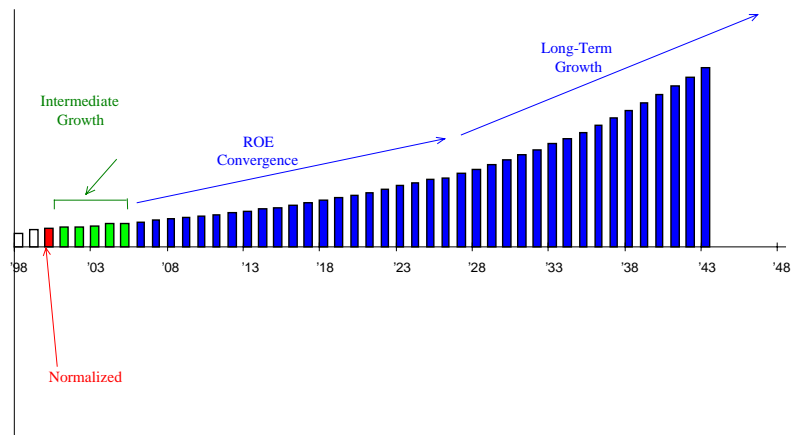
(Where the terminal growth rate is set to our macro forecast for long-term nominal GDP).

The reliance upon ROE in the convergence phase of the model makes a company's dividend discount rate sensitive to its book value. JPMFAM research analysts evaluate the reasonableness of the reported book values for the companies that they follow, and restate those values if necessary within the model to reflect companies' underlying earnings power.

Once the model reaches year 30, it becomes a constant growth model from that point forward. In such a model, earnings and dividends grow at a rate consistent with the terminal ROE and payout ratio:

$$g_{Terminal} = ROE_{Terminal} \cdot (1 - Payout_{Terminal})$$

The final term in the dividend discount model captures the present value as of the end of year 30 of all future dividends from year 31 to infinity. This term is based on the expression for the present value of a stream of dividends growing at a constant rate, g:



$$\frac{DPS_{30} \cdot (1 + g_{Terminal})}{(DDR - g_{Terminal})}$$

In Summary, the dividend discount model for the typical company contains the following inputs:

Years 1&2	EPS, DPS Point Estimates
Year 3	EPS, Normalized Estimates
Years 4-8	EPS, Normalized Growth Rate Estimates
Years 9-30	EPS, DPS calculated based on convergence of ROE and dividend payout to terminal values.
Years 31-∞	Dividend payments form year 31 to infinity expressed in present value terms as of end of year 30 based on formula from constant-growth model.

The DDR is that discount rate that equates a stock's current price to the present value of all future dividends, as reflected in the equation below. Appropriate adjustments are made in JPMFAM's calculations for whatever part of the current year's dividend has already been paid, and for the disparity (where one exists) between calendar years and company fiscal years.

$$P = \sum_{t=1}^{t=30} \left(\frac{DPS_t}{(1 + DDR)^t} \right) + \frac{DPS_{30} * (1 + g_{\text{terminal}})}{(DDR - g_{\text{terminal}}) * (1 + DDR)^{30}}$$

The Growth Convergence DDR

For a small number of sectors (currently four: Software, Systems Hardware, Network Technology, and Retail) we apply a slight variant to the traditional terminal convergence algorithm in computing the Raw DDR. We incorporate this difference because in these four sectors we have found that book value (which is the “E” in ROE) and earnings mean reversion are less reliable as constructs. As a result, DDRs that resulted from our traditional convergence process for these sectors were often less intuitive, and required the analysts to adjust their growth assumptions to produce meaningful rankings.

For these sectors we treat the first eight years of the model identically to other sectors, but for the convergence period from year 9 to year 30, rather than converge ROE to a terminal ROE, we explicitly converge the growth rate to the terminal growth rate used in determining the terminal payout rate above. This results in more intuitive rankings and more sensible earnings growth convergence paths for these four sectors.

Active DDR

As discussed at the outset of this section, we combine the “raw” DDR with an adjustment based on analysts’ subjective +/- ratings to derive the Active DDR.

Analysts may apply a plus or minus to any security they cover, but there is no requirement to use it. Analysts do not have to have a similar percentage of pluses and minuses, it is a discretionary signal. The +/- can be placed on a stock for three reasons: timing, confidence, and risk. The reason for the +/- is recorded in our DDR database when the analyst applies the adjustment to provide additional clarity for the portfolio managers. There is only one +/- for a stock, but it can result from one or more catalysts.

Timing: Analysts use a timing adjustment if they expect events in the short-term which might diverge from the normalized outlook. These can include upcoming earnings announcements, analyst meetings, a recent sell-off which they believe is overdone, etc.

Confidence: The +/- can be used for the analyst to quantitatively pound the table, either higher or lower, on a stock. This can relate to confidence in the earnings forecast, management, etc.

Risk: Different types of risk can be expressed with the +/- . A plus on GE, for example only, may reflect that it is lower risk equity than other names in its sector. A minus might be put on a stock that ranks very high in the first quartile because its possible return outcomes are bi-modal, either very good or very bad.

The size of the adjustment for a plus or minus varies by sector, as a function of the dispersion of DDRs in that sector. The greater the dispersion, the greater the adjustment amount. Sector dispersion is calculated as the average of the absolute value of the difference of each security's DDR from the sector median DDR. A multiplier is applied to the dispersion, resulting in the plus/minus adjustment for affected stocks in each sector, the multiplier is currently 1.5. The dispersion metric insures that the plus/minus adjustment does not have a larger impact on sectors with lower DDRs, or a smaller impact on sectors with higher DDRs.

Structured DDR

The Structured DDR adds an adjustment for consensus earnings revisions to the Active DDR in order to temper somewhat the natural tendency of our process to produce portfolios with an exposure to momentum which is slightly more negative than the overall market. The adjustment serves primarily as a risk control tool, though it has added value over time in backtests. There are four steps in computing the revision adjustment:

The adjustment, the "earnings estimate revision adjustment," is based on the daily six-month history of IBES/First Call consensus earnings revisions, with the more recent revisions gaining a higher weight than the more distant revisions. The next two sections will describe the Dividend Discount Model (DDM) and the Earnings Estimate Revision Adjustment in greater detail.

- 1) Compute the 125 trading day smoothed revision
- 2) Rank the smoothed revisions within sector

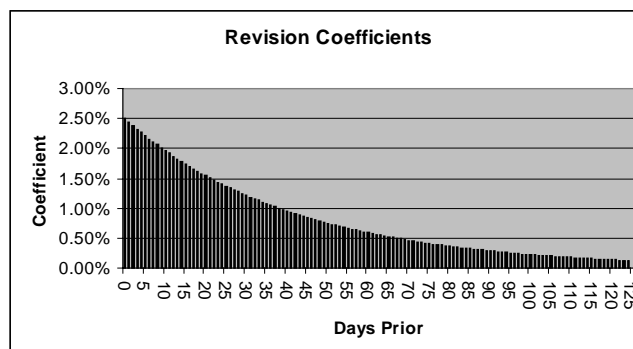
- 3) Calculate each sectors' DDR dispersion, calculated as the mean absolute DDR deviation from the sector median.
- 4) Compute adjustment based on each sector's dispersion.

1) The smoothed earnings revision is calculated as follows:

Each day's earnings revision is calculated from the current or next fiscal year's estimates, E , and the stocks price, P , with the following formula: $(E_t - E_{t-1})/P_t$, where t is today and $t-1$ is yesterday. When we get to within 3 months of the end of the current fiscal year, we shift to the next fiscal year.

The smoothed revision is calculated for each company using the past 125 trading days of daily revisions, weighting by an exponentially decreasing coefficient. The coefficient for each business day, d , is calculated with the following formula: $e^{-0.5([t-d]*6/125)} / (\text{sum from } i = 0 \text{ to } 124 \text{ of } e^{-0.5([t-d]*6/125)})$. " $t-d$ " is the number of days prior that the revision occurred. The denominator is set so that the sum of the coefficients is 1.

The coefficients, graphically, look as follows:



- 2) The stocks' smoothed revisions are then ranked within sectors, with the most positive (or least negative) revision in a sector ranked 1.
- 3) Sector dispersion is calculated as the average of the absolute value of the difference of each security's DDR from the sector median DDR. A multiplier is applied to the dispersion, resulting the maximum revision adjustment for the sector. The multiplier varies across sectors, with the largest sector multiplier currently 1.5 and an average across sectors of approximately 0.9. The

dispersion metric insures that the revision adjustment does not have a larger impact on sectors with lower DDRs, or a smaller impact on sectors with higher DDRs.

4) Revision-adjustment calculation:

If we represent the maximum adjustment as M, the number of stocks in a sector as N, and a stock's revision rank in the sector as R, 1 being the highest and N being the lowest, then the stock's DDR is adjusted by $M \cdot (N+1-2 \cdot R) / (N-1)$.

Thus, the DDR of the stock with the most positive (or least negative) revision in a sector is adjusted by +M, and the DDR of the stock with the most negative (or least positive) revision in a sector is adjusted by -M. The remaining stocks' DDRs are adjusted by an amount dependent its smoothed revision rank, with each increment in rank being accorded an equal increment in revision adjustment.

For example, if there are three stocks in a sector with a maximum adjustment of 1, the top ranked stock will get a DDR adjustment of 1, the second ranked stock 0, and the lowest ranked stock -1. If there are five stocks, the adjustments will be +1, +1/2, 0, -1/2, -1. Etc.

Some interesting characteristics of the smoothed earnings revision:

- Decay rate of estimate revision weight: 38% per month
- Half-life of estimate revision weight: 1.4 months.
- Weighted-average age of daily revisions used in the smoothed revision: 1.7 months.

The Earnings Estimate Revision Adjustment is then added to the Active DDR to result in the Structured DDR.

Companies are ranked by earnings estimate revisions, and the revision adjustment is made

Name	Estimate revision ranking	Revision Adjustment
AXA FINL INC	1	0.67
AMBAC INC	2	0.59
MARSH & MCLENNAN COS	3	0.52
JEFFERSON PILOT CORP	4	0.45
XL CAP LTD	5	0.37
AMERICAN GENERAL CORP	6	0.30
CINCINNATI FINL CORP	7	0.22
LINCOLN NATL CORP IND	8	0.15
MBIA INC	9	0.07
TORCHMARK CORP	10	0.00
AMERICAN INTL GROUP	11	-0.07
AON CORP	12	-0.15
ST PAUL COS INC	13	-0.22
HARTFORD FINL SVCS GROUP INC	14	-0.30
CHUBB CORP	15	-0.37
ALLSTATE CORP	16	-0.45
UNUMPROVIDENT CORP	17	-0.52
SAFECO CORP	18	-0.59
PROGRESSIVE CORP OHIO	19	-0.67

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