Topic 13: Common and Preferred Stock (*Copyright © 2024 Joseph W. Trefzger*)

Common stockholders are the true owners of a corporation. Common stock has become a topic of great interest to Americans in recent years. Being a stockholder is no longer the province of the rich; a large proportion of US households now own common stock either directly, or through mutual funds that they select (based on the types of stocks the mutual fund has said it will buy), or less frequently through pension funds at work (in which an outside financial advisor selects the stocks and other investments that will be the basis for providing the participants with retirement incomes). Of course, overall interest in the stock market became more intense when people seemed to be earning very high annual rates of return in the mid-late 1990s, before prices fell appreciably in the "tech bubble" of 2000. Then stock returns rose considerably again in the ensuing years before plummeting once more during the financial crisis of 2008. Then prices rose again, and average prices of actively traded common stocks hit new highs in 2016/early 2017.

The number of U.S. companies whose common shares are listed on major stock exchanges, and thus can be bought and sold by members of the general public ("public" or "publicly held" companies), has declined by almost half in recent years, from more than 7,300 in the late 1990s to fewer than 3,700 in late 2017. Mergings of two or more companies into one have accounted for part of the dropoff, but another important reason has been a movement away from the public listing that long was the hallmark of U.S. corporate success. Today managers sometimes decide not to take growing enterprises public because of costly financial reporting and government regulations that apply to the public markets but not to privately held firms, and we even see investor groups buy controlling interests in public companies and then reverse the typical process, taking the firms from publicly traded to closely held (going from publicly traded equity to "private equity"). The discussion that follows applies primarily to the common stocks of publicly traded companies, but some of the concepts would apply to the common shares of closely held businesses as well.

I. <u>Common Stockholder Rights, Privileges</u>

A. Claim on Residual Values

As the true owners of a corporation, common stockholders are entitled to claims on *residual values*: net income (periodic inflows net of amounts owed to workers, material suppliers, lenders, *etc.*) and net asset values (asset values minus amounts owed to lenders, since the difference is retained by the owners if the firm is liquidated).

Therefore, the owners also are the only ones who have no place to "run and hide." If management selects inefficient policies with regard to such matters as products, wages, and location, and the company goes out of business, then such "stakeholders" as customers, employees, and the community can all walk away from the relationship (find new jobs, new suppliers, *etc*.). But the owners, standing last in the figurative line of parties with financial interests in the company, are stuck with their losses. (For that reason it is important to hold a diversified portfolio of stocks, as discussed in Topic 11.)

B. Voting
Common stockholders vote to elect the *board of directors*, and sometimes vote on other major corporate issues as well. Voting typically is conducted at the *annual meeting* of shareholders, but generally those who can not attend the meeting can submit *proxies* to pass their voting rights along to current directors, or else to a *dissident group* that is challenging the current directors on one or more issues.

We should note here that a company might issue two (or more) *classes* of common stock (Class A, Class B, *etc*.). A somewhat unusual example of multiple common stock classes is the *tracking* stock, in which the holder has the claim on a residual determined by the operating performance of one specific division of a company. A prominent case back in the 1980s involved General Motors which, in addition to the regular GM shares, issued GM-E and GM-H shares, whose returns respectively tracked the performance of the company's Electronic Data Systems and Hughes Aircraft divisions after GM acquired those two firms. Tracking stocks do not seem to exist much today, though since 2018 Dell Computer has supplemented regular Dell shares with a Class V tracking stock that tracks the performance of virtual machine and cloud computing subsidiary firm VMware.

Now the more typical multiple class example is seen when some shares carry multiple voting rights (perhaps 10 or 20 votes per share, *vs*. the standard one vote per common share), usually to allow the voting power to rest with one group – often the company's founders, or their heirs. The outside owners/those who buy shares later might be provided with a higher level of dividends, but in most cases buyers of the lower-vote class shares get no specific benefit in return for the reduced voting power. The buyers accept this situation as the price paid for getting an ownership stake in a desired firm.

Companies that include Alphabet (Google), Boston Beer (Sam Adams), Ford Motor, Molex, and Under Armor have issued classes of common stock with *no* votes per share. (Boston Beer's founder has 100% of voting shares, Under Armor's founder holds all of the super-vote shares and has 65% voting power, and Alphabet's two founders hold enough super-vote shares to have 52% voting power in one of the world's biggest firms.) But the practice has become controversial with some large investing organizations and corporate governance experts, who fear that insiders' concentrated voting power could prevent actions that would benefit stockholders overall (Standard and Poor's considered excluding firms with multiple voting classes from the widely followed S&P 500 Index).[1] Some corporations are phasing out their multiple share classes. On a more positive note, some companies have experimented with ways to allow greater voting power for common stockholders who have held their shares for a longer time period, rewarding those whose actions as investors encourage the company managers to plan effectively for the long term.

A final example involves Berkshire Hathaway, the conglomerate headed by the world's most famous investor, Warren Buffett (BH's diverse divisions include Geico Insurance, See's Candy, Fruit of the Loom Underwear, and the Burlington Northern Railroad). Buffett's initial plan was to represent ownership through a relatively smaller number of relatively higher valued shares, such that even the holder of one single share would feel a financial commitment to the operation. But as the decades passed the company's success drove the per-share price well in excess of $100,000. As market observers predicted that mutual funds would form to hold only BH shares so that small investors could become BH owners indirectly, Buffet decided in 1996 to create a second, lower-cost share Class B to allow direct ownership for more typical households. A B share carries just 1/10,000 of the voting power of an A share. Class B's per-share closing price on January 10, 2024 was $367.92, while that of a traditional, high-value share with the Class A designation was $557,590 (an investment 1,500 times as big gives 10,000 times the voting power).

A lesson to be noted here is that any time we describe stocks, bonds, or other securities we have to generalize based on the most typical examples, because there can be all types of variations on the most general themes.

C. Right to Buy New Shares (sometimes)

Some states' laws used to require that each common stockholder be given the *right* to purchase newly created shares in proportion to his/her current ownership interest. So if you held 1% of XCorp's shares, you had to be allowed the first chance to buy 1% of any new shares issued. The issuance of preemptive rights protected against loss of a particular person's, or group's, share of control. But you had to *buy* the new shares if you wanted them; they were not *given* to the owners. While preemptive rights are still common in the U.K. and other European markets today, they no longer are typically used by U.S. companies.

A rights offering could also be a marketing tool: a way to distribute new shares by targeting people who had shown an interest in owning that firm's shares in the past (thereby reducing selling, or *flotation*, costs). This result could be attempted through a deliberate *underpricing* of the new shares.

Let's say that XCorp's shares (1 million total outstanding) have been selling recently for $30 each; that price is the market's view of the value of the residual claim per share based on the company's assets, management, and debt. But now 1 million new shares are issued, under a rights offering, at a price of $28 each.

Because the investing public knows the firm will raise only $28 per share to buy and manage new assets, these "new" shares (indistinguishable from the "old" shares once they have been issued) should have a value such that each pair of 1 "old" + 1 "new" share should be worth ($30 + $28) = $58, and all shares will be worth $58/2= $29 each after the rights offering (this is an example of *dilution* in value). So if you hold one share now and get the right to buy one new share, you can:

- buy a new share for $28, combine it with a share that you paid $30 for ($58 total invested), and end up with 2 shares worth $29 each ($58 total), or
- sell the right (for $1) to someone who wants to buy a share (worth $29 after the dilution) for $28. You end up with $1 in cash and a $29 share ($30 total) after having invested $30 in your "old" share.

But notice if you simply ignore the right, you end up with 1 share you bought for $30, now worth only $29 because of the dilution. So to preserve your wealth, the burden is on you to either *exercise* the right (buy the share) or else *sell* the right (find someone else who wants to buy the share). [Even if you had bought the original share for less than $30 at an earlier time – in fact, even if you had inherited the share from your great-uncle and thus directly paid nothing for it – the $30 pre-rights value is the appropriate measure of your investment, since you could have sold the share for $30 before the rights offering was announced.]

A couple of final points to note:

- The diluted share price ($29 above) should be a *weighted* average of the "old" share price ($30) and the lower rights-offering price ($28); here our numbers worked out as a simple average only because we assumed that each holder of one original share got the right to buy one new share.
- People traditionally have purchased common stocks in 100-share blocks (not just one share), because before the high-tech age the paper work costs of administratively breaking apart a 100-share standard "round lot" resulted in paying a high "odd lot" brokerage commission. But the revolution in information management has largely eliminated the round lot/odd lot trading cost concern.

If our firm above (with 1 million current shares) were issuing only 100,000 new shares, you would need 10 "old" shares to get the right to buy one "new" share. We would expect the diluted value to be [(10)($30) + (1)($28)]/11 = $29.82, and we would expect the value of the right to buy a new share for $28 to be ($29.82 – $28) = $1.82.

D. Measuring a Common Stock Holder's Rate of Return

In an earlier Topic we measured a common stockholder's periodic rate of return as

$$\frac{\begin{array}{c}\text{Dividends received} \\ \text{during period}\end{array} + \begin{array}{c}\text{Change in value} \\ \text{during period}\end{array}}{\text{Value at beginning of period}}$$

These figures actually could represent either before-the-fact *expected* returns or after-the-fact *actual* returns. For example, assume that the stock currently sells for $50 per share. The typical investor expects the next year's dividend to be $1.00 per share, and expects each share to rise in value by 10% (or $5), to $55, by the end of the year. The expected annual rate of return therefore is

$$\frac{\$1.00 + \$5.00}{\$50.00} = 12\%$$

But let's say that the economy turns out to be stronger over the following year than had been expected, prompting the company directors to increase the dividend to $1.50 per share while the stock's price rises by 15% (or $7.50), to $57.50, by the end of the year. The actual rate of return therefore turns out to be

$$\frac{\$1.50 + \$7.50}{\$50.00} = 18\%$$

On the other hand, what if the economy turns out to be weaker than expected over the following year, with a dividend decrease to $.75 per share and a price decline of 4% ($2.00), to $48? The actual rate of return therefore becomes

$$\frac{\$.75 + (\$2.00)}{\$50.00} = -2.5\%$$

Of course we know that common stockholders, with their residual claim, do not think the returns they realize will be steady from year to year. What they generally expect is to earn a rate of return that, over a number of years, averages out to be higher than the steady returns the company's lenders receive as long as the company remains solvent. So common stockholders might actually look back and see a 12% average annual rate of return over a multiple-year holding period that included individual yearly returns of 18%, – 2.5%, and numerous other annual figures.

II. Preferred Stock

A. General Features

Preferred stock gets its name from the fact that holders of preferred stock are paid dividends before the holders of common stock receive dividends (and are paid before the common stockholders are paid if the company is liquidated); they are, therefore, in a preferred position with respect to receiving cash from the company managers.

Corporations other than financial firms have not tended to make extensive use of preferred stock in raising money over recent years. However, when the U.S. government made investments to shore up American companies during the financial crisis of 2008 – 2009, it generally did so by buying preferred shares, which were issued by the affected companies specifically for the government's purchase (AIG, General Motors, and Chrysler were examples, along with mortgage lending market giants "Fannie Mae" and "Freddie Mac"). And many preferred shares issued by other types of firms (especially power utilities) in earlier times still trade in the secondary markets.

Textbooks sometimes discuss preferred stock with bonds, because preferred stockholders are essentially lenders, receiving fixed, pre-determined returns rather than a proportional share of profits. (When preferred shares are issued there is an indenture and a trustee, and as with bonds preferred shares are evaluated by the bond rating agencies. Preferred stock also can be *convertible* to common shares, in the same manner that convertible bonds can be traded in for common stock (a financing tool sometimes used by venture capitalists); can in some cases be callable by the issuing company; and can in some instances even have maturity dates.) Dividends to preferred stockholders typically are paid quarterly (that is the assumption we will use in our examples), though other payment patterns could be seen.

In the typical case the dividend received by a preferred stockholder is a *percentage* of the stated *par value.* Whereas the par value of common stock (if the company's common stock indeed even has a par value) bears no connection to the common stock's dividends or market value per share, preferred stock must have a par value (often it is $25 or $50 or $100 per share), and this par value is critical for us to know in computing dividends and theoretical values. (Also, in a bankruptcy proceeding a preferred stockholder generally is entitled to collect the par value per share for each share held – but only after all of lenders' debt claims have been fully satisfied.)

Preferred stock typically is *cumulative*: if the firm does not pay the stated dividend to preferred stockholders in quarter 1, then

- there can be no cash dividends paid to common stockholders in quarter 1, and
- in quarter 2, the firm must pay the quarter 2 preferred dividends *and* the missed preferred dividends ("arrearages") from quarter 1 before the common stockholders can receive cash dividends in quarter 2.

(Preferred shareholders might also gain the right to elect some members to the board of directors when dividends go unpaid for multiple periods.) Because of this feature, which protects the preferred stockholders, a company's managers would be very reluctant to skip a scheduled dividend payment to preferred stockholders, even though missing expected preferred dividends does not put the company in bankruptcy as would missing a promised interest payment to lenders.

Preferred stock typically has no maturity date (the expected stream of cash dividends is a perpetuity), although some preferred issues do have specific maturity dates (at which point the par value is paid to whoever owns the share); if there is a maturity date it tends to be 30 or 50 years after the date of original issue. As with bonds, preferred shares also sometimes are callable after a period of time (often five or ten years) has passed from the original issue date. The existence of preferred shares also can complicate computations for some popular financial ratios. For example, because preferred stock is legally a form of equity and the preferred dividends are deemed to be paid from net income (actually from EBT minus income tax, which would be net income if no preferred dividends were to be paid), Return on Equity for a firm with preferred stock is (Net Income – Dividends to Preferred Stock)/Common Equity rather than the simpler Net Income/Common Equity we saw in Topic 3 (prior to introducing the preferred stock idea in Topic 5).

B. The Preferred Stock Puzzle

Preferred stock arguably has the worst features both of bonds (fixed return; no claim on the residual) and of common stock (returns are not guaranteed; investors can not sue to get the expected dividends). Yet if preferred has the worst features of both bonds and common, then it might well be an *inefficient* form of financing. So how could it exist? On the *supply* side, we observe that preferred stock often was issued in the past by electric power utilities, which were more able than other firms to build inefficient costs into their pricing structures (they had no competition). [Telecommunications companies and banks also have been large issuers, though banks have enjoyed some regulatory benefits from issuing a version called "trust" preferred shares that received favorable regulatory and income tax treatment in past years, but this favorable treatment was supposed to end in 2015.] What will happen in a competitive environment?

On the *demand* side, we often see preferred stock bought by corporations rather than by households. Why? Some say that preferred stock is primarily a child of our income tax system. While the issuer has a tax disadvantage ("dividends" on standard preferred stock are not deductible from operating income like interest paid to lenders is), the buyer has a major tax advantage if it is a corporation. The general rule is that for a U.S. corporation, 50% of dividends received from other U.S. corporations are exempt from income taxes; tax is owed on only 50% of the dividend total received. (Dividends, including those received on preferred stock, get some degree of favorable income tax treatment at the individual taxpayer level, but nothing like the benefits accruing to corporate recipients.)

So a company can set its preferred dividend percentage *lower* than the interest rate it pays on bonds, and (despite the higher risk relative to bonds) corporations looking for fixed-income investments will still buy it. Preferred stock also allows a company to keep its debt ratio from going too high (perhaps in compliance with a covenant in a bond indenture), while still not diluting common stockholders' claims.

C. Preferred Stock Valuation

Recall that the value of any financial asset is the present value of the cash flows the asset is expected to generate for its holder in the future. Our thinking is guided by the general valuation equation we saw back in Topic 10:

$$V_{\text{Any Asset}}\ (= CF_0) = CF_1 \left(\frac{1}{1+r}\right)^1 + CF_2 \left(\frac{1}{1+r}\right)^2 + CF_3 \left(\frac{1}{1+r}\right)^3 + \cdots + CF_n \left(\frac{1}{1+r}\right)^n$$

It is the Net Present Value equation, but here we are solving for the CF_0 outlay that would cause NPV to be \$0, such that paying CF_0 would give the buyer an annual rate of return just sufficient to compensate for accompanying risks (recall that an NPV of essentially \$0 is to be expected in a very competitive situation, including the purchase/sale of actively traded securities among knowledgeable buyers and sellers).

While the general valuation equation shown above will always guide our thinking, we will not always have to discount all projected cash flows individually back to present values. If some or all of the cash flows are expected to follow a nice pattern, then we can compute the combined present values of some or all of the expected cash flows with a shortcut computational version of the general asset value equation.

As noted, preferred stock is, in many ways, more a type of debt instrument than a type of ownership claim. In fact, from a valuation standpoint, preferred stock typically behaves like a perpetual bond, with an unchanging (typically quarterly) dividend stream expected indefinitely (no maturity date, although some preferred stocks do have maturity dates). Because the expected cash flows constitute a perpetuity we can achieve the logic of the general valuation equation if we merely divide the expected periodic dividend by the periodic return investors require for taking the attendant risks.

Let's say that five years ago a company issued preferred stock with a \$100 per share par value, stipulating that an 8% annual dividend (\$8 per year) would be paid perpetually. If each dividend is to be paid quarterly, then the quarterly dividend should be \$2.00. At the time the preferred stock was issued, investors were happy to earn a 2% quarterly, or $(1.02)^4 - 1 = 8.2432\%$ annual return k_p, so each share sold initially for the \$100 par value (recall that the value of a perpetuity is simply the periodic expected cash flow divided by the periodic required rate of return, here $\$2 \div .02 = \$100$). But the firm has faced some financial difficulties over the past few years, and today informed investors would expect a 9.5223% compounded annual return k_p for the risks of being preferred stockholders.

That 9.5223% annual figure corresponds to a quarterly periodic required return of r = $\sqrt[4]{1.095223}$ – 1 = .023. So today this company's preferred stock should sell for

$$V_P = \widehat{P}_0 = \frac{CF}{r} = \frac{D}{k_p} = \frac{\$2.00}{.023} = \$\underline{\underline{86.96}} \text{ per share}$$

(with the expected cash flows consisting of equal dividends to be received every quarter indefinitely we estimate the value using the perpetuity simplification of the general asset value equation, and here we implicitly are assuming that the valuation date is exactly one quarter of a year, or three months, from the first expected dividend payment date). In a manner similar to that seen with bonds, the preferred stock price falls (rises) as the unchanging dividend must represent a higher (lower) periodic rate of return.

If instead there were a maturity date on which the preferred stock would mature (let's say 25 years from now), we would compute the value much like that of a coupon bond, but with quarterly rather than semiannual discounting (n would be 25 years x 4 periods/year = 100 quarterly periods, and the quarterly r would be $\sqrt[4]{1.095223}$ – 1 = .023):

$$\$2.00 \left(\frac{1-\left(\frac{1}{1.023}\right)^{100}}{.023} \right) + \$100.00 \left(\frac{1}{1.023}\right)^{100}$$

$$= \$2.00\ (39.004129) + \$100\ (.102905) = \$78.01 + \$10.29 = \$\underline{\underline{88.30}} \text{ per share}$$

III. Common Stock Valuation Models

A. Some General Points

Again, the intrinsic or theoretical value of any financial asset is the present value of the cash flows the asset is expected to generate for its holder in the future. When we value bonds or preferred stock, we can be reasonably certain of what those cash flows will be. After all, the holder of such a "fixed income" security gets only the pre-determined cash flows (interest as a percentage of par to lenders, dividends as a percentage of par to preferred stockholders) even if the company earns profits far in excess of what the common stockholders would have expected as a financial return based on the risks they faced. (Of course, there is a risk that a weak company may be unable to pay the interest expected by bondholders or the dividends expected by preferred stockholders. So holders of bonds and preferred stock face less downside risk than common stockholders do, but they have no upside potential.)

All *residual* values belong to common stockholders, the true owners of the firm. A given year's residual, in the form of net income remaining after dividends have been paid to preferred stockholders, can be directed to the common stockholders in either of two ways (or there can be some of each). One is as cash paid to them as dividends. The other is through an increase in the share price ("capital gains") that results when the company managers retain earnings and reinvest them in additional assets to make the organization stronger; if things go as planned the investing public recognizes that the company is now bigger and more viable, and a competitive market drives the price of each fractional ownership share higher. Because both the dividend and capital gain benefits spring from net income, one method for estimating the theoretically correct value for common stock is to relate a particular common stock's current market price to a year's worth of net income, the "Price/Earnings" or "P/E" ratio.

A high P/E (high, perhaps, relative to the average P/E for all U.S. common stocks, or at least for those in the same industry) indicates either that 1) investors are willing to pay many dollars today relative to the claim on the earnings expected over the short term, and thus view the earnings stream as low-risk/expect a lot of growth in earnings over more distant future years, or else 2) the stock is selling at too high a price relative to the earnings expected over the short and longer terms, and thus should not be purchased (or should be sold if already held). A low P/E (relative to the average P/E for all firms or that of the appropriate industry group) indicates either that 1) investors are not willing to pay many dollars today relative to the claim on the earnings expected over the short term, and thus view the earnings stream as risky/do not expect much earnings growth in future years, or else 2) the stock is selling at too low a price relative to the earnings expected over the short and longer terms, and thus should be attractive to buy. The average P/E ratio for large U.S. company common stocks has averaged over time to be something close to 15. A simple interpretation is that the market seems to be telling us that it should take about 15 years, as a broad general average, for the stock buyer to recoup the price paid per share through the dividend and capital gain benefits received.

For example, if WCorp's common stock currently can be purchased for $60 per share and expected earnings per share are $5 for the coming year, the indicated P/E ratio is $60/$5 = 12. Under this logic, someone who thinks the P/E for a company like WCorp should be 15 would view the stock as a bargain, thinking its value will rise to $5 x 15 = $75 as the rest of the market ultimately comes to see what an outstanding company WCorp is. But if the price per share currently were $90 the indicated P.E ratio would be $90/$5 = 18. Again, someone who thinks the P/E for a company like WCorp should be 15 would view the stock as overpriced, thinking its value will fall to $5 x 15 = $75 as the rest of the market ultimately comes to see what a poorly performing company WCorp is.
Many investors use the P/E as a quick "rule of thumb" to use in analyzing common stocks, but one period's net income (dividends plus reinvested earnings) is not a meaningful basis for estimating a common stock's appropriate value under traditional cash flow-based valuation models.

It is instead the expected cash *dividends* that give common stock its value under the traditional models. The stronger foundation built by earnings retained (net income not paid as dividends) and invested in additional assets or used to repurchase some existing shares is seen as the basis for the eventual payment of greater cash dividends per share in later future periods. So to estimate the stock's true intrinsic or theoretical value, we project dividend payments forever into the future (typically we view companies as having infinite expected lives, since they do not plan to go out of business at any particular date), and then find the dividends' present values by discounting at k_e.

We then compare this intrinsic value estimate with the price actually observed in the market. If our computed intrinsic value is higher than the current market price, then we can view the stock as a bargain, and would probably want to buy some. If our computed value is less than the current market price, then we feel that the stock is overvalued in the market; we would sell it if we owned it, or avoid buying it if we did not own any. Our belief would be that the rest of the market eventually will recognize the good or bad things we have discovered, and that other investors' buying or selling activities in a competitive environment eventually will bring the price to the level we think is correct.

So say, for example, we buy some shares of some company's common stock at today's market price, which is less than our estimate of the true intrinsic value. Then, if we are right, the market price soon will rise to match our intrinsic or theoretical value estimate, and we will realize the expected increase in our wealth. (Recall the old stock market adage: "buy low, sell high.")

B. Projecting the Dividend Payments

What dividend payments will be observed in the future? We have *no way to know* with certainty – after all, projecting dividends for common stockholders involves predicting future profits, investment opportunities, management policies (including dividend payout *vs*. earnings retention philosophy), and other uncertain matters. In fact, predicting cash dividends to common stockholders is so uncertain that, for computational purposes, we combine the four expected quarterly dividends into one annual total and discount the cash flows as if they were expected to be received annually; the added precision of quarterly discounting is not thought to be justified when the input figures are so subject to error.

In theory, we might project future dividends to differ greatly from year to year; we would simply have to project them out every time period (recall we use yearly approximations) forever and then discount them separately at k_e to present values, which we would sum to find the stock's intrinsic value. Of course we can not actually predict dividends out to time period infinity, but projecting them out for 10,000 years would tend to do a sufficient job of capturing future dividends' total present values, since the PV of anything we expect to receive 10,000 years (or really even just 100 years) from now generally is so small (tiny fractions of a cent) that we can include it or ignore it without materially affecting the value estimate. So more specifically, we could compute

$$V_S = \widehat{P}_0 = D_1\left(\frac{1}{1+r}\right)^1 + D_2\left(\frac{1}{1+r}\right)^2 + D_3\left(\frac{1}{1+r}\right)^3 + \cdots + D_{10{,}000}\left(\frac{1}{1+r}\right)^{10{,}000}$$

When estimating a value for common stock, we show our computed intrinsic value as $\widehat{P}_0$, the price we would *expect* to observe today if investors on average held the same expectations regarding dividends and rate of return that we do. The actual observed price P_0 could be greater than, equal to, or less than our estimated $\widehat{P}_0$. The equation shown above is just a different configuration of our NPV-based general valuation equation

$$V_{\text{Any Asset}} \; (= CF_0) = CF_1\left(\frac{1}{1+r}\right)^1 + CF_2\left(\frac{1}{1+r}\right)^2 + CF_3\left(\frac{1}{1+r}\right)^3 + \cdots + CF_n\left(\frac{1}{1+r}\right)^n$$

but with the cash flows specified as dividends. As always, this general equation guides our thinking, but we need not go through such a tedious computational process if the cash flows, here dividends paid to common stockholders, are expected to follow a convenient pattern. Indeed, when analyzing common stocks we generally assume that it is sensible to model the dividend stream as though a pattern of payments could be expected to occur, if not initially then at least ultimately. (Recall from our Topic 12 discussion that the dividends firms pay to common stockholders tend to stay fairly steady, or perhaps rise slightly, over time unless the company is in financial trouble; reasons might include a perceived desire for predictability on stockholders' part.) This pattern is one we would use as a reasonable approximation based on recent historic trends for the firm, tempered with any facts that would cause us to feel recent history is not a good future indicator.

[The traditional stock valuation models are far from free of criticism or controversy. Nobel Prize-winning economist/financial theorist Eugene Fama has stated that we can not put much faith in the answer that comes from any discounted cash flow model, because both the cash flows (numerator) and discount rate (denominator) are random variables. He feels that rules of thumb may give equally useful answers – P/E ratios, perhaps?]

What dividend patterns could seem reasonable to compute with, based on facts we might observe? One pattern could be payment at an unchanging dollar level every year forever. No one would be likely to think the most recent year's dividend payment per share, in dollar terms, would continue unchanged forever, but if an analyst expected a company to pay approximately the same dividend per share for many years into the future then modeling the stream as a perpetuity could be a good practical approach. Another possibility, if the analyst expected earnings and dividends to change somewhat steadily from period to period for many future years, would be modeling the dividend stream as a changing perpetuity based on a constant positive (for growing firms) or negative (for declining firms) percentage rate to be realized on a compounded annual basis forever into the future.

Another possibility, if the analyst felt the company in question had some advantages over its competitors that would persist for a few years, would be a model showing extraordinary yearly growth in earnings and dividend payments for a few years, followed by a more modest, fairly steady yearly growth rate forever into the future (no firm's sales, earnings, and dividends would sensibly be predicted to grow at an extremely high rate for a prolonged period). In our exercises we will tell the story of an investment manager who has four analysts working for her. Each of the four develops his or her own model for analysis, with expected dividends following one of the payment patterns described immediately above.

If dividends truly were expected to be so erratic that they could not reasonably be modeled as some type of pattern, then we would simply have to discount each periodic (again, we use annual approximations) dividend expected far into the distant future to a present value and sum the PVs together, as shown in the general valuation equation. But typically the best practical approach will involve one of the three general patterns (level, constant percentage periodic change, or erratic change over a brief interval followed by constant periodic change) discussed above. Assuming that the true expected dividend stream can sensibly be modeled as one of these patterns allows us to compute the present value of all expected future dividends with a computational approach more convenient than the general valuation model.

C. The Traditional Common Stock Valuation Models

The Midwest Mutual Fund portfolio manager is thinking about buying some shares of XCorp common stock for the fund, and wonders if the current market price of $40.79 per share is reasonable. XCorp has paid a dividend of $.59 per share per quarter, totaling $2.36 per share for the year, to its common stockholders for several years now. The manager asks four different analysts to independently estimate the true intrinsic or theoretical value per share of XCorp stock based on their own projections of what future dividends will be.

The four analysts agree that a diversified investor buying XCorp common shares should require an annual rate of return k_e or r of 11%, but they have differing views on where dividends are headed. (Remember: while interest payments to lenders and dividend payments to preferred stockholders are specified in advance, no one can know what future dividends will be paid to any company's common stockholders, since dividends are but the portion of unknown future net income that the managers will decide to pay out and not retain. So unlike with bonds or preferred stock, with common stock we think of different analysts or investors who have varying views about where dividends are headed and therefore varying views on whether the current price per share in the market is too high, too low, or just about right. Those differing views are what make the stock market interesting – and allow it to function!)

1. Model 1: Constant Dollar Payment Indefinitely

Ms. Analyst 1 sees no reason to think that the $2.36 annual payment will change in the foreseeable future – such that she can sensibly model the cash flow pattern as a perpetuity (a change in dividend payments expected in the far distant future should have little impact on the stream's computed present value). Because she treats the expected dividend stream as a perpetuity for computational ease, she can reach the same result as with the general valuation equation

$$V_S = \hat{P}_0 = D_1\left(\frac{1}{1+r}\right)^1 + D_2\left(\frac{1}{1+r}\right)^2 + D_3\left(\frac{1}{1+r}\right)^3 + \cdots + D_{10{,}000}\left(\frac{1}{1+r}\right)^{10{,}000}$$

$$= \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{D_4}{(1+r)^4} + \frac{D_5}{(1+r)^5} + \cdots + \frac{D_{10{,}000}}{(1+r)^{10{,}000}}$$

$$= \frac{\$2.36}{(1.11)^1} + \frac{\$2.36}{(1.11)^2} + \frac{\$2.36}{(1.11)^3} + \frac{\$2.36}{(1.11)^4} + \frac{\$2.36}{(1.11)^5} + \cdots + \frac{\$2.36}{(1.11)^{10{,}000}}$$

by simply using the perpetuity formula:

$$V_S = \hat{P}_0 = \frac{CF}{r} = \frac{D}{k_e} = \frac{\$2.36}{.11} = \$\underline{\underline{21.45}} \text{ per share}$$

(recall that while common stockholders receive dividends quarterly, the uncertain nature of those dividends leads market observers generally to use an annual approximation, and in our examples we are implicitly assuming that the valuation date is exactly one year from the first expected "annual" dividend payment date).

2. Model 2: Dividends Changing at a Constant Percentage Rate

Now consider Mr. Analyst 2, who expects XCorp's total annual dividend per share to increase in the future because demand for the company's products seems to be growing. He foresees dividends rising, probably in a stair-step fashion (remaining at the same dollar level for multiple quarters and then rising to a higher level for multiple subsequent quarters), and while he does not expect the increases to be exactly equal in amounts and timing he feels the increase can be modeled sensibly as 5% average annual growth proceeding steadily into the future. D_0 (the dividend for the most recent year) was $2.36, so he treats D_1 (the coming year's expected dividend and first in the series with growth modeled as a constant 5% per year) as $D_1 = D_0 (1 + g)$ = $2.36 (1.05) = $2.478.

Because he envisions the future dividend stream as one that reasonably can be modeled as exhibiting constant annual percentage growth, he can reach the same result as with

$$V_S = \hat{P}_0 = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{D_4}{(1+r)^4} + \frac{D_5}{(1+r)^5} + \cdots + \frac{D_{10,000}}{(1+r)^{10,000}}$$

$$= \frac{\$2.36\ (1.05)^1}{(1.11)^1} + \frac{\$2.36\ (1.05)^2}{(1.11)^2} + \frac{\$2.36\ (1.05)^3}{(1.11)^3} + \frac{\$2.36\ (1.05)^4}{(1.11)^4} + \cdots + \frac{\$2.36\ (1.05)^{10,000}}{(1.11)^{10,000}}$$

$$= \frac{\$2.478}{(1.11)^1} + \frac{\$2.602}{(1.11)^2} + \frac{\$2.732}{(1.11)^3} + \frac{\$2.869}{(1.11)^4} + \cdots + \frac{\$2.36\ (1.05)^{10,000}}{(1.11)^{10,000}}$$

by using a variation on the constant dividend growth model we used in computing k_e in our Topic 5 weighted average cost of capital discussion. Specifically, we can rearrange

$$\hat{k}_e \text{ (or more simply r)} = \frac{D_1}{P_0} + g$$

(in which we know the actual P_0 and solve for the appropriate estimated $\hat{k}_e$ or r) algebraically to tell us

$$r - g = \frac{D_1}{P_0} \quad \Rightarrow \quad P_0\,(r-g) = D_1 \quad \Rightarrow \quad \hat{P}_0 = \frac{D_1}{r-g} = \frac{D_0\ (1+g)}{r-g}$$

(in which we know k_e or r and solve for the appropriate estimated $\hat{P}_0$). Recall from our cost of capital discussion that this approach is appropriate to use only if the analyst truly feels that dividends will follow a pattern that can be modeled, for practical computational purposes, as a fairly constant periodic rate of change forever into the distant future. Or just think back to the present value of a perpetuity changing by a constant percentage rate per period, as introduced in the Special Annuity discussion in Topic 4, with

$$PMT_1\left(\frac{1-\left(\frac{1+g}{1+r}\right)^{\infty}}{r-g}\right) = PMT_1\left(\frac{1-0}{r-g}\right) = PMT_1\left(\frac{1}{r-g}\right) = \left(\frac{PMT_1}{r-g}\right) = \left(\frac{PMT_0(1+g)}{r-g}\right)$$

Here, we have

$$\hat{P}_0 = \frac{D_1}{r-g} = \frac{D_0\ (1+g)}{r-g} = \frac{\$2.36\ (1.05)}{.11-.05} = \frac{\$2.478}{.06} = \$\underline{\underline{41.30}} \text{ per share}$$

So whereas Ms. Analyst 1 thinks a price greater than \$21.45 per share would be too much to pay, more optimistic Mr. Analyst 2 would feel favorably about any price up to \$41.30.

A couple of points to note:

- Mr. Analyst 2 expects substantial growth in dividends in the future, and as a result his computed intrinsic value is much higher ($41.30) than is that of Ms. Analyst 1, who assumes no growth in dividends ($21.45). Note that the g figure appears both in the numerator (making it larger) and in the denominator (making *it* smaller) in the final computational step of the constant growth model, leaving the quotient much larger than it would be if expected dividends were modeled to reflect no future growth.

  See also that, as a result, someone who wants to paint an unduly rosy picture need only *slightly* overstate a true belief about growth. Here if Mr. Analyst 2 set g = 6% instead of 5% his intrinsic value estimate would be $50.03/share instead of $41.30.

- Note further that the constant dollar dividend case is simply the constant percentage dividend growth approach with g = 0. Ms. Analyst 1, modeling dividends as an unchanging expected $2.36 per year forever, instead could compute

$$\widehat{P}_0 = \frac{D_1}{r-g} = \frac{D_0\,(1+g)}{r-g} = \frac{\$2.36\,(1+0)}{.11-0} = \frac{\$2.36}{.11} = \$\underline{\underline{21.45}} \text{ per share}$$

- The constant dividend growth formula also can be used in computing the intrinsic or theoretical value for a share of common stock when dividend change is modeled as a constant negative growth rate, just as with constant positive growth. For example, pessimistic Ms. Analyst 3 fears that adverse impacts of changing technology will cause XCorp's earnings and dividends to decline fairly steadily in the future, such that she would model the dividend stream as exhibiting constant "growth" at a rate of –3% per year indefinitely. She computes the theoretical value per share as a low

$$\widehat{P}_0 = \frac{D_1}{r-g} = \frac{D_0\,(1+g)}{r-g} = \frac{\$2.36\,(1-.03)}{.11-(-.03)} = \frac{\$2.36\,(.97)}{.11+.03} = \frac{\$2.289}{.14} = \$\underline{\underline{16.35}} \text{ per share}$$

3. Model 3: Dividends Changing at a *Non-Constant* Percentage Rate

Finally, consider very optimistic Mr. Analyst 4, who is intrigued by XCorp's status as the only US firm in its industry with an established distribution channel in China. He expects the company's sales, and therefore its profits and the dividends it can pay, to grow from the most recent year's $2.36 by g_1 = approximately 40% in year 1, g_2 = approximately 30% in year 2, and then in a manner that sensibly can be modeled into subsequent future years, when competing firms will have entered the Chinese market, as Mr. Analyst 2's proposed $g_{3-\infty}$ = 5%. (Dividends paid to common stockholders, with their residual claim, would be highly unlikely to grow by exactly the same percentage year upon year for a prolonged time period; constant dividend growth is just a modeling approach used for computational convenience in light of the uncertainty involved.)

Recall that if dividends can not reasonably be modeled as following a long-term pattern, we must rely on the general valuation equation

$$V_S = \widehat{P}_0 = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{D_4}{(1+r)^4} + \frac{D_5}{(1+r)^5} + \cdots + \frac{D_{10,000}}{(1+r)^{10,000}}$$

(again, 10,000 years is chosen to represent a very long time period, but any long period of dividends, even 100 years, discounted to present values would provide a reasonably good estimate of the value of this infinite expected stream). But if expected dividends can be modeled reasonably as growing by a constant percentage rate, that pattern allows for use of the shortcut formula

$$\widehat{P}_0 = \frac{D_1}{r-g} = \frac{D_0\,(1+g)}{r-g}$$

Based on Mr. Analyst 4's projections there are elements of both: erratic dividend payments for two years, with growth that can be modeled as a constant annual percentage then setting in. So he will make use of both approaches: the general valuation equation for the period of expected non-constant growth, and the constant growth model for the later period of expected change that can be modeled, for practical purposes, as a constant annual rate. The first step is to compute the expected dividends over the next three years, until growth that can be modeled as a constant annual rate is expected to have set in. With D_0 = \$2.36, they should be

$$D_1 = D_0\,(1 + g_1) = \$2.36\,(1.40) = \$3.304$$
$$D_2 = D_1\,(1 + g_2) = \$3.304\,(1.30) = \$4.295$$
$$D_3 = D_2\,(1 + g_3) = \$4.295\,(1.05) = \$4.510$$

Expected dividends D_1 and D_2 must be discounted to present values individually, but with D_3 and later expected dividends the constant growth approach can be applied. Note that

$$\frac{\$3.304}{(1.11)^1} + \frac{\$4.295}{(1.11)^2} = \$2.977 + \$3.486 = \$\underline{6.463}$$

is the value attributed by Mr. Analyst 4 today to the right to collect the dividends expected in years 1 and 2. Then further observe that

$$\frac{D_3}{r-g} = \frac{\$4.510}{.11-.05} = \$75.166$$

should be Mr. Analyst 4's computed intrinsic value at time 2 (the end of year 2/start of year 3) of the right to collect the dividends expected in years 3 through infinity. But as with any other value that will not prevail until two years from now, Mr. Analyst 4 finds its present value today by discounting that year-2 value for two periods. Think of the present value of a deferred perpetuity expected to change by a constant percentage rate per period, as introduced in the Special Annuity section in Topic 4, with a factor equal to

$$\left[\left(\frac{1-\left(\frac{1+g}{1+r}\right)^{\infty}}{r-g}\right)\left(\frac{1}{1+r}\right)^{d}\right] = \left[\left(\frac{1}{r-g}\right)\left(\frac{1}{1+r}\right)^{d}\right],$$

such that the value today of the right to collect the endless stream of dividends expected once a steady growth rate has set in is computed as

$$\left[\left(\frac{PMT_{1+d}}{r-g}\right)\left(\frac{1}{1+r}\right)^{d}\right]$$

with d representing the number of periods of deferral before constant periodic growth is expected to begin and PMT_{1+d} representing the first dividend in the series expected to grow by the same percentage rate each period. So we have

$$\frac{D_3}{r-g}\left(\frac{1}{1+r}\right)^2 = \frac{\$4.510}{.11-.05}\left(\frac{1}{1.11}\right)^2 = (\$75.166)(.811622) = \$\underline{61.006}$$

as the value *today* of the right to collect dividends expected in years 3 through infinity. ($75.166 thus is the price Mr. Analyst 4 would expect to be able to sell the stock for in two years, but that also should be the value to a holder in two years of keeping the stock if it can be expected to deliver the described future dividend stream.) Now putting it all together, he computes

$$V_S = \widehat{P}_0 = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{D_3}{r-g}\left(\frac{1}{1+r}\right)^2$$

$$= \frac{\$3.304}{(1.11)^1} + \frac{\$4.295}{(1.11)^2} + \frac{\$4.510}{.11-.05}\left(\frac{1}{1.11}\right)^2$$

$$= \$2.977 + \$3.486 + (\$75.166)(.811622)$$

$$= \$6.463 + \$61.006 = \$67.469 \text{ or } \$\underline{67.47} \text{ per share}$$

The exponent on the final term is 2, not 3 because, under Mr. Analyst 4's model, two (not three) years from today investors will view $4.51 as the first dividend, and one that sets the base for subsequent growth of a type that can be modeled as a 5% constant annual rate. His optimism in expecting two years of extraordinary growth leads him to a much higher estimated theoretical value per share ($67.47) than those computed by Mr. Analyst 2 modeling his estimate on 5% steady dividend growth ($41.30), Ms. Analyst 1 modeling her estimate on no expected dividend growth ($21.45), and Ms. Analyst 3 modeling her estimate on – 3% steady dividend growth ($16.35). [Dollar values in the examples above are generally taken to 3 decimal places to prevent rounding confusion.]

At that point the portfolio manager calls a meeting where the four analysts will present their computations and defend the assumptions behind them, and the team will come to a consensus on the best measure of XCorp common stock's true intrinsic value. If the team determines that Mr. Analyst 2 has the most convincing arguments and thus his approach of modeling the value ($41.30) based on 5% constant annual dividend growth is the most realistic, then the group will view the current $40.79 as a good price to pay, and the portfolio manager will purchase shares for the fund (Mr. Analyst 4 might comment that the stock is an especially good buy and encourage buying a large number of shares).

(Would four analysts who worked for the same investment firm and had access to the same information compute per-share common stock intrinsic value estimates ranging from $16.35 to $67.47? That outcome might be unlikely if the company being analyzed were well established and its common shares were well known to the investing public. But for an unproven new company that ultimately could turn out to be anything from the next Pets.com to the next Facebook or Google, the answer could certainly be: yes.)

D. The Corporate Value Model

Instead of predicting dividends on a per-share basis, an analyst might look at a company as a business operation. The business will generate net operating profit after taxes, or NOPAT (sales minus costs of running the business, including income taxes). NOPAT, plus depreciation, minus amounts the firm must invest in long-term investments and working capital, is free cash flow, or FCF. The present value of those FCFs belongs to the money providers; subtracting the amount owed to the lenders and preferred stockholders leaves the total value of the common stock. Dividing that total value by the number of shares gives a per-share estimate of value for the company's common stock. •

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[1] Driebusch, Corrie. "Altman Episode Makes Startups Fret." *The Wall Street Journal*, January 10, 2024, B1.