Accession Capital Corp

THE PRICE-EARNINGS RATIO AND ITS COMMON MISAPPLICATION IN BUSINESS VALUATIONS

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EXECUTIVE SUMMARY:

- The P/E Ratio is widely quoted for every public stock and purports to convey some meaningful value information about the security
- Professional valuators have begun using the P/E multiples as an indicator of value – often without testing the appropriateness of the earnings estimate
- Firm value is reliant upon the long-term cash generating abilities of the firm, a one-year estimate will rarely be representative of a long-term normalized amount
- The P/E multiples for firms with volatile earnings and cash flows are not at all useful in estimating a meaningful range of value

INTRODUCTION

The financial press often speaks of a given investment's Price-to-Earnings Ratio (P/E ratio) with a reverence that suggests the number contains some magical insight. Further, the NYSE, NASDAQ and AMEX all prominently display the daily P/E ratio for each security listed[1].

Often professional valuators will take to using the P/E ratio as an estimator of firm value. This can be done in two ways. The first is to find a number of comparable firms that act as a proxy for the subject firm. The P/E ratios of the comparable firms suggest a multiple to be applied against the subject firm's earnings. Conversely, if the subject firm is publicly traded, the second way is to use the inverse of the P/E ratio (the Earnings-to-Price ratio … or Earnings Yield, as it is sometimes called) as an indication of a capitalization rate that is applicable to the firm. The capitalization rate can then be transformed into a discount rate that is used to discount the long-term projected earnings (or cash flow) of the subject firm. Regardless of which version is used, employment of the P/E ratio in this manner is fraught with peril – it is a statistic that is much more likely to be misleading rather than useful.

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[1] The NYSE reports a trailing P/E, so it is always available. The AMEX reports a single year forward P/E. The NASDAQ will report a series of forward P/E's if analysts have provided sufficient estimates of up to five future years. For those securities without analyst coverage, no P/E is provided.

The investment community places a high degree of importance upon the P/E ratio and prima facie the concept is intuitively appealing. The very core ambition of why investors forego current consumption and make investments instead is to gain an even greater return of future dollars. Therefore, the ratio of today's investment to tomorrow's return lies at the very heart of their motivation. Notwithstanding the risk differential across various competing investments, investors want to select the lowest P/E ratio possible. Or, at least this is the general dogma of present-day sentiment.

By relating the current price of the firm's shares with the forthcoming earnings per share[2] one can equate how expense or inexpensive a proposed investment is expected to be. For example, paying $100/share for a firm that is expected to generate $10/share in earnings (a P/E multiple of 10) is much more expensive than paying $50/share for a firm that is also expected to generate $10/share in earnings. There may be a number of reasons for why the first stock sells for twice the price of the second. For example, the first share may have a much more stable and predictable earnings base (thereby showing a much higher probability that the $10 in earnings will actually be achieved compared with the second investment). This would be another way of saying the first stock requires a lower risk-adjusted-discount-rate over the second. Or, it could be the case that the first stock is expected to grow at a much more rapid pace than the second (which may either be expecting stable or even shrinking earnings in future years). Investors are willing to pay more for positive future growth because they know this generates additional cash for future dividends.

AN EXAMPLE

Suppose we are currently attempting to decide which of four firms (Companies A, B, C and D) we are going to invest in. We know that each holds no long-term debt and each currently has a market capitalization of $100 million in widely-held publicly traded common shares. Further,
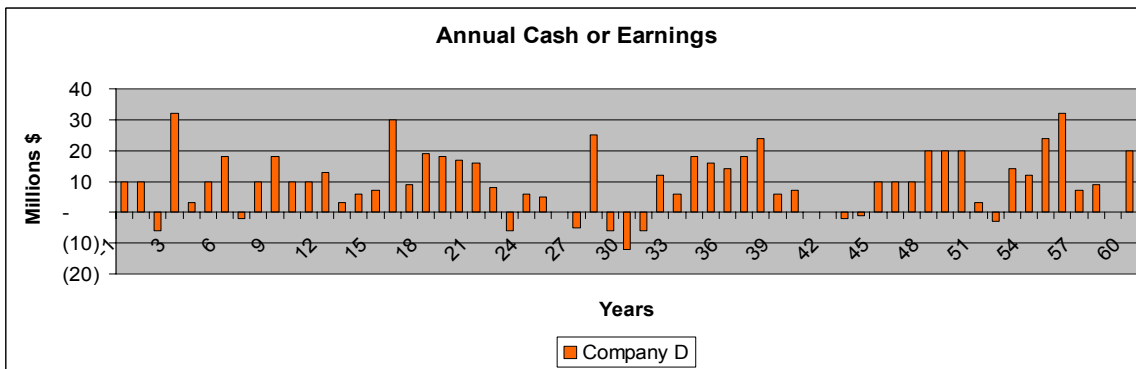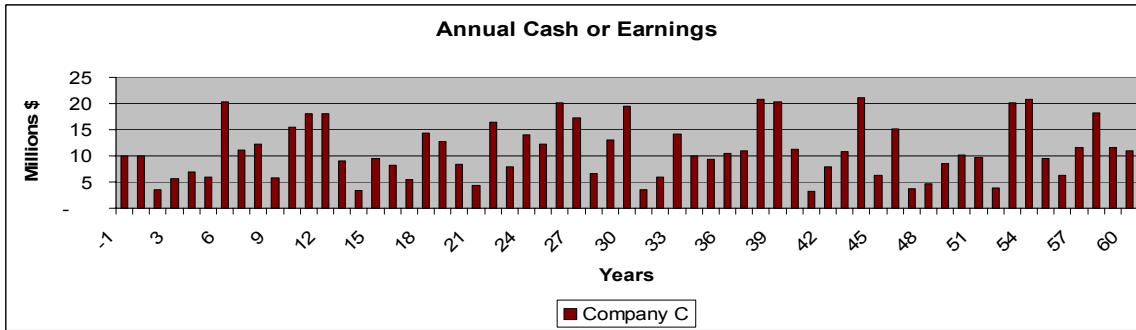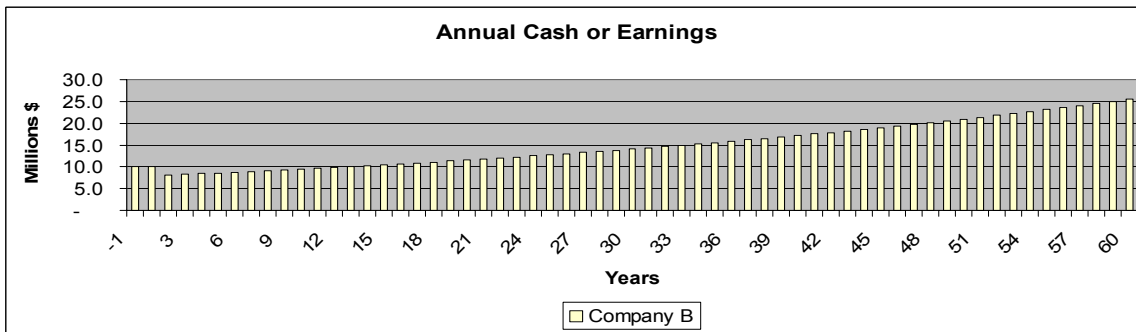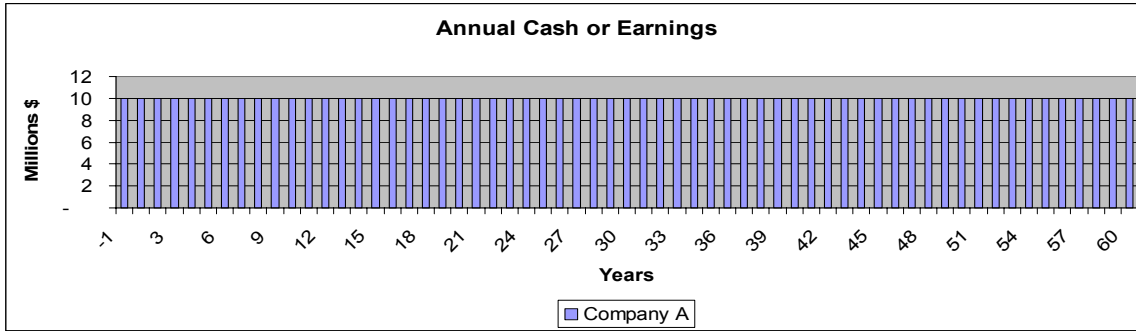
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[2] P/E Ratios are also reported on a "trailing" earnings to current price basis, but since all value is prospective, that is, based upon the future ratio of cash inflow to current investment cost, trailing earnings are not very informative (unless the trailing earnings are believed to be predictive of the future earnings).

we know that each earned an after-tax net income of some $10 million last year, and the 12 month forward earnings expectations are that each will again earn approximately $10 million in the forthcoming year. While each firm is in a different industry sector, it has been largely agreed by creditable financial analysts that these four firms face very similar risks[3]. Since we will assume each is accepted to have generally the same risk profile, it is not surprising that they all share a P/E multiple of 10. It wouldn't be much of a surprise either, therefore, to learn that, if all four of these firms had the same number of shares issued and outstanding, that all four currently sold for the same share price.

Now let us suppose that we (and only we, none of the rest of the investment community) can, for some mystical reason, know precisely what the next sixty years of earnings will be for each of the four companies A through D. Now we can graph these future earnings:

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[3] The assertion of a near-identical risk profile across all four firms might be reasonably challenged given the highly erratic earnings profile of Company D. However, the assumption has only been made for convenience. Whether the discount rates for each of the sample firms is the same or entirely different the point being made is that any form of "multiple-of-earnings" valuation will only provide a useful approximation when those earnings themselves are quite stable.

Annual Cash or Earnings

Millions $ — Years — Company A

Annual Cash or Earnings

Millions $ — Years — Company B

Annual Cash or Earnings

Millions $ — Years — Company C

Annual Cash or Earnings

Millions $ — Years — Company D

(In each of the four examples presented above, Year "-1" refers to the fiscal year just ended. The Cash [or Earnings] in each of the four preceding examples are REAL - the effects of expected future inflation has been eliminated such that all amounts are in Year 1 dollars.)

Having examined these earnings (or cash flows … the issue as to the important distinction between the two and the various types of each will be dealt with subsequently, for now, we will assume that earnings are synonymous with cash flows) visually one can ascertain that each has a forward P/E ratio of 10. More surprising is that, when each earnings (or cash flow) profile is discounted at a rate of 10% per annum, all four sum to a Net Present Value (NPV) of exactly $100 million. Since we are in the omnipotent position of actually *knowing* what the earnings (or cash flows) will be for the next sixty years, we can conclude that the market 'got it right', these firms should all bear a current market cap of $100 million. However, associating the current market price with the fact that each has the same P/E of 10 is highly misleading.

Note how divergent the future earnings (or cash flows) are from one and other. Company A shows a solid unwavering ability to generate $10 million each year without fail or variation[4]. Company B does the same for Year One, but then earnings/cash flow declines to $8.2 million in Year Two and then these grow by 2% for each subsequent year. Company C's earnings/cash flow are erratic but always positive[5]. Company D's earnings (or cash flows) are extremely volatile ranging from a low of minus $12 million to a high of $32 million with a standard deviation of $10 million per year.

If the one-year P/E ratio did convey any real guidance upon the overall value of the firm at any given time, then some curious market events should be expected to occur. For example, at the end of Year 1, if the analysts correctly predicted the Company C drop in earnings/cash flow from $10 million to $4 million, only one of four Company C share price impacts could be expected to happen[6]:

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[4] Indeed, Company A, at sixty years, is virtually a perpetuity which would be valued by the formula $c/r = V$ where c is the annual cash flow, r is the risk adjusted discount rate and $10/.10 = $100.

[5] Company C's results are actually based upon Company A's. The annual Company C outcome, from Year Two onward, is randomly based upon Company A's results being within 30% or plus 120% of the Company A $10 million. Within that range, the Company C's results are a uniformly random distribution.

[6] Here we are assuming all systematic, macroeconomic influences are held static. Ceteris paribus, only dealing with the change in forward earnings, one these four Company C share price impacts would occur.

1. The previously assessed market-risk factor of 10, derived from the trailing P/E ratio is assumed still to be applicable, and since future earnings (in Year 2) drops by 60%, so too will the market capitalization. This would be a logical outcome for anyone who truly believed that the ratio of the near-term income to appropriate market price actually conveyed some rational synopsis of intrinsic investment value. For those investors who were willing to pay 10 times the $10 million, now, after a 60% decline in earnings, at the very best they should be willing to pay 10 times the $4 million or a market cap of $40 million.

2. Conversely, the market may believe that the 60% earnings drop is not reflective of the long-term normalized earnings – it is just a temporary one-time event. In such a case, it may continue to value the aggregate of all the outstanding shares at $100 million, in which case the then forward P/E ratio becomes $100/$4 = 25. Some analysts may attempt to justify this high P/E ratio by stating that there is considerable growth potential in future earnings, but it would be more precise to characterize the $4 million in earnings as an anomaly and that the previous level of higher earnings is expected to be regained (This is known as the Molodovsky Effect).

3. Some combination of 1. and 2. above. In this case, the market capitalization of Company C could be expected to fall somewhere in between $40 and $100 million.

4. The market now perceives Company C as much more risky than a 'P/E multiple of 10' firm. If the 60% earnings drop was unexpected, it would be quite reasonable to presume that the investment is more risky than originally thought. Perhaps investors now demand an 8:1 P/E which would lead the market capitalization to drop to $32 million ($4 million x 8).

Carrying this logic just a little further, one would have to wonder if, for Company D, the market capitalization would go to zero in Year Two when earnings turned negative? Would they skyrocket to $320 million in the subsequent Year Three? Hopefully not. The Market does not react this way – firms that experience even multiple years of losses do not report share prices of zero. Conversely, firms that show one-time positive earnings outliers do not experience

exponential share price growth. The Market is focused upon more than just one year of earnings or cash flow. "The use of one-year's earnings in the price-earnings ratio is an unfortunate convention, recommended by tradition and convenience, rather than any logic. As long ago as 1934, Benjamin Graham and David Dodd, in their now famous textbook Security Analysis, said that for purposes of examining such ratios, one should use an average of earnings of 'not less than five years, preferably seven or ten years.' (p. 452) Earnings in any one year tend to be affected by short-run considerations, that cannot be expected to continue."[7]

NORMALIZED EARNINGS

Purists would state that, in using the forward estimate of earnings (or cash flows), a 'normalized' rather than actual expectation of earnings must be created. Normalization involves eliminating all the one-time shocks and non-recurring items expected to occur over the forthcoming year and restating earnings to the 'average' level achievable over the longer term. Note that, in our example, Company A does not require any normalization whatsoever. The question remains, how would one 'normalize' the Year Two or Year Three earnings for Company C or Company D[8]?

Since none of us can actually see into the future and *know* what the precise earnings (or cash flow) of any given firm will be, it becomes very difficult to predict a normalized version for those firms with a highly volatile earnings history. For example, even if one could know with relative certainty that the Company D near-term earnings were to be negative $6 million followed by positive $32 million, how many would then surmise that the long-term normalized amount should be $10 million?

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[7] Shiller, Robert, J. *Price-Earnings Ratios as Forecasters of Returns: The Stock Market Outlook in 1996*, pg. 2
[8] Curiously, however, the simple average for Company D earnings in Years 2 through 4 is 9.7. The five year forward average (YR2 through YR6) is 11.4. The ten year forward average is 10.3.

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PRICE-EARNINGS MULTIPLES ARE NOT USEFUL INDICATORS FOR FIRMS WITH VOLATILE EARNINGS

The P/E multiplier is an acceptable, if crude, indicator of value for firms with stable earnings history, and relatively predictable futures. Taken to the limit, a firm that has absolutely unwavering earnings ad infinitum is actually a perpetuity that can be accurately valued by the well-known formula[9]:

$$V = c / r$$

Where:

$V \equiv$ Value = $P \equiv$ Price[10]

$c \equiv$ perpetual Cash flow = $E \equiv$ Earnings

$r \equiv$ Risked-Adjusted Rate of Return = $E/P \equiv$ Earnings-to-Price Ratio

(Note that the denominator is more correctly represented by $r - g$, the Rate minus expected Growth, as in the Gordon Growth Formula. However, since we are asserting that all future earnings are perpetually the same, the growth rate is, de facto, zero)

However when these multipliers are derived from a one-year earnings perspective, they can be extremely misleading when that one-year is not representative of the long-term normalized earnings. This fact was clearly demonstrated by the Year Two and Three P/E ratios of Company D above.

Molodovsky, in his seminal 1953 paper "A Theory of Price-Earnings Ratios" characterized the long-term normalized earnings of a firm as it's 'Estimated Earning Power". He proposed a normative state whereby the P/E multiple would move inversely with actual current earnings. That is, as actual earnings drifted above the Estimated Earning Power of the firm, the P/E

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[9] This formula is actually derived from the Annuity Formula : $V = (c/r)(1 - (1+r)^{-n})$ but as n gets very large, $(1+r)^{-n}$ goes to zero and the formula simplifies to $V = c/r$

[10] We use 'Price of the Firm' interchangeably with the concept of 'Price of the Shares' without regard for the fact that a control premium would apply if more than 50% of the shares were being purchased.

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multiple should decrease to compensate for the fact that the market recognizes that the current earnings are a temporary anomaly. If this were not the case, as earnings rose, so too would the share price. Conversely, he suggests that, as earnings slips below the Estimated Earning Power, the P/E ratio will compensate by increasing accordingly to maintain firm value in keeping with long-term expectations.

Molodovsky's Compensation Effect
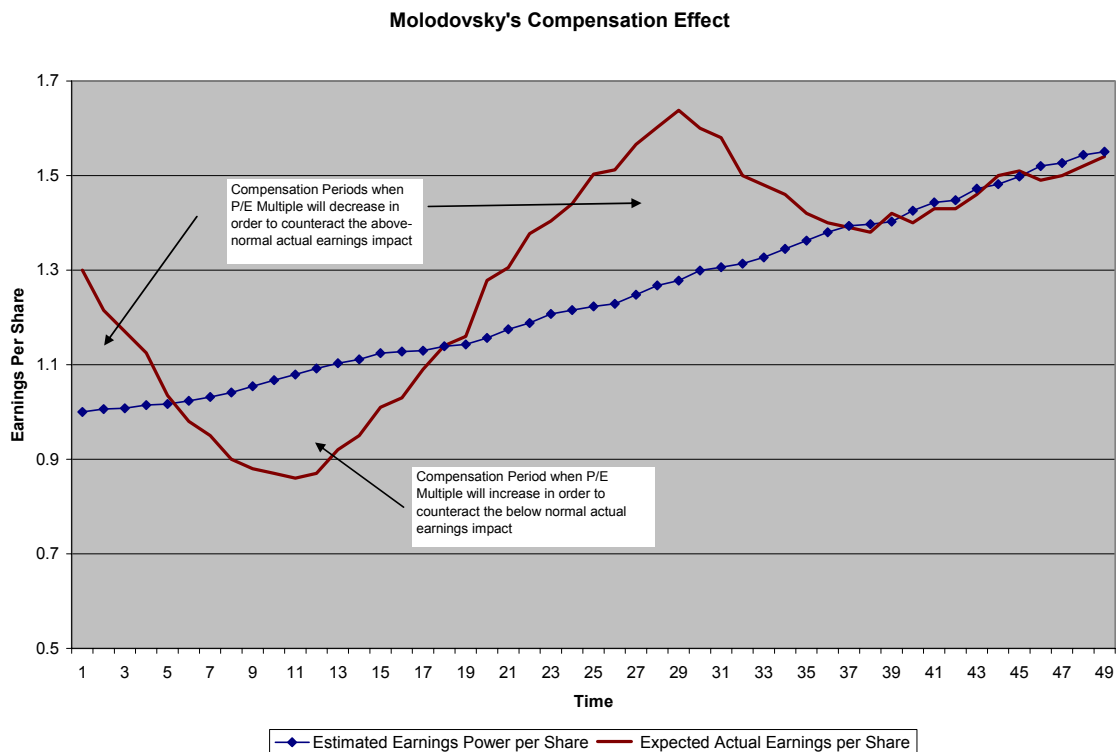
Sharpe et al. describe the same basic concept as Molodovsky, but separate the future earnings ability of the firm into two components; the Permanent and Transitory. The Permanent, as they

explain it, is 'likely to be repeated in the future[11]". This Permanent Earnings Component would be analogous to Molodovsky's 'Estimated Earning Power'. "… the intrinsic value of a share depends on the firm's future earnings prospects … and in turn its price, will be correlated with changes in the permanent component of its earnings but not with changes in the transitory component."[12]

EARNINGS VS. CASH FLOWS

Thus far we have made reference to the Price To "Earnings" ratio and assumed that Earnings are equivalent to Cash Flows. They are not. Investors should not be concerned with 'earnings'. Dividends cannot be paid in 'earnings', nor EBITDA, nor Net Income Before Taxation. Dividends can only be paid in Cash (well, at least the dividends that convey value, anyhow). However, for convenience and convention, the Price-to-EARNINGS ratio has become the most widely quoted. Perhaps this is to spare those analysts that predict forward earnings from having to contend with the multitude of Price-to-Cash definitions.

The problem with using accounting-based measures of income is that they include a number of non-cash items: depreciation, amortization, stock-based compensation, deferred taxes and others. 'Earnings' also includes a deduction for interest expense paid to the bondholders. Interest cash outflows should be added back into the net free cash flow if the goal is to arrive at a multiple that is reflective of an enterprise valuation, versus just a value to the equity holders.

Most commonly when analysts refer to the Price-To-Cash ratio, they mean Net Operating Cash, but sometimes mean Net Income plus Depreciation & Amortization less Preferred Share Dividends. The difficulty with this latter definition is that 'Net Income' is after deduction for both Current and Deferred Taxes, whereas only the normalized cash taxes should be deducted.

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[11] Sharpe, William, F., et al. *Investments, 2nd Canadian Edition*, pg 580, Prentice Hall Canada Inc.
[12] Ibid.

While operating cash is a better representative for value than 'earnings', it still suffers from the absence of any provision for sustaining capital cash outflows. Normalized long-term operating cash flows would usually exclude the amount of recurring capital refurbishment cash that is expended annually in order just to maintain the normalized level of service or production[13]. In order to properly account for the net amount of cash that will be available to the investors (the equity and debt holders combined, if applicable), net operating cash flows should be reduced by estimated annual sustaining capital cash outflows.

THE DIFFICULTY IN IDENTIFING A NORMALIZED CASH FLOW

It is easy to criticize professional valuators for the misuse of one-year estimates in the application of the Price-to-Cash (P/C) ratio, but more difficult to offer a constructive alternative. The problem comes back to being able to derive a normalized representative for the denominator.

Clearly the one year estimate should not be used in isolation. That is, it is the valuator's obligation to consider prior year's results to ascertain whether the current forward estimate may be an anomaly. And, if it is, one needs to consider the question 'should it be?' Has something significant occurred to the firm such that the normalized expectation of future cash flows will be different than in recent history? If so, does the current estimate fully reflect this change? If not, and the current estimate is different than the recent history of real cash flows (i.e. the nominal differences alone have been factored out), one needs hold the current estimate suspect. A financial analyst may have correctly accounted for a one-time predicted cash impact, but non-recurring cash changes should not be included the P/C multiplier.

As to the idea of simply using the past five, seven or ten years average of prior cash flows, as Graham and Dodd have suggested, Molodovsky has cautioned against this. "The greatest

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[13] Ironically, if the annual amount of Sustaining Capital is approximately equal to the accounting depreciation charged, using "Earnings" rather than pre-Sustaining Operating Cash Flows may provide a more precise estimate of the true valuation multiple.

drawbacks of an average of past current earnings are that it is subject to distortions through inclusion of unrepresentative years and that it cannot allow for any estimated future changes."[14] Short of having time machines to go forward and check how things actually turn out, however, valuators only have the past with which to make inferences about the future.

Referring back to our Companies A, B, C, D example, the standard deviations in annual cash flows are 0, 5, 5 and 10 respectively. We know that the 'correct' normalized cash flow for each of the firms (i.e. the cash flow that derives a multiple of 10) is $10 million. If Company D (the one with the most volatile earnings) is selected and each Five, Seven and Ten year consecutive period within the 60 year *known* future are averaged, the following results are obtained (recall that all the annual data presented is stated in real Year 1 dollars, therefore each of the data points many added and averaged without distortion from the effects of inflation):
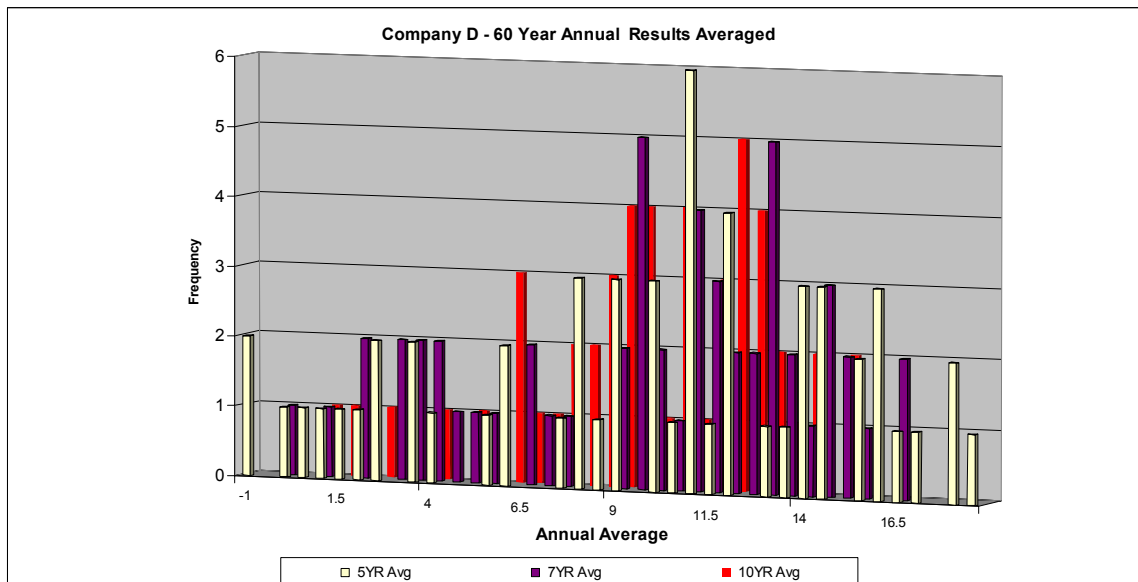
The above graph is a frequency distribution that shows the concentration and dispersion of how many times a given average is encountered. Note, for example, using a five-year series from the 60 year sample, an average of negative one million earnings will occur twice. And remaining with the five-year average series, on one occasion an average of $18.5 million will be incurred.

[14] Molodovsky, N. *A Theory of Price-Earnings Ratios,* The Analysts Journal (November 1953):pg 65 – 80

In a 60 year sample, there are 56 unique occurrences of a 5-year average. This means that there is a 2 in 56 chance that one might conclude the normalized annual cash flow for Company D was negative one million … or a 1 in 56 chance that one might surmise it was $18.5 million. Perhaps these chances are rare. However, there still is a 15 in 56 chance that the 5-year average will amount to less than $6.5 million and 17 in 56 chance that it will be over $13 million.

While there is a much more centralized tendency in the 10-year average series (at the extremes there is one occurrence of a $1 million 10-year average and two occurrences of a $15 million average), the dispersion is still $14 million. There are 51 occurrences of a unique 10-year sequential grouping in 60 years of data. There is a 9 in 51 chance (17.6%) that one would observe a 10-year average less than $6.5 million and a 5 in 51 chance (9.8%) that an observation over $13 million will be seen.

The point here is that, while averaging more data (and, in real life, it will be past historical data, not future data) does appear to improve the probability of correctly identifying the long-term normalized earnings power of the firm, there is still considerable room for error when dealing with firms with highly volatile earnings and/or cash flows.

By comparison, if we look at the same averaged-groupings of Company C results:

Company C 60 Year Annual Results Averaged

Legend: □ 5YR Avg ■ 7YR Avg ■ 10YR Avg
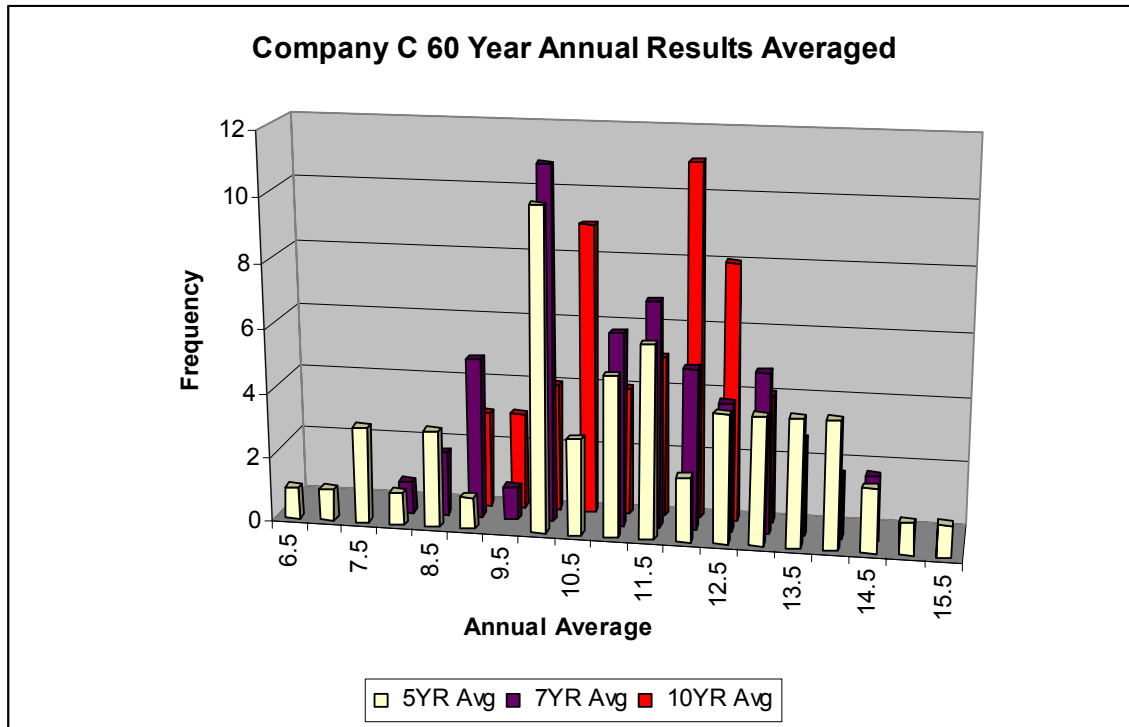
Now the overall dispersion of observations is only $9 million ($6.5 to $15.5) for the 5-year average series and only $4 million ($9.0 to $13.0) for the 10-year average. This fact alone goes a long way in demonstrating why the P/E or P/C multiple can be an acceptable form of valuation only if the earnings and/or cash generating abilities of the firm has been and is expected to continue to be relatively stable.

For the Company C 5-year averages, there is no observation less than $6.5 million and there was a 12 in 56 (21.4%) chance of seeing an observation in excess of $13 million. For the 10-year series, there were no occurrences of averages lower than $6.5 million nor higher than $13. In consistently stable firms, then, longer averaged periods significantly improve the accuracy of the estimate. To put this into context, one can see from the following graph that, by selecting any one of the possible 51 averaged ten-year's estimates of a normalized year, the multiple could have ranged from a high of 11 to a low of 7.6

Company C Possible Multiples Using 10-Yr Averaged Data
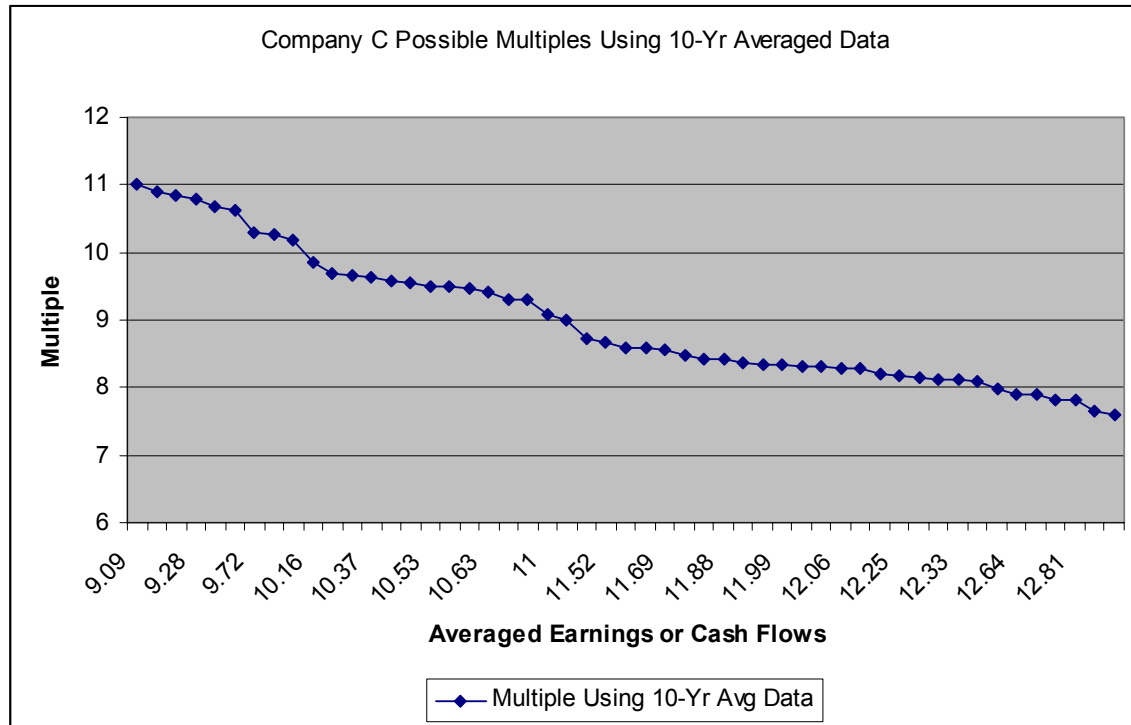
So while these Company C results may be far more agreeable to any of those that might have been concluded for Company D, a multiple of 7.6 to 11 is still a considerable range. Relating this back to our Company C year one data would cause us to conclude a firm value of $76 to $110 million. Not really a level of precision that would be helpful to any interested party.

CONCLUSION

The Price-to-Cash multiple (or even the less meaningful Price-to-Earnings multiple) is largely founded upon the assumption that annual Net Cash (or Earnings) are relatively stable. As evidence of this, some analysts even speak of using the P/E multiple as an estimate for nominal payback. "So a stock with a P/E of 10 has a payback period of 10 years, assuming its earnings are the same each year. But most companies don't make the same earnings year after year."[15] And this last fact is the predominant reason why the P/E (or P/C) ratio has such a limited application in the business valuation world. It is precisely because corporate cash flows do tend

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[15] From Morninstar's "Interactive Classroom", Course 304 (online)

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to show a high degree of year-over-year variation[16] that makes the selection of any one single year more likely to be divergent from, rather than representative of, the long-term normalized version.

However, for those businesses that are expected to generate consistently stable earnings or cash flow over the long-term, the P/E or P/C multiple will generate satisfactory results.

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[16] For an empirical study on the overall year-over-year stability of earnings for 30 NYSE listed firms selected at random, see the adjunct Accession Capital paper "Annual Earnings Consistency for 30 NYSE Firms".

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