Abstract

The paper examines three benchmark earnings concepts: (i) permanent earnings with the cost-of-equity determining the capitalization, (ii) permanent earnings with the risk-free rate determining the capitalization, and (iii) economic earnings (Hick's concept). The concepts can be measured empirically using stock prices. The paper starts by explaining how the three concepts differ in terms of reflecting risk and growth. Critically, (i) and (ii) highlight two cases along a continuum. In case (i) growth can be dismissed because the cost-of-capital alone determines the P/E ratio. By contrast, for (ii) the risk free rate determines the P/E ratio, the idea being that risk and growth cancel out. We refer to this case as full cancelling out (FCO) of risk and growth. The paper then compares the concepts to reported earnings using US data, for the period 1976 to 2012, split into industrial vs. financial firms. The main findings show that, as an overall average, (ii) provides a better approximation for industrials' reported earnings than (i). For distinct sub periods, however, (i) better approximates reported earnings. As to benchmark (iii), the data shows it relates the closest to financial firms.

KEYWORDS: Permanent earnings, Economic Earnings, Firm valuation, Earnings yields.

JEL Descriptors: M41, G32

Earnings: Concepts versus Reported

1. Introduction

Accounting research during the past few decades tends to view firms' reported earnings as the income statement's "bottom line", without any reference to what earnings actually tries to represent. Most prior research assumes that earnings take a role within the financial reporting framework because of their generic "information" value, which influences investors' perceptions about the firm and its future cash flows. However, a more traditional perspective on earnings views such thinking as too broad and lacking in specifics as to how reported earnings relate to firm value and changes in value. This literature focuses on "income measurement" and it introduces terms like permanent earnings (or sustainable earnings) and economic earnings (Hick's concept of earnings).

This measurement perspective on earnings differs radically from the information perspective because it directs attention to the hypothesis that the way reported earnings is connected to firms' values is far from open ended. It seeks to explain deviations of reported earnings from theoretical earnings constructs in terms of the consequences of the way the accounting system is designed. Moreover, this approach helps to understand practical approaches to equity valuation such as earnings multiples as espoused, for example, by Graham and Dodd (1934, 1951). [1]

[1] Some of the income measurement literature seeks to portray economic concepts of earnings as ideal measures of income to which reported earnings should seek to conform. We call this the (normative) ideal view of economic earnings concepts. This is not our view. Our view is that one can gain a better understanding of the nature of reported earnings by understanding what features of the accounting system that cause reported earnings to deviate from economic concepts of earnings. We call this the (positive) benchmark view of economic earnings concepts. Beaver and Demski's (1979) critique of income measurement is directed at the (normative) ideal view.

This paper develops three earnings concepts and proceeds to consider their relation to reported earnings. Our empirical approach hinges on the observability of the various earnings concepts. An assumption of "efficient markets" implies observed stock prices can be used as inputs to measure the various concepts of earnings. The earnings concepts also potentially depend on cost-of-capital, the risk-free rate, and, as a minor adjustment term, the current net distribution of wealth (or dividends).

Two of the earnings concepts we consider fall into the category of permanent earnings, because they explain value itself. As for the third concept, we refer to it as economic earnings, which, in contrast, explains the change in value. Specifically, the concepts can be characterized as follows.

(i) Permanent earnings using the cost-of-capital as the capitalization factor. If 'E*' represents permanent earnings, then the E*/P ratio connects directly with cost-of-equity. It leaves out "growth" as a free-standing quantity that enters the assessment of an appropriate PE ratio, which suggest a "slippage" when one tries to connect real world PEs with PE*. But risk is relevant insofar it influences the cost-of-equity. This earnings concept involves some subtle aspects, to be discussed later. Ryan (1988) is the modern originator of this concept.

(ii) Permanent earnings using the risk-free rate as capitalization factor. Roughly speaking, the E*/P ratio now relies on the risk free rate as the anchor – this rather than the cost of equity as in (i). The underlying formal model effectively hypothesizes that earnings growth and earnings risk cancel each other. This model has a long history and it can be tied to the Gordon (1959) growth model (at least as an approximation). We refer to it as the permanent earnings model with a *full cancelling out of risk and growth* (FCO).

(iii) Economic earnings: this concept is defined by the change in a firm's market value adjusted for dividends. Contrary to (i) and (ii), the concept makes no reference to a capitalization factor or how to infer price itself from earnings. The expected value of economic earnings depends on risk.

Our empirical analyses center on (ii) because it embeds the idea that growth and risk fully cancel each other (on average). This risk-growth cancellation feature is not present in (i) and (iii), as noted. But one can still organize these concepts relative to (ii) and more generally one can organize the empirics of E/P ratios around whether risk dominates growth or the other way around. Hence (ii) acts as a natural reference point in the empirical analyses.

The stage setting empirics uses a robust, non-parametric approach, because observations of "measurement errors" will be interdependent over time and in the cross-sections. Thus we evaluate the signs of the "error", defined by reported earnings minus the risk-free rate times the stock's price. In broad terms, the data supports a fifty-fifty proposition for pluses and minuses (that is, FCO, full cancelling out). The result holds on a value weighted basis no less than on an equally weighted basis. But it should be noted that for certain sub-periods, spanning many years, the error can be mostly positive or mostly negative. In other words, the error signs are serially correlated. So only the grand average of all the errors, across all firms and all years, can be viewed as approximating zero. The periods 1976-80 and 2004-12 tend to have positive errors (reported earnings exceed permanent earnings), and the period in between tends to have negative errors. For these two specific sub- periods, the results suggest that permanent earnings (i) are a better approximation than (ii).

The paper hypothesizes that financial firms differ from industrial firms because their balance sheets approximate mark to market accounting much more so than industrial firms. As a consequence, reported earnings are now much more like economic earnings, suggesting that the theory of economic earnings can be applied. Specifically, financial firms' earnings differ from permanent earnings, the (ii) concept, and E/P ratios should be better benchmarked by the cost of equity than the risk free rate. In other words, the idea of FCO is effectively absent in the data for financial firms.

2. Earnings Concepts

Accounting research refers to two benchmark (theoretical) concepts of earnings: "economic earnings" and "permanent earnings".[2] Economic earnings, often attributed to Hicks, capture the change in cum-dividend value (and where value is the "correct" value). Permanent earnings, by contrast, capture value, not its change. This concept (also sometimes referred to as "sustainable earnings") puts the onus on the P/E ratio. It has a long history in the accounting literature, going back to at least Graham and Dodd (1934), Black (1980 and 1993), and the earliest version of Beaver's monograph (1981). Scott (1986) also points out the importance of distinguishing between earnings concepts that focus on changes in wealth ('gain' in Scott, 1986) and permanent earnings ('standard stream income' in Scott, 1986).

[2] Hicks (1946 Chapter XIV) considers three concepts of *ex ante* income, and three corresponding concepts of *ex post* income. Our initial definition of permanent earnings is somewhat in the spirit of what Hicks defines as ex ante income No. 1. Our definition of economic earnings, below, corresponds to what Hicks defines as *ex post* Income No. 1. A complete reconciliation of Hicks's and our concept of permanent earnings cannot be done because in his discussion Hicks leaves out any role for risk.

Ryan (1988) identifies the concept of permanent earnings formally. He assumes that in case of a full payout of earnings and a constant stream of expected earnings, discounted at cost of equity, the cum dividend value equals

$$(P_t + d_t) \equiv x_t + x_t/r(e) \qquad (1)$$

In the expression P_t is stock price, d_t dividends, x_t earnings and r(e) represents the cost of equity capital. Alternatively, the expression corresponds to

$$(P_t + d_t)/x_t \equiv c \qquad (2)$$

Where, c represents the earnings capitalization factor (1+ r(e))/r(e). We use PE_r(e) to denote permanent earnings defined using the cost of equity capital.

In (2), x alone suffices as information to infer the cum-dividend value. More subtly, (2) identifies the multiplier/scalar as a direct function of the cost of equity. Setting aside the minor role of dividends, and noting that (1+ r(e))/r(e) can be approximated by 1/r(e), the formal model thus suggests that the E/P ratio should be approximated by the cost of equity, r(e).

A more general approach to permanent earnings simply uses expression (2) as the starting point without prejudging the value of c. It does not have to derive from the cost of equity. Black (1980) underscores this aspect, and he suggests that c=10 would be perfectly fine. Ohlson (1995) recognizes that c can be specified as (1+r(f))/r(f) where r(f) is the current short term risk-free rate. In other words, one can simply replace r(e) with r(f) in (2). The so re-specified formula relates directly to the valuation of a risk-free savings account, often expressed as P = [(1+r(f))/r(f)] x(t) – d(t). The underlying economics makes no reference to the payout ratio; it derives from the present value of dividends discounted by the risk free rate (regardless of the dividend policy). Permanent income defined in this way, can be viewed as a "certainty equivalent" concept of income. In other words it represents the risk free level of income that has the same market value as the risky dividend stream underlying the equity value. We use PE_r(f) to denote permanent earnings defined using the one year ahead risk free rate.

More generally (2) defines a continuum of alternative measures of permanent income depending on the choice of the discount factor. The conventional (Ryan (1998)) version of PE (based on the cost of equity capital) and certainty equivalent PE (based on the risk free rate) are just two particular cases along this continuum.

The reader may object that the discount factor ought to depend on the equity risk. After all, should not P depend on the cost of equity, which in turn depends on risk? This objection misses out on a key element though. Just as P should depend on risk, it should also depend on the growth in expected earnings. And how can risk be present unless there is some commensurate benefit, namely, growth? Thus expression (2) with c=(1+r(f))/r(f) can make sense due to the idea that growth and risk should offset each other under ideal circumstances. Moreover, it should be noted that the formula per savings account can be derived using the cost-of-equity, not r(f), when discounting the future expected dividends to the present (see the appendix).

To gain some intuitive understanding as to why PE defined by the risk free rate might provide a more accurate benchmark for reported earnings one can think about the classic Gordon (1959) growth model

$$P_t = d_t(1+g)/ (r(e) - g) \qquad (3)$$

where g is growth, and all other variables are as previously defined. Assuming full dividend payout we can set d equal to x, and rewrite (3) as

$$(P_t + d_t)/x_t = (1+ r(e))/(r(e) - g) \qquad (4)$$

In contrast to (2), the Gordon model has r(e) - g as the denominator of the capitalization factor as opposed to r(e) by itself.

Now consider the possibility that the equity risk premium in the Gordon growth model is roughly equal to the growth rate. In such case the capitalization factor becomes (1+ r(e))/r(f), which approximates (1+r(f))/r(f) for reasonable values of r(f) and the risk premium. For example, suppose the risk free rate is 4% and the risk premium is 4%. Then (1+ r(e))/r(f) equals 27 and (1+r(f))/r(f) equals 26. In contrast (1+ r(e))/r(e) equals 13.5. So if one considers the choice of capitalization factor from the viewpoint of the Gordon growth model, one can see that a capitalization factor calculated using the risk free rate will provide a more accurate benchmark for earnings capitalization if growth and the equity risk premium fully cancel out.

Risk and growth cancellation is a familiar idea in financial economics. The so-called "Fed model" of equity valuation refers to neither risk nor growth: to estimate value, this model, too, capitalizes earnings using a risk-free rate.[3]

$$P_t=E(x_{t+1})/r(f) \qquad \text{(Fed)}$$

In two respects, however, the Fed model differs from our valuation framework. First, the Fed model connects the forthcoming *expected* (reported) earnings to current

[3] Lander et al (1997) credit Graham and Dodd (1951) as providing the earliest recognition of the link between bond yields and earnings yields. The "Fed model" terminology was inspired by a 1997 report of the Board of Governors of the Federal Reserve System (BGFR (1997)). For further details see Lander et al. (1997) and Asness (2003).

value; our framework, by contrast, connects *concurrent* earnings to current value. Second, the Fed model capitalizes the expected forthcoming earnings using the *10-year* risk free rate; our framework, as explained in the appendix, refers to the *short term* one year risk-free rate.[4]

Whether the risk free rate applied to share prices gives a reasonable benchmark for reported earnings depends on how accounting practices deal with growth and risk. In broad terms one can argue that the accounting works such that there are two effects that actually end up offsetting each other. On the one hand, current earnings cannot recognize the expectation of growth-oriented positive NPV activities in the future, though today's price does. Due to accounting conservatism, risk also tends to push earnings recognition into the future, thereby lowering the current earnings yield ratio if the firm is growing. Therefore, the impact of growth is fairly clear cut: it pushes the EP in a downward direction. On the other hand, risk pushes the EP yield in the opposite direction. Thus whether the risk free rate provides a reasonable benchmark for the reported earnings to price ratio depends on whether growth and risk cancel out. Hence the question arises whether, *on average,* these two effects cancel each other. The empirical results of Easton et al (2002) provide initial support to the possibility that the average risk premium of industrial equities reflects the expected growth rate of earnings. Their results indicate that estimates of the expected rate of return for their sample of US equites were roughly equal to the expected long term growth rate. In fact their results suggest more than full cancelling out for their 1981-1998 sample period.

[4] Penman and Reggiani (2013) apply a similar risk/growth cancellation idea to model the relation between expected returns (as the dependent variable) and the current earnings yield, the current book to market ratio, and the growth rate of the firm, as the explanatory variables.

In the Appendix we provide a formal treatment of growth/risk cancelation. Assumptions are made on the time-series dynamics of earnings, which will depend on both risk and growth in such a way that the implied valuation (the E/P ratio) reflects the risk-free rate.

The next section reports on the primary empirical findings: the extent to which earnings capitalized by r(f) serves as a good benchmark when one characterizes permanent earnings. It is a "grand" hypothesis, evaluated across all firms and all years. But we also distinguish between financial and industrial firms because we expect the FCO hypothesis to hold as better for industrial than financial firms.

To aid understanding, one can organize the possible scenarios around E/Ps and the reference points r(f) and r(e) (where r(e)>r(f)). Figure 1 presents the five possibilities. First note that scenarios A1, A2, A3, B and C depend on the E/P ratio as compared to r(f). In the middle, the B case, E/P approximates r(f) so that FCO applies. At the very bottom, C, where the E/P ratio is less than r(f) , growth dominates risk. This category may in fact be quite common when interest rates are relatively high and economic circumstances are attractive. Though stocks may look expensive, the growth relative to risk scenario is generally favorable. In sharp contrast, in the A cases risk dominates growth, and stocks tend to "look cheap" if one does not recognize that the risk vs. growth trade-off is unfavorable. Interest rates can often be quite low. But the A cases can be refined into three sub-categories. A3 allows for a mild case where risk dominates growth and clearly for many periods most firms fall into this category. Category A2 changes the conceptual frame of reference because the E/P benchmark now focuses squarely on risk, a la Ryan's model, with growth lacking in force. The top line, A1, is truly extreme; the E/P ratio is now so high that risk completely dominates growth. Thus Figure 1 enumerates the full range of E/P ratios, and the question arises, yet again, whether GAAP has worked such that FCO permanent earnings, case B, supplies an empirically useful benchmark.

Now compare the permanent earnings concepts to "economic earnings". In this case earnings, by definition, explain the cum-dividend change in market value ((p_{t+1}+d_{t+1}) – p_t). Economic earnings relate directly to a change in value, whereas permanent earnings focus on value itself. The underlying accounting for economic earnings picks up on an ideal where the firms' totality of tangible and intangible assets/liabilities are marked to market; in this case market and book values perforce coincide, assuming rational pricing without arbitrage. The definition requires no discount rate, of course. Nonetheless, the *expected* earnings equal the firm's cost of equity times the opening market(=book) value. In this case the expected value of economic earnings will be equal to the expected value of PE_r(e). Morevover, given that PE_r(e) is strictly greater than PE_r(f) it follows that the expected value of economic earnings exceeds PE_r(f).

The Fed model provides some intuition as to why one should expect economic earnings to exceed permanent earnings. Suppose that, in fact, earnings are calculated using perfect mark to market accounting. In this case it is obvious that expected earnings relate to value only if one uses cost of equity as opposed to the risk free rate; that is $E[\{(p_{t+1}+d_{t+1}-p_t\};t] = r(e)\, p_t > r(f)\, p_t$. Roughly, r(e) is twice the magnitude of r(f) so it makes a material difference. If we lived in a world with approximate mark to market accounting, then an expected earnings capitalization on the basis of a risk free rate would grossly overstate actual values.

3. Empirical Framework and Hypotheses

Referring back to Figure 1, A3 and C will be the most common categories; after all, B and A2 represent points of approximations rather than categories per se and A1 is far too extreme to be common. But one can still ask whether B, that is PE_r(f), holds on average and, also, whether B better approximates reported earnings than A2, PE_r(e). For industrial firms we expect to find evidence of significant cancelling out of growth and risk i.e. scenario B. For financial firms, because their accounting better approximates marking to market, we expect results to be closer to A2 than B. An issue requiring sophisticated judgement is how A3 and C compare. The empirics will show that it depends substantially on a few specific sub-periods, so the idea is that A3 and C, as an average, leads to B.

In more detail, the empirics assess the following hypotheses.

(a) A non-parametric evaluation of FCO: reported earnings minus PE_r(f) ≈0.

Our first approach to the FCO hypothesis evaluates the sign (plus or minus) of the difference between reported earnings and PE_r(f), across all years and firms. Because the test is straightforward without any distributional assumptions, it provides a natural starting point. Additional analyses later elaborate on the hypothesis via consideration of the sensitivity of the findings to firm size and more parametric-type tests.

Our initial approach ignores time series dependence in the ratio of pluses to minuses. Such time-series modelling poses considerable problems if one wants robust statistics. Thus we proceed descriptively by simply counting the number of pluses/minuses for each year. From this data we further derive the “grand total” of pluses/minuses, and the percentage of years when the pluses exceed the minuses. If FCO holds, we expect to find a 50% of positives and a 50% of minuses.

We expect FCO to be more descriptive on average for industrial firms than financial firms. For the latter firms the pluses should exceed the minuses by a distinct margin. Hence, we report separate results for the two types of firms.

(b) Firm size and the hypothesis that reported earnings minus PE_r(f) ≈0.

One naturally has to worry that the pooling of small/large firms in our first set of tests could be a driving force behind an acceptance of FCO. If such is the case, then one would have to conclude that it does not hold for the economy as a whole. Thus we also assess the hypothesis on a value weighted basis: the positive and negative signs weighted by relative market values. As before, results are shown separately for industrial and financial firms.

(c) An evaluation of FCO focusing on the earnings yield.

FCO corresponds to (2) and thus it implies that the (adjusted) earnings yield should on average equal r(f)/(1+r(f)). This parametric perspective provides a different flavor because the magnitudes speak to the issues directly. The outcome for each observation, {E/(P+D)} – {r(f)/(1+r(f))}, when averaged over firms for any given year, and across years, tell us the extent of deviations from the null and how these change over the years. The data can also be tabulated to bear on the cross-sectional variation in any year. Two basic questions can be addressed: by what percentage does the null hypothesis differ from zero, and to what extent do we observe years which "clearly" deviate from the null hypothesis.

(d) Evaluation of the Ryan hypothesis, reported earnings minus PE_r(e)≈0.

The absence of FCO (that is, non-cancelling out, or NCO), points toward PE_r(e) as a competing benchmark. Will it be apparent that FCO should be rejected using PE_r(e), in sharp contrast to PE_r(f)? A test of the hypothesis requires an assumption on the average risk premium. We assume a market risk premium of 4%, and make no attempt to refine the analysis by estimating betas. The "error" due to assuming all betas equal to one should be minor and cancel out across observations. As to the 4% figure, it is in line with what the capital asset pricing empirical literature finds. An exhaustive study by Duff and Phelps (2013), for example, reports an average market risk premium for the S&P 500 over the period 1963 to 2012 of 4.5%. In any event, evaluations of PE_r(e) as a benchmark follows the earlier approach when the focus was on PE_r(f): the risk free rate plus 4% simply replaces the risk free rate. Results are reported separately for industrial and financial firms; the expectation is that for financial firms PE_r(e) serves as a better benchmark than PE_r(f); the opposite is likely to hold for industrial firms.

(e) Comparisons of permanent earnings and reported earnings with economic earnings

Economic earnings, the change in market value plus dividends, can be compared to reported earnings and permanent earnings defined with r(f). Do such earnings behave according to the previously discussed concepts? That is, economic earnings should on average exceed PE_r(f) as well as reported earnings, at least for industrial firms.

To compare economic earnings with PE_r(f) we first report the proportion of firms for which economic earnings exceed PE_r(f) year by year. In addition, to allow for the possibility that the findings may be sensitive to firm size, we report the percentage of market capitalization for which economic earnings exceed PE_r(f). Separate results are presented for industrial and financial firms. The procedures follow the same steps when we compare economic and reported earnings.

(f) A Test of the Fed Model

The Fed model, using r(f) as capitalization factor, can be evaluated by replacing the realized t+1 earnings with those expected. The basic test thus evaluates the null hypothesis that $x(t+1)/r(f) - P(t) = 0$. The test is similar to the basic ones in (a), (b), (c), except that the perspective has changed away from contemporaneous earnings to subsequent earnings. Thus results should be similar, consistent with theory (developed in the appendix).

4. Results

Compustat and CRSP provide the data, for earnings and market values, respectively. The sample period comprises 37 years, starting 1976 and ending 2012. The industrial and financial samples consist of, respectively, 214,875 and 44,590 firm year observations.

As background to our motivation for presenting separate results for industrial and financial firms Figure 2 reports the year by year median Tobin's q for industrial and financials. For financials the median Tobin's q is close to one in most years and with no discernable time trend. The mean of the yearly median q values is 1.03. This is consistent with the idea that the total assets of financial firms as reported in the financial statements are, on median, close to market values. In contrast the median Tobin's q values for industrials are mostly materially greater than one except for the first four years of the sample period. Furthermore there is a tendency for the median Tobin's q to increase over time, perhaps reflecting an increase in the importance of growth opportunities as a proportion of industrial company stock market values. The mean of the yearly median q values for industrial firms is 1.35 compared to 1.03 for financials. The median q value for industrials exceeded the median q value for financials in all years after 1979.

We now consider empirical issue (a), outlined in the previous section. Table 1 shows the percentage of firms for which reported earnings exceeds PE_r(f) both by year and for the sample period as a whole. The FCO hypothesis predicts that this percentage should on average be around 50%.

The results for industrial firms do indeed fluctuate around 50%. Over the 37 years there are 10 years when the percentage exceeds 50%, that is 10/37 or about a third of all years. The mean (median) percentage is 42% (39%). Overall these results indicate a high degree of risk/growth cancelling out. Surprisingly, referring to Figure 1, category A is therefore less common than category C, the latter being characterized by an environment with relatively high interest rates and favorable economic circumstances: growth dominates risk. To be sure, there is also a high degree of serial correlation over time, and that suggests informally that the null is not readily rejected at conventional levels.

Figure 3A presents the results in graphical form. The relevant percentage is much greater than 50% for the first four years of the sample period when inflation rates were high and stock prices were depressed. From 1980 through to 2003 the relevant percentage is less than 50% in all years except 1994 when it is just slightly above 50%. For this period the data is consistent with more than FCO, category C. The relevant percentage rises above 50% after the financial crisis in 2008; it moves the data into category A.

During this period short term interest rates have been exceedingly low due to the policy of Quantitative Easing (QE) and the stock market has been moderately priced (or even depressed) *given* these exceedingly low short term interest rates. But this post 2008 period combined with what happened during the late seventies cannot make up for the category C period in between.

Table 1 also considers financial firms, and now the results differ markedly. Out of the 37 years, there are no less than 28 years when the mean percentage is over 50%, that is, category A applies overwhelmingly. The cross-year mean (median) is 62% (58%). So for firms in the financial sector risk exceeds growth and P/E ratios end up being quite low. Figure 3B reports the results in graphical form. The graph mostly plots above the 50% line with significant peak periods in the inflationary period 1976 to 1980, 1993 to 1995, 2002 to 2006, and 2009 to 2012.

Comparing the results for financials with industrials on a year by year basis, we find that the percentage of firms for which reported earnings exceeds PE_r(f) is greater for financial firms in all but the last five years of the sample period i.e. the recent financial crisis. This supports the idea that FCO provides a better characterization of the reported earnings for industrial firms than it does for financial firms. The time series correlation of the results for industrial firms with the results for financials in Table 1 is 86%, consistent with broad macroeconomic factors causing the general level of share prices for financial and industrial firms to move together.

Table 2 tests the FCO hypothesis on a value weighted basis, that is (b) in the previous section. This test places more weight on the larger firms that, arguably, on average are likely to have a lower risk premium and lower unrecognized growth options. Out of the 37 years, the percentage exceeds 50% in 21 years, or 21/37 about 60% of all years. The mean (median) percentage is 57% (58%). Again the results are highly cyclical over time with long swings below and above the 50% benchmark. But the results make it clear that as one moves from an equal weighted approach to a value weighted approach category A becomes more pervasive than C, but only slightly so. Nevertheless the null of FCO still seems to be reasonable for industrial firms on a value-weighted basis.

As to financial firms on a value-weighted basis, results point to category A without qualification. There are only 6 years (out of 37) when the percentage is lower than 50%. The cross-year mean (median) percentage is 74% (78%).

We noted earlier that serial correlations in outcomes cause a problem when evaluating the null-hypothesis of 50%. To allow for this we model the time series results reported in Tables 1 and 2 as first order autoregressive Ar (1) processes and test if the intercepts of the processes are equal to 0.5, i.e. 50%. Applying the Ar (1) model to the results for industrial firms shows that the 95% confidence interval for the intercept is 31.3% to 62.7%. So the null hypothesis of FCO cannot be rejected. For the financial firms the relevant confidence interval is 62.2% to 102%. Thus for financial firms this test rejects the null hypothesis of FCO in favor of less than full cancelling out. On a value weighted basis, the Ar (1) tests for Table 2 results in a confidence interval of 31.7% to 90.3% for industrial firms; the null of 50% cannot be rejected. For financial firms the 95% confidence interval is 51.5% to 75.1% which rejects the FCO hypothesis at the 5% level.

Some robustness results can be evaluated via rolling windows that "smooth" results over time. Table 3 represents the results in Tables 1 and 2 for twenty eight ten-year rolling windows. For industrial firms there is no ten-year window in which either the mean or the median percentage of firms with reported earnings greater than PE_r(f) exceeds 50%. For financial firms the mean (and median) percentage exceeds 50% in 25 ten-year rolling windows out of 28. The results on a value weighted basis show that, for industrial firms, the mean (median) percentage of market capitalization for which reported earnings exceed PE_r(f) is greater than 50% in 9 (10) rolling windows out of 28. For financial firms, the mean (and median) percentage of market capitalization for which reported earnings exceed PE_r(f) is greater than 50% in all 28 rolling windows. Thus Table 3 supports FCO for industrial firms -- but not for firms in the financial industry.

With respect to issue (c) we suggest that perhaps a more intuitive way of viewing the evidence for and against FCO is to compare the earnings yield with the inverse of the permanent earnings capitalization factor derived using the risk free rate, i.e. r(f)/(1+r(f)). Table 4 provides the results of this test for our industrial and financial samples.

With respect to the industrials, the results in table 4 indicate that the median value of the earnings yield minus the benchmark tends to be negative, that is, firms' (expected) growths exceed their risks. Consistent with the null hypothesis, the difference is relatively small, median across years -2%, which can be reasonably approximated by zero insofar the median interquartile range is no less than 15% (= 2% -(-13%)). There is a reasonable degree of stability in this finding across the years in spite of the years having spanned all sorts of different macroeconomic environments (GNP growth, inflation rates and interest rates). The great bulk of years, more than 2/3rds, fall inside a (-3%,+3%) range. The only exception is the high inflation years in the 70's. Also, for all years but three, the first quartile is negative and quartile three is positive suggesting that the median in any given year, positive or not, does not act as a representative outcome for a large proportion of the firms. Firms' earnings yields are highly scattered in any given year, with zero acting as a reasonable (unconditional) center across all years. The null hypothesis "mean of the medians =0" across 37 years (presumed, unrealistically, to be independent) can be accepted at the 5% level.

As to the earnings yields of financial firms, the results could not be any more different. The median value of the earnings yield minus the risk free rate benchmark has shifted from -2% to + 2%, a swing of 4%. Moreover, the number of years when the interquartile range violates the null has more than doubled to 7 observations (years), all for the same reason, the first quartile earnings yield minus the benchmark is positive. Also note that the "mean of the medians= 0" hypothesis is now rejected at the 5% level. So it is quite clear that financials end up with a very different tilt in the numbers. Still, some caution is called for. One can argue that both sectors, industrials and financials, deviate non-trivially from the null; they just happen to do so from different sides of the null. When everything is said and done, this relativity conclusion, as opposed to the null by itself, would seem to be reliable.

Table 5 reports on issue (d): the extent to which the data supports the competing permanent earnings hypothesis, PE_r(e), that is, A2 in Figure 1. As noted before, the average market risk premium for both industrial and financial firms is assumed to be 4%.

Panel A, in Table 5, reports the results on an equally weighted basis. Results do not surprise the least since replacing r(f) with r(e) perforce decreases the incidence when reported earnings are less than the reference earnings. The mean (median) percentage of positives for industrial firms is 25% (20%) when reported earnings exceed the permanent earnings defined using r(f). As to the financial firms, the evidence is much more supportive of the hypothesis; the mean (median) percentage is 40% (37%) of positives. On a value weighted basis the results are similar, as panel B shows. One arrives at the following conclusion: as one compares the two permanent earnings models as benchmarks it is clear that for industrial firms one must reject cost-of-equity capitalization in favor of risk-free rate capitalization (FCO), but for financial firms the reverse is true.

Table 6 evaluates the first part of issue (e), whether economic earnings exceed PE_r(f), on average. Theory predicts that such should be the case, for financial and industrial firms alike. In panel A, the case of equally weighted observations, the median percentage is greater than 50% for 24 years out of 37 for industrial firms, and the cross-year median is 57%. For financial firms the median percentage is greater than 50% in 30 years out of 37 and the cross-year median is 64%. The predicted tendency for economic earnings to exceed PE_r(f) is even more apparent in panel B, where results have been value weighted. The results are thus unambiguous: economic earnings on average exceed permanent earnings when r(f) capitalizes.

Table 7 compares economic earnings with reported earnings, the second part of (e). Theory predicts economic earnings should exceed reported earnings for industrial firms if such firms can be benchmarked by PE_r(f). But the latter condition cannot be taken for granted, which gives rise to an evaluation of economic earnings compared to reported earnings. We also hypothesize that economic earnings exceed reported earnings for financial firms, but we also expect the gap between economic earnings and reported earnings to be smaller for financial firms due to such firms better approximating full mark to market accounting.

For industrial firms, Table 7, panel A shows that the median percentage of firms for which economic earnings exceeds reported earnings is 53%, and the median percentage exceeds 50% in 23 years out of 37. These results are surprising given the results in Table 1 and Table 6A for industrial firms. Given the results in Table 1 and table 6A we would have expected the results in Table 7A to show mean (median) values above the 52% (53%) reported for industrials. For financial firms Panel A indicates that the all years' median percentage of firms for which economic earnings exceeds reported earnings is 56%, and the median percentage exceeds 50% in 22 years out of 37.

Results are somewhat stronger in favor of economic earnings exceeding reported earnings when one adjusts for market capitalization. For industrial firms, Table 7 Panel B shows that the median percentage of firms for which economic earnings exceeds reported earnings is 67%, and economic earnings is greater than reported earnings in 26 years out of 37. For financial firms results are pretty much the same as in Panel A. Overall, Table 7 supports our prediction that economic earnings should be greater than reported earnings on average. This is true for both financial and industrial firms. However, we were expecting to see a bigger gap between economic and reported earnings for industrial firms than financial firms, but the results do not lend strong support to this idea. On an equally (value) weighted basis the gap is slightly greater for financial (industrial) firms.

Finally, Table 8 presents the results related to the Fed model, issue (f).[5] We report the percentage of market capitalization for which one year ahead reported earnings exceeded market value at the start of the year multiplied by the risk free rate. We expect to find results similar to the ones reported in Table 2, that is, reported earnings exceed the reference earnings in about 50% of all cases. The Fed model holds up reasonably well for industrial firms; the overall median slightly exceeds 50%. As to financial firms, unsurprisingly in light of earlier results, the Fed model does not work at all; the median percentage when realized earnings exceed reference earnings is no less than 83%.

5. Concluding Remarks

The paper's key contribution centers on the idea that firms' reported earnings can be compared to a number of benchmark concepts of earnings. These concepts of earnings differ as to whether they indicate a stock of value, with two versions of permanent earnings depending on the capitalization rate, or a flow, which leads to economic earnings. With these ideas in place and developed in terms of implications, the empirical analyses provide some reasonably robust conclusions.

First, for industrial firms, reported earnings tend, as a broad average, to exceed PE_ r(f), about half the time. It is an interesting result insofar it suggests that GAAP accounting works such that income measurement cancels risk and growth; accordingly, equity valuation can be based on the risk-free rate in the capitalization of earnings, at

[5] The Fed model is normally implemented by comparing earnings yields calculated using consensus analyst earnings forecasts with a long term rate of interest calculated using yields on 10-year (or, sometimes, 30) government bonds. Since analyst forecasts are not available for all firm years in our sample, we used realized earnings. We use the one year rate of interest to facilitate comparison with the other tests in the paper.

least as a crude first cut. The findings stand in contrast to the hypothesis that cost-of-equity should provide the rate in earnings capitalization, which the evidence thus does not support. However, these findings must be reversed when one shifts focus to the financial industry: PE_r(e) now serves as a better benchmark than PE_r(f). We attribute this finding to the accounting principles used by financial firms, which come closer to mark to market accounting.

Second, the difference between reported earnings and PE_r(f) changes over time, and the analysis of different sub-periods yields different conclusions. The data shows that reported earnings are far more likely to exceed permanent earnings (defined using r(f)) in two distinct sub-periods, one in the late seventies and one more recently following the Fed's Quantitative Easing policy.

Third, economic earnings tend to exceed reported earnings more often than not, something close to 60% of the times on a value-weighted basis. This result makes eminent sense insofar that theory predicts that economic earnings exceed permanent earnings when capitalized by r(f). However, whilst we had predicted the tendency for economic earnings to exceed reported earnings to be much stronger for industrial firms than financial firms, this prediction is not convincingly supported by the results.

Fourth, the so called Fed model, where the expected earnings are capitalized (in this paper) by the short term risk-free rate to estimate value, holds up reasonably well for industrial firms. That is, realized t+1 earnings exceed r(f)*p_t about half the time. In sharp contrast, for financial firms the realized t+1 earnings tend to be greater most of time, again underscoring the difference between closer to mark to market accounting for financial firms and the accounting for industrial firms.

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Appendix

The appendix formalizes a model of permanent earnings for any strictly positive discount rate.

To keep matters simple, we initially assume that the short-term risk-free rate is a constant, as is the cost of equity. The notation is:

r = a discount used to define permanent earnings

r(f) = the one year risk-free rate

r(e) = the cost of equity

x_t = permanent earnings for period t

d_t = dividend at date t

p_t = value at date t.

To keep matters simple, we initially assume that the short-term risk-free rate is a constant, as is the cost of equity.

The *definition* of permanent earnings calculated using the discount rate r is as in the body of the paper:

$$x_t \equiv (p_t + d_t)/c \quad \text{(A1)}$$

where $c \equiv (1+ r)/r$.

The constant 1/c defines a (cum-dividend) earnings rate, and its inverse represents a capitalization factor applied to (concurrent) earnings. Critically, the definition (A1) ensures that reported earnings suffice to infer (cum-dividend) value: given cum dividend value one knows permanent earnings and conversely. In its essence, A1 is simply a re-scaling representation.

Expression (A1) with r equal to r(f) derives from a savings account. But it is only a special case because a savings account value relates to the forthcoming earnings deterministically; the forthcoming earnings are *certain* and without risk. The ensuing analysis allows for *uncertain* (permanent) earnings for the forthcoming period. To avoid risk-neutrality, this earnings uncertainty necessitates a cost of capital parameter different from r(f). It serves the usual role as a discount factor when one values the future expected dividends. In other words, a second assumption A2 stipulates that p(t) =PVED(r(e)). Thus it should be underscored that PVED with a discount-factor r(e) co-exists with A1 which is wholly independent of the discount factor, except that the price depends implicitly on r(e), because the dynamics and realizations of x(t) depend on r(e).

Though assumptions A1 and A2 effectively suffice to develop the earnings dynamics, we also need a standard regularity condition on the dividend policy. It stipulates that the expected dividends grow (asymptotically) less than the discount factor. A policy that fixes the dividends to earnings ratio, d(t)=x(t)*K, K>0, always satisfies the regularity condition. To be sure, such an assumptions is easily combined with something like d(t)=0 when t is even. The set of admissible dividend policies is truly general.

Given these assumptions, A1 and A2 plus the regularity condition on the dividend policy, routine analysis derives the permanent earnings dynamic:

E[xt+1;t]=[1+r(e)]xt - r[1+r(e)]/[1+r]dt (ED)

In fact, the more general result runs as follows: *Given the three statements A1, A2, ED, any two of the statements imply the third.*

One can consider interesting special cases of (ED). First consider the case of zero dividend payout. In this case we can see that the growth rate of permanent earnings will be the cost of equity capital whatever the discount rate used to define permanent earnings.

Next consider the case of 100% dividend payout of the level of permanent earnings defined using the rate r. In this case if r is set equal to r(e) then the expected rate of growth of permanent earnings will be exactly zero. In contrast if r is set equal to r(f) then the expected rate of growth of permanent earnings will be approximately equal to the risk premium (using the approximation that [1+r(e))/(1+r(f)] roughly equals one). In general for any value of r between r(f) and r(e) the expected rate of growth of permanent earnings will range between zero and the risk premium (again making use of the approximation that [1+r(e))/(1+r)] equals one). For a given cost of equity, the rate of growth of permanent earnings increases with r and decreases with the dividend payout ratio.

In our main analysis we focus particular attention on permanent earnings defined using the risk free rate. One can relax the assumption of a fixed interest rate to allow for a stochastically changing short term risk free rate. Expression (A1) generalizes to define permanent earnings as

$$x_t \equiv (p_t + d_t)/ c_{t-1} \qquad \text{(A1”)}$$

where $c_{t-1} = (1+r(f)_{t-1})/ r(f)_{t-1}$. Like the earnings on a savings account, the inverse of the capitalization factor at date t depends on the earnings rate during the most recent past period. Hence, the correct subscript related to the risk-free rate is t-1 when the valuation pertains to date t.[6] All empirical tests rely on this changing interest rate approach and they refer to x.

[6] Gode and Ohlson (2004) discuss valuation in a stochastic rates setting. They underscore that it is the interest rate at the start of a period that capitalizes the subsequent earnings, whether expected or concurrent.

Figure 1

E/P, Risk and Growth: Five Scenarios

A1	$x/P \gg r(e)$	RISK WITHOUT THE GROWTH BENEFIT
A2	$x/P \approx r(e)$	RISK FOCUSED (RYAN)
A3	$r(e) \gg x/P \gg r(f)$	SOME GROWTH BENEFIT BUT LESS THAN FCO
B	$x/P \approx r(f)$	FCO: GROWTH CANCELS OUT RISK
C	$x/P \ll r(f)$	MORE THAN FCO, GROWTH DOMINATES RISK

TABLE 1: % of firms with Reported Earnings > PE_r(f)
Permanent earnings [PE_r(f)] calculated using the 1-year Treasury Bill Rate

	INDUSTRIAL FIRMS		FINANCIAL FIRMS	
	% Positives	N	% Positives	N
Total	40	214875	63	44590
1976	82	3442	79	407
1977	83	3396	83	409
1978	84	3564	86	437
1979	71	3787	77	550
1980	49	3952	68	580
1981	43	4461	57	639
1982	20	4664	37	663
1983	18	5055	41	706
1984	36	5136	53	727
1985	17	5139	32	749
1986	21	5363	47	820
1987	40	5589	55	891
1988	42	5394	58	895
1989	31	5219	49	891
1990	30	5198	47	875
1991	19	5258	43	904
1992	31	5497	52	926
1993	43	5923	73	1546
1994	56	6325	79	1719
1995	37	7061	68	1757
1996	30	7732	57	1767
1997	29	7868	46	1706
1998	31	7689	52	1635
1999	33	7830	69	1709
2000	33	7898	66	1754
2001	20	7509	51	1673
2002	35	7160	73	1699
2003	45	6844	80	1656
2004	53	6786	82	1649
2005	51	6647	81	1648
2006	42	6592	72	1626

[Cont…]

TABLE 1: [Cont…]

	INDUSTRIAL FIRMS		FINANCIAL FIRMS	
	% Positives	N	% Positives	N
2007	32	6567	58	1605
2008	39	6287	43	1555
2009	44	6027	58	1518
2010	56	5975	72	1500
2011	55	5913	74	1513
2012	59	4128	83	1286
Mean	42		62	
Median	39		58	
St. Error	2.91		2.48	
corr with median btm (pval)	0.55 (0.00)		0.12 (0.49)	

PE_r(f) is implied permanent earnings, calculated as $(p_t + d_t)/c_{t-1}$, where p_t is market capitalization at the fiscal year end date, d_t is dividends, and c_{t-1} is $(1+r(f)_{t-1})/\ r(f)_{t-1}$, where r(f) is the risk free rate, which is the 1 year treasury bill rate. We match the Treasury bill rate with the firm-year observation based on the fiscal year end month. Reported earnings is Net income, as reported in Compustat. N is the total number of observations (positives or negatives). btm is the book to market ratio.

TABLE 2: % of market capitalization (over total market capitalization of all firms) held by firms with Reported Earnings > PE_r(f)
Permanent earnings [PE_r(f)] calculated using the 1-year Treasury Bill Rate

	INDUSTRIAL FIRMS		FINANCIAL FIRMS	
	% Positives	N	% Positives	N
1976	77	3442	94	407
1977	96	3396	97	409
1978	97	3564	98	437
1979	87	3787	94	550
1980	58	3952	86	580
1981	57	4461	78	639
1982	23	4664	45	663
1983	26	5055	55	706
1984	53	5136	64	727
1985	26	5139	41	749
1986	33	5363	76	820
1987	63	5589	66	891
1988	68	5394	85	895
1989	37	5219	64	891
1990	34	5198	65	875
1991	16	5258	56	904
1992	35	5497	65	926
1993	57	5923	79	1546
1994	78	6325	87	1719
1995	48	7061	80	1757
1996	38	7732	72	1767
1997	28	7868	45	1706
1998	16	7689	36	1635
1999	16	7830	68	1709
2000	27	7898	58	1754
2001	13	7509	31	1673
2002	61	7160	87	1699
2003	81	6844	96	1656
2004	90	6786	97	1649
2005	90	6647	97	1648
2006	81	6592	92	1626

[Cont…]

TABLE 2: [Cont…]

	INDUSTRIAL FIRMS		FINANCIAL FIRMS	
	% Positives	N	% Positives	N
2007	65	6567	74	1605
2008	82	6287	59	1555
2009	86	6027	86	1518
2010	95	5975	90	1500
2011	95	5913	93	1513
2012	93	4128	91	1286
Mean	57		74	
Median	58		78	
St. Error	4.60		3.15	
corr with median btm (pval)	0.20 (0.23)		0.25 (0.13)	

All variables are as in Table 1.