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# Why have measures of earnings quality changed over time?[☆]

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ABSTRACT

The properties of earnings have changed dramatically over the past 40 years. Prior studies interpret this trend as a decline in earnings quality but disagree on whether it results from changes in the real economy or changes in accounting standards. I find that each new cohort of listed firms exhibits lower earnings quality than its predecessors, mainly because of higher intangible intensity. I conclude that the trend of decline in earnings quality is due more to changes in the sample of firms than to changes in generally accepted accounting principles (GAAP) or in the earnings quality of previously listed firms.

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## 1. Introduction

The literature finds that over the past 40 years or so, there has been an increase in the volatility of earnings and a decrease in both the relevance of earnings and the degree of matching between concurrent revenues and expenses.[1] The literature interprets these changes as a decline in earnings quality (EQ). But there is disagreement about whether the decline is "due to changes in GAAP or due to real economic changes" (Collins et al., 1997, p. 65). I reexamine this question by using

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[1] See Collins et al. (1997), Lev and Zarowin (1999), Givoly and Hayn (2000) and Dichev and Tang (2008). The relevance of earnings is measured by the adjusted-$R^2$ of the regression of annual stock returns on the levels of, and changes in, annual earnings (Easton and Harris, 1991; Lev and Zarowin, 1999). The volatility of earnings is measured by the standard deviation of earnings over a rolling four-year window. Matching is measured by the coefficient on the current expenses in a regression of revenues on past, current, and future expenses (Dichev and Tang, 2008). Matching represents the contemporaneous revenue–expense correlation.

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more recent data than do most prior studies, allowing me to shed light on the issue in three ways. First, I show a strong negative correlation between intangible intensity and average EQ measures, i.e., volatility, relevance, and matching. (For ease of discussion, an increase in earnings volatility is viewed as a declining EQ measure.) Second, I show that successive cohorts of newly listed firms exhibit increasing intangible intensity and decreasing EQ measures. Third, I show that the progressive declines in EQ measures are largely the result of the assimilation of successive cohorts of newly listed firms into the firm population. Hence, I identify the “new-list” phenomenon as the biggest reason for the decline in average EQ measures over the study period of 1970 to 2009.

By the outset of the twenty-first century, the United States had moved from being primarily an industrial economy to becoming mainly a knowledge-based economy (Baumol and Schramm, 2010; Shapiro and Varian, 1998). As a result, U.S. firms have increased their investments in intangible capital such as innovation, advertising, information technology, human capital, and customer relations (Corrado and Hulten, 2010). Consistent with this trend, there has been a dramatic increase over time in U.S. firms' average intangible intensity as measured by research and development (R&D) expenses, market-to-book ratios, and selling, general, and administrative (SG&A) expenses (Francis and Schipper, 1999; Banker et al., 2011; Eisfeldt and Papanikolaou, 2013).

I hypothesize that increases in intangible intensity reduce earnings quality for several reasons. An intangible-intensive firm is likely to display high volatility in its revenues and cash flows because intangible investments carry higher uncertainty about future benefits than do tangible investments (Kothari et al., 2002). Furthermore, relative to material-intensive firms, intangible-intensive firms are more likely to have growth options, whose values and changes in values are typically not recognized in the balance sheet and income statement (Smith and Watts, 1992; Watts, 2003; Roychowdhury and Watts, 2007; Skinner, 2008). Similarly, firms generally expense their investments in internally generated intangibles as incurred, except for industry-specific practices (e.g., SOP 98-1 [AICPA 1998] for software firms). An immediate expensing of intangible investments, irrespective of when their associated benefits materialize, should increase the volatility in expenses and reduce the matching between concurrent revenues and expenses. The increased revenue and expense volatilities, compounded by the decline in matching, should increase the volatility in earnings. But volatile earnings are less informative for predicting a firm's future fundamentals (Dichev and Tang, 2009; Barton et al., 2010). Thus, intangible-intensive firms should display less earnings relevance. As expected, I find a strong and negative association between intangible intensity and average EQ measures (volatility, relevance, and matching).

I next examine whether the temporal trends in intangible intensity and EQ measures encompass all firms. I find that an increasing percentage of “new” firms, i.e., those listed after 1970 (Fama and French, 2004), enter knowledge-intensive industries such as business services, communications, pharmaceuticals, healthcare, and computers. These industries mainly transform “information from one pattern into another,” unlike material-intensive industries that transform “matter and energy from one form into another” (Apte et al., 2008, p. 15). Thus, knowledge-intensive industries need a higher proportion of intangible inputs in their production functions than do material-intensive industries. Consistent with this idea, successive cohorts of new firms show increasing intangible intensity. In contrast, “seasoned” firms (those listed before 1970) continue to operate in material-intensive industries, such as textiles, utilities, aircraft, steel, and railroads. Following Fama and French (2004), these findings show that seasoned firms continue to pursue businesses that have reached the mature phases of their lifecycles (Anthony and Ramesh, 1992; Jovanovic and MacDonald, 1994).[2] In such phases, firms tend not to radically change their production functions unless breakthroughs in production technology occur (Hambrick, 1983; Chen et al., 2010). Consistent with this concept, increases in average intangible intensity over time mainly reflect the increasing intangible intensity of the successive cohorts of new firms rather than increasing intangible usage by seasoned firms.

In addition, I find that the average EQ measures of the firm population exhibit a declining trend. More important, successive cohorts of new firms display declining EQ measures despite controls for overall time trends. I investigate these trends by dividing the firm population into seasoned-firm and new-firm segments. The number of firms in the new-firm segment increases and its average EQ measures decline with the arrival of each new listing cohort. As a result, the average EQ measures of the new-firm segment decline more rapidly than those of the seasoned-firm segment. The average earnings relevance (the adjusted-$R^2$ of the regression of annual stock returns on levels of, and changes in, annual earnings) of the new-firm segment declines from 20.4% to just 2.6% from the period 1970–1974 to the period 2005–2009. This decline shows that the earnings of new firms no longer explain the variation in their stock returns in any economically significant way. In comparison, the average earnings relevance for seasoned firms declines less dramatically, from 20.1% to 14.4%. Further, for the new-firm segment, the average matching, measured by the concurrent revenue–expense association (Dichev and Tang, 2008), declines from 1.05 to just 0.59. This decline shows that a significant portion of the new firms' outlays are now expensed before recognition of the associated revenues. In comparison, the average revenue–expense matching of the seasoned-firm segment declines by much less, from 1.05 to 0.94. Similarly, the average earnings volatility of the new-firm segment increases more sharply. As a result, at the end of the study period, relative to the seasoned-firm segment, the new-firm segment's average earnings relevance is 82% lower, matching is 37% lower, and earnings volatility is 476% higher.

Because new firms have lower EQ measures than seasoned firms, the addition of new firms to the firm population should lower overall average EQ measures. I quantify this effect by disaggregating the changes in average EQ measures over the sample period of 1970 to 2009 into new-list and seasoned-firm effects. The seasoned-firm effect reflects the decline in

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[2] Fama and French (2004) find seasoned firms to be relatively large firms with high survival rates and stable profits, but low growth prospects.

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