Did Earnings Lose their "Relevance"?

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ABSTRACT

The literature documents that the cross-sectional earnings-returns relation has weakened over time. Yet, in contrast, we find that the time-series, firm-level earnings-returns relation has remained stable. Our results demonstrate that while the relation between idiosyncratic earnings and returns has weakened, the relation between firm-level stock returns and aggregate earnings has strengthened. The two time-series trends cancel each other, resulting in a stable overall time-series, firm-level earnings-returns relation. Furthermore, the serial correlation of firm-level earnings has declined, but its correlation with prior aggregate earnings has intensified, pointing to the increased importance of aggregate earnings in predicting firm-level earnings and assessing firm value.

Keywords: aggregate earnings, firm-level stock returns, earnings response coefficient, firm-level time-series regression

JEL Classification: G14, M41

1. Introduction

This paper examines how the relation between earnings and returns (Ball and Brown, 1968) has changed over time. Prior studies found that the cross-sectional association between earnings and returns (or Earnings Response Coefficient, henceforth, ERC) has declined over time. The declining trend is robust to various specifications and periods (e.g., Collins, Maydew, and Weiss, 1997; Francis and Schipper, 1999; Brown, Lo, and Lys, 1999; Lev and Zarowin, 1999; Srivastava, 2014; Barth, Li, and McClure, 2019).[1] This decline has generated a debate in accounting about whether earnings have lost the information content or "value relevance."[2] However, these studies fail to present a complete view of the earnings-returns relation because they mostly examine the relation in the cross-section. By construction, the cross-sectional analysis ignores the potential impact of common earnings or the systematic component of earnings on firm-level stock returns.[3] Thus, the impact of aggregate earnings is excluded from most studies of the earnings-returns relation. Furthermore, firm-level time-series analyses are often not included in existing studies, even though firm-level time-series analyses could provide different insights from firm-level cross-sectional analyses. A cross-sectional analysis compares a firm to other firms during a given period, while a time-series analysis examines the temporal earnings-returns relation within a given firm over time.

In this paper, we fill the literature gap by conducting a more complete analysis of the earnings-returns relation over time including both time-series as well as cross-sectional analyses

[1] When analyzing corporate bonds, Givoly, Hayn, and Katz (2017) find an increased earnings-returns relation over time. Moreover, Ogneva (2012) document differential earnings-returns relation between high and low accrual quality firms. Please see Dechow, Sloan, and Zha (2014) for a review. Recently, Oh and Penman (2020a) and (2020b) modify the regression model based on a valuation framework and do not find a decline in the earnings-returns relation.
[2] Not all studies assume a decline in ERCs or the R^2 from earnings-returns regressions as an undesirable feature that motivates changes to accounting standards (e.g., Holthausen and Watts, 2001).
[3] Inflation may also play a role in the aggregate earnings-returns relation (e.g., Shivakumar 2007; Cready and Gurun, 2010; Konchitchki, 2011, 2013; Gallo, Hann, and Li, 2016; Shivakumar and Urcan, 2017).

and taking into account the impact of systematic earnings changes. Specifically, we examine three different earnings-returns associations, which encompass all the different components listed above, over time. First, following the studies listed above, we examine the cross-sectional association between firm-level earnings and returns while extending the sample period to 2019. Second, we examine the time-series association between firm-level earnings and returns (Teets and Wasley, 1996). The firm-level time-series regression further allows us to examine the association between firm-level returns and the systematic component of earnings (proxied by aggregate earnings). This component of the earnings-returns relation is excluded, by construction, from the cross-sectional analysis. Finally, we examine the time-series association between aggregate earnings and returns. By examining all three different earnings-returns associations over time, we provide a comprehensive view of the temporal variations in the earnings-returns relation.

We define earnings as a firm's change in annual earnings before extraordinary items deflated by beginning market capitalization and accumulate a firm's twelve-month return from the fourth month after the previous fiscal year-end.[4] Aggregate earnings are based on the sum of all sample firms, and aggregate return is CRSP value-weighted stock return, including dividends.[5] Prior studies document an increase in cross-sectional dispersion of earnings (e.g., Jorgensen, Li, and Sadka, 2012; Kalay, Nallareddy, and Sadka, 2018) and time-varying idiosyncratic volatilities (e.g., Campbell, Lettau, Malkiel, and Xu, 2001; Brandt, Brav, Graham, and Kumar, 2010; Bartram, Brown, and Stulz, 2019). The increase in earnings dispersion reduces ERCs, therefore we focus

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[4] When including both the level of earnings and the change in earnings, following Easton and Harris (1991) and Easton, Harris, and Ohlson (1992), we find consistent patterns of temporal changes in the cross-sectional and time-series analyses. We examine long-window associations, instead of a short-window event study around earnings announcements, because relevant earnings information may not always be released via earnings announcements (e.g., Ball and Shivakumar, 2008). Our inferences do not change when using excess return after subtracting risk free rate.
[5] We find similar results when using CRSP equal-weighted stock return, including dividends, as aggregate return.

our analysis on R^2. However, we do not take a stance on the debate of whether or not an increase (or decrease) in R^2 is desirable.

Overall, our findings suggest that the relation between earnings and returns has not declined over time, but rather the nature of the relation has changed. Consistent with existing studies, we find that the positive cross-sectional association between earnings and returns has declined over time. Over the last few years, from 2011-2019, the adjusted R^2 reduces to only 0.04 (less than a half of the adjusted R^2 at the beginning of the sample period from 1963-1980). In contrast, the time-series association between firm-level earnings and returns has remained stable over time (or slightly increasing), with an average adjusted R^2 of 0.06. One potential explanation for the discrepancy between the cross-sectional and the time-series associations is the increasing importance of systematic earnings and the decreasing association between idiosyncratic earnings and returns. We define idiosyncratic earnings as earnings that are specific to an individual firm and use aggregate earnings to capture systematic earnings that are common to all firms.

To explore the increased role of systematic earnings, we examine the time-series association between earnings and returns at both the aggregate and firm levels. Consistent with Kim, Schoenberger, Wasley, and Land (2020), we find that the aggregate association between earnings and returns has changed from negative (e.g., Kothari, Lewellen, and Warner, 2006; Sadka, 2007; Sadka and Sadka, 2009) to positive. The change in the aggregate earnings-returns relations is accompanied by an increasing adjusted R^2 over time. In time-series regressions of firm-level returns on both firm-level and aggregate earnings, we further document a rising incremental R^2 for aggregate earnings and a declining incremental R^2 for firm-level idiosyncratic earnings. These results suggest that the relation between earnings and returns has changed rather than simply declined over time. Specifically, systematic earnings became more important, while idiosyncratic earnings became less important in explaining variations in firm-level stock returns.

It is worth noting that the increasing association between aggregate earnings and returns (Kim, Schoenberger, Wasley, and Land, 2020) does not imply an increase in the time-series relation between firm-level returns and aggregate earnings. For example, before the 2000s, the aggregate earnings-returns relation was negative, while the firm-level associations in both the cross-section and the time-series were positive. This suggests that the strengthened aggregate earnings-returns relation and the weakened firm-level earnings-returns relation could co-exist. Therefore, an increased relation between firm-level returns and aggregate earnings is not obvious.[6]

One underlying reason for the declining importance of idiosyncratic earnings is lack of persistence. Specifically, transitory earnings components, such as special items, are likely to reverse in the next period and less relevant to investors for assessing firm values (Miller and Rock, 1985; Kormendi and Lipe, 1987; Collins and Kothari, 1989). Consistent with existing evidence (e.g., Freeman, Ohlson, and Penman 1982; Fama and French, 2000), we document a negative serial correlation of firm-level earnings change. Furthermore, the serial correlation has become more negative over time, suggesting that firm-level earnings changes tend to reverse. The increasing negative serial correlation implies that abnormally high earnings do not slowly disappear, but rather reverse immediately in the following period. In other words, a firm that outperformed in the current period is likely to underperform in the next period. This result is consistent with the declining importance of idiosyncratic earnings due to lack of persistence.

[6] Our primary empirical results are based on a sample that excludes financial institutions, distinct from the argument in Kim, Schoenberger, Wasley, and Land (2020) that financial institutions attribute the increased aggregate earnings-returns relation.

In contrast to the declining serial correlation of firm-level earnings, the association between firm-level earnings and the previous year's aggregate earnings is positive and strengthens over time. This finding suggests that the overall market performance has become more persistent than firm-level performances. The rising association between firm-level earnings and lagged aggregate earnings is consistent with the earlier documented increasing importance of aggregate earnings in explaining the firm-level earnings-returns association. These results together highlight the increasing valuation of systematic earnings.

We also examine an alternative hypothesis that the declining (rising) importance of idiosyncratic (systematic) earnings is due to change in earnings predictability over time (Beaver, Lambert, and Morse, 1980; Collins, Kothari, and Rayburn, 1987; Collins and Kothari, 1989; Kothari and Sloan, 1992). Sadka and Sadka (2009) and Choi, Kalay, and Sadka (2016) show that earnings predictability affects the earnings-returns relation but have not examined whether predictability explains the time trend in the earnings-returns relation. In unreported results, we fail to find a consistent time trend in earnings predictability that can explain our findings.

We perform a battery of tests to assess the robustness of the results. Using quarterly data to reduce the survivor bias in the firm-level time-series analysis (Fama and French 2000), we find consistent evidence of an increasing association between firm-level returns and systematic earnings and a declining association between firm-level returns and idiosyncratic earnings. When replacing beginning market capitalization with beginning total assets as an alternate earnings deflator, we continue to find consistent time trends, suggesting the results are unlikely to be influenced by a scaler effect (Brown, Lo, and Lys, 1999).

We further examine different earnings components because items toward the bottom of an income statement tend to be transitory and reduce the earnings-returns relation (Lipe, 1986; Elliott and Hanna, 1996; Donelson, Jennings, and McInnis, 2011). After replacing income before extraordinary items with operating income that excludes interest expense, income taxes, and special items, we continue to document increasing importance of systematic earnings and decreasing importance of idiosyncratic earnings. However, the increase and the decrease magnitudes are smaller compared to those using earnings that include transitory items. Consistently, the serial correlation of firm-level earnings change is less negative, and the association between firm-level returns and the previous year's aggregate earnings is weaker when using operating income instead of the "bottom-line" net income. These findings suggest that transitory earnings components exacerbate the divergent importance between idiosyncratic and systematic earnings. Similarly, we replace firm-level earnings change with analyst forecast error as an alternate earnings news proxy (Easton and Zmijewski, 1989; Bradshaw and Sloan, 2002).[7] We find increased importance of both aggregate forecast errors and firm-level forecast errors over the recent years from 2002-2019.

The nature of our sample does not allow for well-identified tests to examine why systematic earnings have become more "relevant" in the overall relation between earnings and returns. Nevertheless, we conjecture that the increased importance of aggregate earnings relates to the superstar firm phenomenon, especially in the post-Sarbanes Oxley (SOX) era. Autor, Doron, Katz, Patterson, and Reenen (2017, 2020) argue that most industries' market shares are dominated by only a few large superstar firms, who are more profitable, productive, and innovative than their smaller-sized competitors. Such a trend is potentially related to globalization and frequent technological disruptions that have led to transient competitive advantages over time (Schumpeter,

[7] Analyst forecast error is based on realized pro-forma earnings that exclude transitory earnings components and provides an opportunity to examine whether analysts understand the rising importance of aggregate earnings, measured as the sum of all IBES firms' forecast errors. However, the analysis is restricted to a shorter period from 2002-2019 due to the available data from IBES.

1912, 1942; Chun, Kim, Morck, and Yeung, 2008; D'Aveni, Dagnino, and Smith, 2010).[8] For example, the percentage of sales conducted online has increased from 11 percent in 1999 to 42 percent in 2018, and the percentage of households with internet access has increased from 18 percent in 1999 to 90 percent in 2018.[9]

We conduct several cross-sectional analyses to examine our conjecture. When partitioning the sample by firm size or the market-to-book ratio, we find that the declining relation between firm-level returns and idiosyncratic earnings is driven by large and growth firms. Large firms have become larger during recent years. As a result, their firm-level earnings are not as relevant as aggregate earnings when their business is more subject to macroeconomic conditions. The superstar firm hypothesis suggests that growth firms are more likely to be superstar firms, consistent with 56 (13) percent of superstar firms, identified as the largest 100 firms based on market capitalization, are growth (value) firms.

To directly examine the superstar hypothesis, we replace overall aggregate earnings with superstar firm aggregate earnings and identify superstar firms as the largest 100 firms based on beginning market capitalization each year. We find that the incremental R^2 of superstar earnings presents similar trends as the incremental R^2 of aggregate earnings. The finding is robust to using only the largest 50 or 25 firms as superstar firms and suggests that superstar firms' earnings have increasing relevance for non-superstar firms' valuation, consistent with their dominant influence in the product market (Autor et al., 2020; De Loecker et al., 2020).

[8] Recent studies show increased industry concentration and weakened competition (e.g., Grullon, Larkin, and Michaely 2019; De Loecker, Eeckhout, and Unger, 2020), distinct from the increased competition argument by Irvine and Pontiff (2009). Specifically, De Loecker et al. (2020) analyze listed firms' profitability based on the Compustat data and attribute the rise of market power to Schumpeter's (1912) technological disruption.

[9] The percentage of sales conducted online comes from Census E-Commerce Statistics for manufacturers (NAICS 31-33), wholesalers (NAICS 42), and retailers (NAICS 44-45). The percentage of households with internet access comes from the Census 1997 survey and the Pew Research Center post-2000 annual survey.

We caution that our results are based on listed firms only and may not be generalized to privately held firms because studies have shown that listed firms are drastically different from privately held firms due to the endogenous listing decision (e.g., Davis, Haltiwanger, Jarmin, and Miranda, 2006; Brown and Kapadia, 2007). The decline in the number of publicly traded firms is also apparent in our study.

The remainder of the paper proceeds as follows. In Section 2, we describe our sample and provide the results of three different associations and robustness tests. Section 3 presents additional cross-sectional analyses, and Section 4 concludes the paper.

2. Sample and Results

2.1 SAMPLE AND SUMMARY STATISTICS OF VARIABLES

Our sample comprises U.S. firms with listed common equity securities (CRSP share code: 10 or 11), excluding ADRs (American Depository Receipts), REITs (Real Estate Investment Trusts), and closed-end funds. The sample period starts in 1963 to avoid selection bias in the pre-1963 Compustat annual data (Ball and Watts, 1977; Fama and French, 1992). We require non-missing income before extraordinary items from Compustat and beginning market capitalization from CRSP. The sample period ends in 2019. Our primary analysis focuses on the sample that excludes financial institutions, identified based on SIC four-digit codes from 6000-6999, to differentiate from the financial institution explanation in Kim, Schonberger, Wasley, and Land (2020). After excluding financial firms, our sample includes 178,559 firm-years with 15,724 distinct firms.

Change in earnings for firm i of fiscal year t ($\Delta X_{i,t}$) is firm i's year t's annual earnings before extraordinary items (Compustat: IB) minus the year t-1's annual earnings before extraordinary items, deflated by the year t's beginning market capitalization (CRSP:

PRC×SHROUT). Following prior studies (Kormendi and Lipe, 1987; Collins and Kothari, 1989; Hayn, 1995; Elliott and Hanna, 1996; Lev and Zarowin, 1999), we use beginning market capitalization as the earnings deflator to be consistent with the stock return's denominator. However, we do not use earnings per share or stock price per share to avoid the scale effect discussed in Brown, Lo, and Lys (1999).

Contemporaneous annual stock return for firm i of fiscal year t ($RET_{i,t}$) is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. For example, a firm's fiscal year ends in December. Its annual return for the year 2000 is the twelve-month cumulative return from April 2000 to March 2001 because most firms announce earnings within three months after the fiscal year end (Collins and Kothari, 1989). Firm stock returns are adjusted for delisted returns based on the estimates from Shumway (1997). Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors.

Aggregate earnings change for year t (ΔX_t) is the sum of all sample firms' year t's annual earnings before extraordinary items minus the sum of all sample firms' year t-1's annual earnings before extraordinary items, divided by the sum of all sample firms' year t's beginning market capitalization. Aggregate return for year t (RET_t) is CRSP value-weighted stock return, including dividends (CRSP: VWRETD).

Table 1, Panel A presents the variable distributions based on 210,740 firm-years from 1963-2019 when including financial institutions and Table 1, Panel B presents the variable distributions based on 178,559 firm-years from 1963-2019 when excluding financial institutions. Consistent with existing studies, the distribution of firm-level earnings change is left-skewed, and the distribution of firm-level stock return is right-skewed. Aggregate earnings change and stock return have a smaller standard deviation than firm-level earnings change and stock return, consistent with aggregation reducing firm-specific noises (Collins, Kothari, Shanken, and Sloan, 1994). Moreover, the distributions of aggregate variables are not as skewed as the firm-level variable distributions. Table 1, Panel C presents the variable distributions based on 112,408 firm-years from 1963-2019 when requiring at least 15 years of data used in the firm-level time-series regression analysis. The variable distributions based on the reduced sample are similar to those based on the full sample.

2.2 CROSS-SECTIONAL EARNINGS-RETURNS RELATION

We first replicate existing studies by examining the cross-sectional association between firm-level earnings change and the contemporaneous firm-level stock return using the following empirical model:

$$RET_{i.t} = \beta_{0,t} + \beta_{1,t}\Delta X_{i.t} + \varepsilon_{i,t} \qquad (1)$$

$\Delta X_{i,t}$ is firm i's year t's earnings (Compustat: IB) minus year t-1's earnings, deflated by beginning market capitalization. $RET_{i,t}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. Both firm return and change in earnings are winsorized at +/-1% in each year to address potential data input errors. We estimate Equation (1) in a cross-sectional regression for each year t. Table 2 reports the number of observations, adjusted R^2, and the coefficient estimate on $\Delta X_{i.t}$ by year for three samples, excluding financial firms, including financial firms, requiring at least 15 years of data in a firm-level rolling window. Figure A plots the annual adjusted R^2 statistics based on the sample that excludes financial institutions.

Consistent with existing studies (Collins, Maydew, and Weiss, 1997; Francis and Schipper, 1999; Brown, Lo, and Lys, 1999; Lev and Zarowin, 1999; Srivastava, 2014; Barth, Li, and McClure, 2019), we document a decline in the cross-sectional earnings-returns relation. Specifically, the annual adjusted R^2 is significantly decreasing, with a t-statistic of three across three samples (see Table 5). For example, based on the sample of 178,559 firm-years, excluding financial firms, the adjusted R^2 is averaged at 0.08 during the period from 1963-1980, declining to 0.04 over the past few years from 2001-2019. The decreased cross-sectional earnings-returns relation becomes more pronounced after including financial firms.

2.3 AGGREGATE TIME-SERIES EARNINGS-RETURNS RELATION

Next, we replicate existing studies by examining the time-series relation between aggregate earnings change and the contemporaneous aggregate stock return using the following empirical model:

$$RET_t = \gamma_{0,r} + \gamma_{1,r}\Delta X_t + \varepsilon_t \ldots\ldots\ldots (2)$$

Aggregate earnings change for year t (ΔX_t) is the sum of all sample firms' year t's earnings minus the sum of all sample firms' year t-1's earnings, divided by the sum of all sample firms' beginning market capitalization. RET_t is CRSP value-weighted stock return, including dividends. We estimate Equation (2) for each 20-year rolling window r and rolls over the window every year. Table 3 reports the signed adjusted R^2 and the coefficient on ΔX_t by the end year of each rolling window for three samples, excluding financial firms, including financial firms, requiring at least 15 years of data in a firm-level rolling window. Signed R^2 is the product of adjusted R^2 and the sign of the coefficient on ΔX_t. Figure B plots the signed R^2 statistics based on the sample that excludes financial institutions.

Consistent with existing studies (Kothari, Lewellen, and Warner, 2006; Hirshleifer, Hou, and Teoh, 2009; Sadka and Sadka, 2009; Gallo, Hann, and Li, 2016; Choi, Kalay, and Sadka, 2016; Kim, Schonberger, Wasley, and Land, 2020), the relation between aggregate returns and earnings is negative during earlier years but has recently changed to positive. The increasing trend is statistically significant with a t-statistic of eight across three samples (see Table 5). For example, based on the sample excluding financial firms, the signed R^2 is averaged at -0.07 during the period from 1982-2000, increasing to 0.09 over the past few years from 2001-2019. Consistent with the evidence in Kim, Schonberger, Wasley, and Land (2020), the increased aggregate earnings-returns relation becomes more pronounced after including financial firms.

2.4 FIRM-LEVEL TIME-SERIES EARNINGS-RETURNS RELATION

The diverging patterns between the firm-level cross-sectional association and the aggregate time-series association potentially suggest differential implications that emerged between firm-level earnings and aggregate earnings. We first document the overall firm-level earnings-returns relation by examining Equation (5) in a firm-level time-series regression (Teets and Wasley, 1996).

$$RET_{i,t} = \alpha_{1,i,r} + \alpha_{2,i,r}\Delta X_{i,t} + \alpha_{3,i,r}\Delta X_t + \varepsilon_{i,t} \quad (3)$$

$$RET_{i,t} = \alpha_{4,i,r} + \alpha_{5,i,r}\Delta X_t + \varepsilon_{i,t} \quad (4)$$

$$RET_{i,t} = \alpha_{6,i,r} + \alpha_{7,i,r}\Delta X_{i,t} + \varepsilon_{i,t} \quad (5)$$

Table 4 reports the mean and median values of adjusted R^2 and coefficients estimated from the firm-level time-series regression with a 20-year window that rolls over every year. We further winsorize the adjusted R^2 and the coefficient at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations. Figure C presents the mean value of adjusted R^2 for each rolling window. Year indicates the last year of a rolling window. Based on the sample excluding financial firms, the mean adjusted R^2 remains at 0.06 and the median adjusted R^2 remains at 0.01 over the sample period, suggesting a stable earnings-returns relation.

To disentangle the relative importance of firm-level and aggregate earnings, we estimate Equations (3)-(5) for each firm i that has at least 15 years of data during a 20-year rolling window r and roll over the window every year. Then we estimate the incremental adjusted R^2 of firm-level earnings $\Delta X_{i,t}$ as the adjusted R^2 from Equation (3) minus the adjusted R^2 from Equation (4) and estimate the incremental adjusted R^2 of aggregate earnings ΔX_t as the adjusted R^2 from Equation (3) minus the adjusted R^2 from Equation (5)..[10] Table 6 reports the mean and median values of the incremental R^2 statistics for firm-level and aggregate earnings. Signed R^2 is the product of incremental R^2 for aggregate earnings and the sign of the coefficient on ΔX_t in Model (3). Figure D and Figure E plot the (signed) incremental R^2 statistics based on the sample that excludes financial institutions.

The average incremental R^2 of firm-level earnings increase to 0.08 during the earlier years and then significantly decline to 0.05 over the recent decade. The overall decline from 1982-2019 is weekly significant (Table 8), but the decline over the recent years from 2000-2019 is significant (t = -6.5). Moreover, the median incremental R^2 of firm-level earnings also presents a significantly declining trend, from 0.08 during 1982-2000 to 0.05 from 2001-2019. Including financial institutions in the sample yields consistent patterns—a significant decline in the mean value from 2000-2019 and a significant decline in the median value over the entire sample period.

In contrasts, the average and median signed incremental R^2 of aggregate earnings have significantly increased, regardless of excluding or including financial firms (Table 8). Based on the sample excluding financial firms, the signed incremental R^2 of aggregate earnings is averaged at -0.06 during the period from 1982-2000, increasing to 0.03 over the past few years from 2001-2019. Based on the median value, the increase is more pronounced, from -0.14 to 0.05.

As a comparison, trends between firm-level and aggregate earnings are significant different from each other (Table 8). Taken together, results from the firm-level time-series analysis suggest that firm-level idiosyncratic earnings have slightly lost their importance in the earnings-returns

[10] Collins, Maydew, and Weiss (1997) and Brown, Lo, and Lys (1999) use a similar approach to calculate the incremental R^2 of earnings versus book equity in the cross-sectional analysis.

relation over the recent years, but aggregate earnings have continuously gained importance over the past 57 years.

The increasing importance of systematic earnings, along with the decline in the idiosyncratic earnings-returns relation, suggests that firms are gradually more exposed to systematic risk than to firm-specific idiosyncratic risk. Distinct from our firm time-series analysis, Collins and Kothari (1989) develop a similar conjecture to explain the cross-sectional earnings-returns relation. They argue and find supporting evidence that firms with a high systematic risk (i.e., high market beta) have a lower earnings-returns relation than low market beta firms. Why firms are more vulnerable to systematic risk than idiosyncratic risk is beyond the scope of our study, but the documented result is potentially explained by globalization and frequent technological disruptions that have caused transient competitive advantages over time (Schumpeter, 1912, 1942; Chun, Kim, Morck, and Yeung, 2008; D'Aveni, Dagnino, and Smith, 2010). Overall, we find that earnings have not lost their "relevance." Although firm-level earnings became less important, aggregate earnings have become more relevant to investors over the last five decades.

2.5 EARNINGS PERSISTENCE AND ITS RELATIONSHIP WITH AGGREGATE EARNINGS

We further examine firm-level earnings persistence and its relationship with lagged aggregate earnings as a potential explanation for the divergent trends. Miller and Rock (1985) argue that the earnings-returns relation is increasing in earnings persistence because persistent earnings allow investors to use current earnings to infer future earnings. Kormendi and Lipe (1987) and Collins and Kothari (1989) document consistent evidence in the cross-section.

Applying this conjecture to the firm-level time-series analysis, we examine firm-level earnings persistence and the relationship between firm-level earnings and the previous year's aggregate earnings using the following model:

$$\Delta X_{i,t} = \delta_{0,i,r} + \delta_{1,i,r}\Delta X_{i,t-1} + \delta_{2,i,r}\Delta X_{t-1} + \varepsilon_{i,t} \qquad (6)$$

$\Delta X_{i,t}$ ($\Delta X_{i,t-1}$) is firm i's year t's (t-1's) earnings minus year t-1's (t-2's) earnings, deflated by year t's (t-1's) beginning market capitalization. Aggregate earnings change for year t-1 (ΔX_{t-1}) is the sum of all sample firms' year t-1's earnings minus the sum of all sample firms' year t-2's earnings, divided by the sum of all sample firms' beginning market capitalization. We estimate Equation (6) for each firm i that has at least 15 years of data during a 20-year rolling window r.

The coefficient δ_1 captures firm-level earnings first-order autocorrelation incremental to the relation between firm-level earnings and lagged aggregate earnings. The coefficient δ_2 captures the relationship between firm-level earnings and lagged aggregate earnings. Table 7 reports the mean and median values of δ_1 and δ_2 in Equation (6). Figures F and G present the mean value of δ_1 and δ_2, based on the sample excluding financial firms.

The average δ_1 decreases from -0.16 during 1982-2000 to -0.26 during 2001-2019, while the average δ_2 increases from 0.21 during 1982-2000 to 1.20 during 2001-2019. Both trends are statistically significant (Table 8). The negative sign of δ_1 is consistent with prior evidence (Freeman, Ohlson, and Penman 1982; Fama and French, 2000; Dichev and Tang, 2008; Jackson, Plumlee, and Rountree, 2018) and suggests that firm-level earnings change reverses in the next period. However, the rising relation between firm-level earnings and the previous year's aggregate earnings suggests that when the overall market performs well, individual firms ride with it and outperform in the future. As the systematic component of earnings becomes more influential in explaining firm earnings, the relation between firm-level return and aggregate earnings strengthens over time. The relations of earnings with the previous year's firm-level and aggregate earnings are significantly different from each other (Table 8) and provide a potential explanation for the rising (declining) importance of aggregate (firm-level) earnings in firm valuation.

2.6 EARNINGS PREDICTABILITY

We further examine an alternative hypothesis that the declining (rising) importance of idiosyncratic (systematic) earnings is because of the changing earnings predictability over time (Beaver, Lambert, and Morse, 1980; Collins, Kothari, and Rayburn, 1987; Collins and Kothari, 1989; Kothari and Sloan, 1992). Assume that firm-level returns incorporate timely information. The ability of returns to predict firm-level earnings suggests a lack of timely information in earnings. Sadka and Sadka (2009) and Choi, Kalay, and Sadka (2016) show that earnings predictability affects the earnings-returns relation but have not examined whether predictability explains the time trend of the earnings-returns relation. Specifically, we examine the following models in a firm-level time-series regression:

$$RET_{i,t-1} = \varphi_{1,i,r} + \varphi_{2,i,r}\Delta X_{i,t} + \varphi_{3,i,r}\Delta X_t + \varepsilon_{i,t-1} \quad (7)$$

$$RET_{i,t-1} = \varphi_{4,i,r} + \varphi_{5,i,r}\Delta X_{i,t} + \varepsilon_{i,t-1} \quad (8)$$

$$RET_{i,t-1} = \varphi_{6,i,r} + \varphi_{7,i,r}\Delta X_t + \varepsilon_{i,t-1} \quad (9)$$

$\Delta X_{i,t}$ is firm i's year t's earnings minus year t-1's earnings, deflated by year t's (t-1's) beginning market capitalization. Aggregate earnings change for year t (ΔX_t) is the sum of all sample firms' year t's earnings minus the sum of all sample firms' year t-1's earnings, divided by the sum of all sample firms' beginning market capitalization. $RET_{i,t-1}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-2's end. We estimate Equations (7)-(9) for each firm i that has at least 15 years of data during a 20-year rolling window r and roll over the window every year.

Using firm-level time-series regressions, we estimate the incremental adjusted R^2 for firm-level earnings predictability as the adjusted R^2 from Equation (7) minus the adjusted R^2 from Equation (8) and estimate the incremental adjusted R^2 for aggregate earnings predictability as the adjusted R^2 from Equation (7) minus the adjusted R^2 from Equation (9). In the untabulated analysis (available upon request), we fail to document predictability patterns consistent with the divergent relevance between firm-level and aggregate earnings. Both firm-level and aggregate earnings predictability increase over the recent years, which may explain the declining importance of firm-level earnings but fail to explain the rising importance of aggregate earnings. We further use the past two years of stock returns as an alternate predictor, but still fail to document patterns consistent with the divergent trends. Lastly, in the cross-sectional regression of lagged stock returns on firm-level earnings, we observe a stable temporal trend. Overall, earnings predictability fails to explain why idiosyncratic and systematic earnings have differential importance over time.

2.7 QUARTERLY ANALYSIS

Our primary analysis examines the annual earnings-returns relation and requires at last 15 years of data in firm-level time-series rolling window. Such a requirement potentially creates a survivor bias (Fama and French, 2000). In this additional analysis, we examine the quarterly data and require at least 15 quarters (i.e., less than four years) of data in the firm-level time-series analysis. We use the seasonally differentiated earnings to capture quarterly earnings change (e.g., Easton and Zmijewski, 1989; Kothari, Lewellen, and Warner, 2006). Quarterly earnings $\Delta X_{i,q}$ is firm i's quarter q's earnings before extraordinary items minus the same quarter of the prior year's quarterly earnings, deflated by beginning market capitalization. $Return_{i.q}$ is firm i quarter q' s three-month cumulative return from the month after its prior quarter' s earnings announcement. For example, a firm announced Q3 earnings in Nov. 2000. Its Q4 return is the three-month cumulative return from Dec. 2000 to Feb. 2001. We use Compustat quarterly data from 1972Q4 to 2019Q4. Both individual firms' return and change in earnings are winsorized at +/- 1% in each calendar quarter to address potential data input errors.

We estimate the cross-sectional regression by each calendar quarter based on the modified Equation (1) where the subscript t is replaced with the subscript q. Consistent with our annual analysis, we find a significant decline in the cross-sectional earnings-returns relation over time (t = -15). The average adjusted R^2 is 0.04 during the period from 1972-1980, decreasing to 0.01 0.01 over the past few years from 2011-2019.

When examining the quarterly time-series relation between aggregate earnings and returns by substituting the subscript q for the subscript t in Equation (2), we restrict the sample to firms whose fiscal years end in March, June, September, or December, so that aggregate return is aligned with aggregate earnings (Kothari, Lewellen, and Warner, 2006). Aggregate return RET_q is CRSP value-weighted stock return, including dividends. Aggregate earnings ΔX_q is the sum of all sample firms' quarter q's income before extraordinary items minus the sum of all firms' quarter q-4's income before extraordinary items, divided by the sum of all firms' beginning market capitalization. Consistent with the evidence in Kim, Schonberger, Wasley, and Land (2020), we document a significantly rising aggregate earnings-returns relation over time (t= 9.5). The average signed R^2 increases from -0.02 during 1977-2000 to 0.11 during 2001-2019.

More importantly, we find more significant results in the firm-level time-series analysis. When estimating the modified Equations (3)-(5) by substituting the subscript q for the subscript t, we find that the mean and median incremental R^2 of firm-level quarterly earnings significantly decline over time (t= -15 and -16, respectively), while the mean and median signed incremental R^2 of aggregate quarterly earnings significantly increase over time (t= 11 and 13, respectively).

The differential patterns are consistent with earnings persistence. When estimating Equation (6) using the quarterly data, we find that the mean and median δ_1 significantly decrease (t= -37 and -35, respectively), while the mean and median δ_2 significantly increase (t= 10.2 and 3.5 respective). Overall, we find consistent results that firm-level earnings have become less relevant, while aggregate earnings have become more important when analyzing the quarterly data.

2.8 ALTERNATE EARNINGS DEFLATOR

The earnings-returns relation is sometimes sensitive to the scale effect (Brown, Lo, and Lys, 1999). Our primary analysis uses beginning market capitalization as the earnings deflator to be consistent with the stock return's denominator. In this additional analysis, we use beginning total asset value as an alternate earnings deflator to assess the robustness of the reported results. Specifically, change in earnings for firm i of fiscal year t ($\Delta X_{i,t}$) is firm i's year t's annual change in earnings, deflated by the year t's beginning total asset (Compustat: AT). Aggregate earnings change for year t (ΔX_t) is the sum of all sample firms' year t's annual earnings minus the sum of all sample firms' year t-1's earnings, divided by the sum of all sample firms' beginning total asset.

We continue to find a significantly declining trend in the cross-sectional earnings-returns relation (t= -3.5) and a significantly increasing trend in the aggregate earning-returns relation (t= 7.3). In the firm-level time-series analysis, we document consistent patterns—decreasing incremental R^2 and persistence of firm-level earnings (t= -4.1, during the period from 2000-2019, and -9.4, respectively) and increasing importance of contemporaneous and previous year's aggregate earnings (t= 15 and 9, respectively). Overall, our inferences do not change when using an alternate earnings deflator.

2.9 OPERATING INCOME

Several studies show that items toward the bottom of an income statement, such as income taxes and special items, lead to a lower earnings-returns relation due to the transitory nature of these income components (Lipe, 1986; Elliott and Hanna, 1996; Donelson, Jennings, and McInnis, 2011). Motivated by these findings, we replace income before extraordinary item (Compustat: IB) with operating income after depreciation (Compustat: OIADP) that excludes interest expense, income taxes, and special items. Specifically, change in earnings for firm i of fiscal year t ($\Delta X_{i,t}$) is firm i's year t's annual operating income after depreciation minus the year t-1's annual operating income after depreciation, deflated by the year t's beginning market capitalization. Aggregate earnings change for year t (ΔX_t) is the sum of all sample firms' year t's annual operating income after depreciation minus the sum of all sample firms' year t-1's annual operating income after depreciation, divided by the sum of all sample firms' year t's beginning market capitalization.

In general, results are similar, except for occasional analyses resulting in smaller magnitudes. For example, the cross-sectional earnings-returns relation significantly declines over time (t= -2.5) and the aggregate earning-returns relation significantly increases (t= 10). In the firm-level time-series analysis, there is a significant decline in the incremental R^2 and persistence of firm-level earnings (t= -7.1, during the period from 2000-2019, and -5.3, respectively) and increasing importance of contemporaneous and previous year's aggregate earnings (t= 10 and 3, respectively). Overall, our inferences do not change when using an alternate earnings measure.

2.10 ANALYST FORECAST ERROR

Researchers have used IBES analysts realized pro-forma earnings as another way to exclude transitory earnings components because analysts often exclude transitory items that are less relevant to investors (Easton and Zmijewski, 1989; Bradshaw and Sloan, 2002). We follow this stream of studies and replace firm-level change in earnings $\Delta X_{i.t}$ with analyst earnings forecast error $FE_{i.t}$, measured as firm i's year t's annual IBES realized pro-forma earnings minus the most recent analyst median forecast consensus prior to an earnings announcement, deflated by the year t's beginning market capitalization. Aggregate earnings forecast error FE_t is the sum of all sample firms' year t's annual IBES realized pro-forma earnings minus the sum of all sample firms' most recent analyst median forecast consensus, divided by the sum of all sample firms' year t's beginning market capitalization. Firm-level analyst forecast errors are winsorized at +/- 1% in each year to address potential data input errors. The sample includes 84,819 firm-years that have available IBIES data from 1983-2019. Note that analyst forecast error captures earnings news with respect to analyst expectations, which are distinct from the change in realized earnings by assuming that earnings follow a random walk (Ball and Watts, 1972).

We continue to find a significantly declining trend in the cross-sectional earnings-returns relation (t= -4.2) and a significantly increasing trend in the aggregate earning-returns relation (t= 6.6). However, in the firm-level time-series analysis, results are slightly different. Although the incremental R^2 of aggregate forecast errors is significantly increasing over time (t= 3.4), the incremental R^2 of firm-level forecast errors is no longer declining yet increasing significantly (t= 15). Moreover, the relations of firm-level forecast errors with lagged firm-level and aggregate forecasts errors both decline over time. Overall, our inference on the rising relevance of aggregate earnings do not alter when using forecast errors as an alternate earnings measure. However, the declining relevance of firm-level earnings and the earnings persistence explanation do not hold when relying on analyst forecasts to capture earnings news.

2.11 EXCESS RETURN

Studies show that inflation plays an important role in the aggregate earnings-returns relation (e.g., Shivakumar 2007; Cready and Gurun, 2010; Konchitchki, 2011, 2013; Gallo, Hann, and Li, 2016; Shivakumar and Urcan, 2017). In this additional analysis, we use excess return that subtracts risk free rate from firm-level stock return to examine whether our firm-level time-series results depend on the time-varying inflation. Risk free rate is based on the 30-day Treasury bill.

When using excess returns, we find a significant decline in the incremental R^2 and persistence of firm-level earnings (t= -5.9, during the period from 2000-2019, and -7.5, respectively) and increasing importance of contemporaneous and previous year's aggregate earnings (t= 22 and 3, respectively). Overall, similar results, when using excess returns, suggest that inflation does not fully explain the temporal trends.

2.12 POSITIVE VERSUS NEGATIVE EARNINGS

Studies often argue that negative earnings have a higher association with stock returns than positive earnings (Ball and Brown, 1968; Hayn, 1995; Basu, 1997; Givoly and Hayn, 2000; Balachandran and Mohanram, 2011). To examine whether negative earnings presents differential results from positive earnings, we augment Equations (1), (2) and (5) to the following:

$$RET_{i.t} = \beta_{0,t} + \beta_{1,t}\Delta X_{i.t} + \beta_{2,t}I[\Delta X_{i.t} < 0] + \beta_{3,t}I[\Delta X_{i.t} < 0] \times \Delta X_{i.t} + \varepsilon_{i,t} \ldots\ldots\ldots \text{(1R)}$$

$$RET_{t} = \gamma_{0,r} + \gamma_{1,r}\Delta X_{t} + \gamma_{2,r}I[\Delta X_{t} < 0] + \gamma_{3,r}I[\Delta X_{t} < 0] \times \Delta X_{t} + \varepsilon_{t} \ldots\ldots\ldots \text{(2R)}$$

$$RET_{i,t} = \alpha_{0,i,r} + \alpha_{1,i,r}\Delta X_{i,t} + \alpha_{2,i,r}I[\Delta X_{i.t} < 0] + \alpha_{3i,r}I[\Delta X_{i.t} < 0] \times \Delta X_{i.t} + \varepsilon_{i,t} \ldots \text{(5R)}$$

$I[\cdot]$ represents an indicator for negative values. β_3 significantly increases from -5.4 during the period from 1963-1981 to -0.91 from 2001-2019. γ_3 significantly increases from 2.0 from 1982-2000 to 11.3 to 2001-2019. The mean and median values of α_3 both increase significantly. The significant increasing trends across in the cross-section, the aggregate, and the firm-level time-series suggest that negative earnings have become more relevance than positive earnings, consistent with the cross-sectional evidence in Givoly and Hayn (2000). However, the consistent asymmetric patterns across three analyses fail to provide clues for the differential earnings-returns relation across in the cross-section, the aggregate, and the firm-level time-series (see Table 5).

3. Superstar Firms and Other Potential Explanations

The nature of our sample does not allow for well-identified tests to examine why systematic earnings have become more "relevant" in the overall relation between earnings and returns. Nevertheless, we conjecture that the increased importance of aggregate earnings relates to the superstar firm phenomenon, especially in the post-Sarbanes Oxley (SOX) era. Autor, Doron, Katz, Patterson, and Reenen (2017, 2020) argue that most industries' market shares are dominated by only a few large superstar firms. They present evidence of within-industry reallocation, instead of a cross-industry shift, such that winning firms are more profitable, productive, and innovative than their smaller-sized competitors. They conjecture that the "winner take most" phenomenon is potentially explained by easier price/ quantity comparisons on the internet, software platforms and online services that involve high fixed un-front costs but low subsequent variable costs, strengthened network effects that favor firms adopting the latest technologies, and increasing competition due to globalization.

Their evidence is consistent with growing profitability by U.S. corporations (Barkai, 2020), and such growth in profitability is mostly enjoyed by the largest listed firms in each industry (De Loecker, Eeckhout, and Unger, 2020).[11] Such a trend relates to globalization and frequent technological disruptions that have led to transient competitive advantages over time (Schumpeter, 1912, 1942; Chun, Kim, Morck, and Yeung, 2008; D'Aveni, Dagnino, and Smith, 2010). For example, the percentage of sales conducted online has increased from 11 percent in 1999 to 42

[11] Bartram, Brown, and Stulz (2019) attributes the recent decline in idiosyncratic return volatility to U.S. publicly listed firms becoming larger and older.

percent in 2018, and the percentage of households with internet access has increased from 18 percent in 1999 to 90 percent in 2018. In the following sections, we conduct several tests to investigate whether the superstar phenomenon explains the rising (declining) relevance of aggregate (firm-level) earnings.

3.1 FIRM SIZE

We partition our sample by firm size to examine the superstar firm hypothesis. Studies have observed that large firms have a lower earnings-returns relation than small firms in the cross-sectional analysis and attribute the discrepancy to the richer information environment by large firms (Burgstahler, 1981; Freeman, 1987; Collins, Kothari, and Rayburn, 1987; Collins and Kothari, 1989). To assess whether our results differ in firm size, we partition the sample into three terciles based on beginning of year market capitalization and compare large firms in the top tercile to small firms in the bottom tercile.

Figure H presents that the large firms' average incremental R^2 of firm-level earnings has declined over time (t= -1.5) and their median value has decreased more significantly (t= -9.1). In contrasts, the small firms' average and median incremental R^2 of firm-level earnings has increased over time (t= 4.0 and 1.7, respectively). The difference between large and small firms is significant (Table 10, Panel A). Figure I shows that both the large firms' and small firms' average incremental R^2 of aggregate earnings are increasing over time (t= 17 and 14, respectively) and the large firms' increase is significantly greater than the smaller firms' increase (Table 10, Panel A). Moreover, Figure J presents that large firms' earnings persistence has declined significantly (t= 10), while small firms' earnings persistence remains stable over time (Table 10, Panel A). The results are consistent with the superstar firm hypothesis. As large firms become larger during recent years, their firm-level earnings are not as relevant as aggregate earnings when their business is more subject to macroeconomic conditions.

3.2 SUPERSTAR FIRMS

To directly examine the superstar hypothesis, we replace aggregate earnings with superstar firm earnings. We identify superstar firms as the largest 100, 50, or 25 firms based on beginning of year market capitalization. ΔSSX_t is superstar firms' earnings change, measured as the sum of all superstar firms' year t's annual earnings before extraordinary items minus the sum of all superstar firms' year t-1's annual earnings before extraordinary items, divided by the sum of all superstar firms' year t's beginning market capitalization. We examine the following models in a firm-level time-series regression:

$$RET_{i,t} = \theta_{1,i,r} + \theta_{2,i,r}\Delta X_{i,t} + \theta_{3,i,r}\Delta SSX_t + \varepsilon_{i,t-1} \quad (10)$$

$$RET_{i,t} = \theta_{4,i,r} + \theta_{5,i,r}\Delta X_{i,t} + \varepsilon_{i,t-1} \quad (11)$$

We estimate Equations (10)-(11) for each non-superstar firm i that has at least 15 years of data during a 20-year rolling window r and roll over the window every year. Then we estimate the incremental adjusted R^2 of superstar earnings ΔSSX_t as the adjusted R^2 from Equation (10) minus the adjusted R^2 from Equation (11). We exclude superstar firms from the sample, so Figure K and Table 9 present the relation between non-superstar firms' returns and superstar firms' earnings.

Surprisingly, the incremental R^2 of superstar earnings ΔSSX_t in Figure K presents similar trends as the incremental R^2 of aggregate earnings ΔX_t in Figure E. The incremental R^2 of superstar earnings significantly increases from -0.05 during the period from 1982-2000 to 0.01 over the past few years from 2010-2019, regardless of using the largest 100, 50, or 25 firms as superstar firms (t= 10, 8, and 8, respectively). When including financial institutions, the incremental R^2 of superstar earnings increases more, suggesting that superstar financial institutions have a greater impact on non-superstar firms. These findings suggest that superstar firms' earnings have increasing relevance for non-superstar firms' valuation, consistent with their dominant influence in the product market (Autor et al., 2020; Barkai, 2020; De Loecker et al., 2020). The finding is also consistent with the evidence in Comin and Philippon (2005). They find that aggregate volatility decreases while firm-level volatility increases over time. They attribute the declining aggregate volatility to the decreased cross-industry correlation and within-industry correlation.

3.3 MARKET-TO-BOOK RATIO

The superstar firm hypothesis suggests that growth firms are more likely to be superstar firms. When partitioning the sample into three terciles based on beginning of year market-to-book and comparing growth firms in the top tercile to value firms in the bottom tercile,[12] we find that non-superstar firms are equally distributed across three terciles, while 56 percent of superstar firms are in the top tercile (i.e., growth firms), and only 13 percent of superstar firms are in the bottom tercile (i.e., value firms). Existing studies also acknowledge that growth firms, proxied by a high market-to-book ratio, present a lower earnings-returns relation because future growth opportunities are not entirely captured by the current year of earnings, especially after the requirement of expensing R&D activities (Collins and Kothari, 1989; Easton and Zmijewski, 1989; Lev, 1989; Lev and Zarowin, 1999).

Figure L presents that the growth firms' average incremental R^2 of firm-level earnings has declined over time (t= -3.9). In contrasts, the value firms' average incremental R^2 of firm-level earnings has increased over time (t= 2.9). The difference between growth and value firms is significant (Table 10, Panel B). Figure M shows that both the growth firms' and value firms'

[12] Beginning market-to-book is the market value of equity at the end of the prior fiscal year divided by the book value of equity from the prior fiscal year. Following Fama and French (1992), book equity is total assets (Compustat: AT) minus liabilities (LT), plus balance sheet deferred taxes and investment tax credit (TXDITC), minus preferred stock liquidating value (PSTKL), redemption value (PSTKRV), or carrying value (PSTK).

average incremental R^2 of aggregate earnings are increasing over time (t= 17 and 16, respectively) and the growth firms' increase is significantly greater than the value firms' increase (Table 10, Panel B). Moreover, Figure N presents that large firms' earnings persistence has declined more significantly than small firms' earnings persistence (Table 10, Panel B). The results are consistent with the superstar firm hypothesis. As large firms are quick to grow their business, their firm-level earnings are not as relevant as aggregate earnings when their business is more subject to macroeconomic conditions.[13]

3.4 NEWLY LISTED FIRMS

Srivastava (2014) argues and presents evidence that newly listed firms present a lower earnings-returns relation than seasoned firms, in part due to the expensing of innovative activities. To investigate whether our results differ in listing cohorts, we partition the sample into two cohorts based on whether a firm is listed before or after 1980. Because we require at least 15 years of data in each rolling window, seasoned firms (listed before 1980) account for 68 percent of our sample used in the firm-level time-series analysis.

We find that the declining importance of firm-level earnings is more pronounced for newly listed firms than for seasoned firms during 2000-2019 (t= -1.62 and -4.37, respectively, and the difference is significant). Consistently, seasoned firms' earnings persistence has significantly declined (t= -11), while newly listed firms' earnings persistence has not (t= 0.8). Nevertheless, both cohorts of firms experience the increasing importance of aggregate earnings (t= 22 and 14, respectively, and the difference is significant). The results suggest that newly listed firms are

[13] We find similar results when partitioning the sample based on R&D intensity, measured as the ratio of R&D expense to sales revenue following Lev and Zarowin (1999). Specifically, the decline in the firm-level earnings returns relation is more pronounced for high R&D firms. However, aggregate earnings have gained importance over time for both high and low R&D firms.

associated with the declining importance of firm-level earnings, consistent with Srivastava (2014), and seasoned firms are more associated with the rising importance of aggregate earnings.

3.5 NEW ECONOMY INDUSTRIES

Core, Guay, and Van Buskirk (2003), Dichev and Tang (2008) and Barth, Li, and McClure (2019) argue that new economy industries attribute to the changing earnings-returns relation. To assess whether our results differ between declining and rising industries, we partition 187 MSCI's Global Industry Classification Standard ten-digit industries into three terciles based on the change in the ratio of an industry's member firms to the total number of listed firms during the sample period from 1963-2019 and compare the rising industry firms in the top tercile to the declining industry firms in the bottom tercile. The top three declining industries are electronic utilities (GICS: 55101010), packaged foods and meats (GICS: 30202030), and aerospace and defense (GICS: 20101010). The top three rising industries are regional banks (GICS: 40101015), biotechnology (GICS: 35201010), and application software (GICS: 45103010).

We find that firms in rising industries are more associated with the declining importance of firm-level earnings, while firms in declining industries are more associated with the rising importance of aggregate earnings. Taken together, the firm and industry age analyses suggest that young firms (industries) attribute to the declining relevance of firm-level earnings and old firms (industries) relate to the increasing relevance of aggregate earnings, consistent with the superstar firm hypothesis.

4. Conclusion and Implications for Future Research

This paper documents that the overall relation between earnings and returns has remained stable over time. However, the nature of the relation has changed. Specifically, we find that while the cross-sectional relation between firm-level returns and firm-level earnings has declined, the time-series relation between firm-level returns and aggregate earnings has increased over time. Consistently, the serial correlation of firm-level earnings has declined over time, while the relation between firm-level earnings and the previous year's aggregate earnings has strengthened. These findings suggest the increased importance of aggregate earnings in assessing firm values.

Our paper highlights the importance of understanding the systematic component of earnings (e.g., Brown and Ball, 1967; Ball, Sadka, and Sadka. 2009; Ellahie, 2020; Ball, Sadka, and Tseng, 2020). Given the importance of aggregate earnings in firm valuation, a better understanding of the macroeconomic forces driving aggregate shocks warrants future research. Our study also sheds light on the importance of examining earnings properties in both the time-series and the cross-section. One example is the reversal of accruals. Over the life of a firm, the sum of cash flows and the sum of earnings are the same and the sum of accruals is zero, suggesting that accruals reverse over time. This reversal characteristic of accruals is a firm-level time-series property. Yet, most studies on the topic employ cross-sectional regressions to examine accrual reversals. Our study highlights the importance of distinguishing between time-series and cross-sectional properties and the importance of evaluating both firm-level and aggregate earnings properties.

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FIGURE A

Cross-Sectional Earnings-Returns Relation

This figure presents the adjusted R^2 estimated from the annual cross-sectional regression: $RET_{i.t} = \beta_{0,t} + \beta_{1,t}\Delta X_{i.t} + \varepsilon_{i,t}$. We run a cross-sectional regression for each year t. $\Delta X_{i,t}$ is firm i's year t's annual earnings before extraordinary items (Compustat: IB) minus the year t-1's annual earnings before extraordinary items, deflated by the year t's beginning market capitalization (CRSP: PRC×SHROUT). $RET_{i,t}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. For example, a firm's fiscal year ends in December. Its annual return for the year 2000 is the twelve-month cumulative return from April 2000 to March 2001 because most firms announce earnings within three months after the fiscal year end. Firm stock returns are adjusted for delisted returns based on the estimates from Shumway (1997). Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. The sample comprises 178,559 firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019 and excludes financial firms, identified based on SIC four-digit codes from 6000-6999.

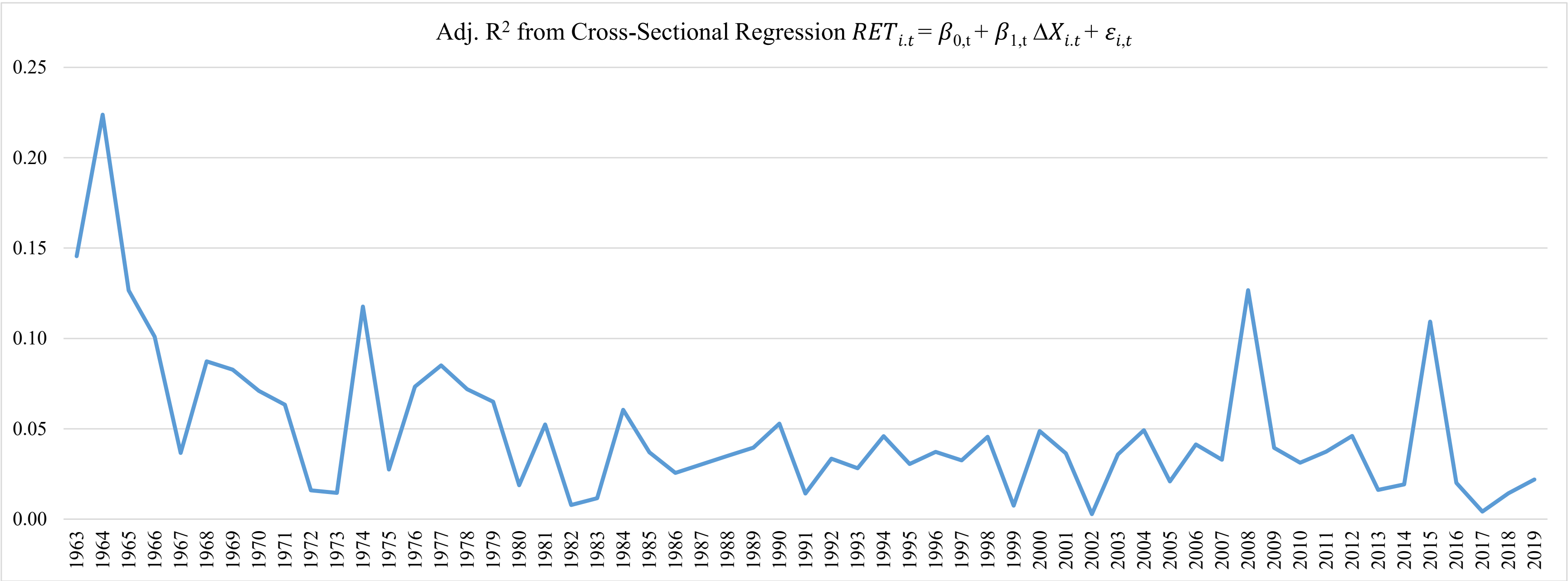

FIGURE B

Aggregate Earnings-Returns Relation

This figure presents the signed adjusted R^2 estimated from the aggregate time-series regression: $RET_t = \gamma_{0,r} + \gamma_{1,r}\Delta X_t + \varepsilon_{i,t}$. We run a time-series regression for each 20-year rolling window r and rolls over the window every year. Aggregate earnings change for year t (ΔX_t) is the sum of all sample firms' year t's annual earnings before extraordinary items minus the sum of all sample firms' year t-1's annual earnings before extraordinary items, divided by the sum of all sample firms' year t's beginning market capitalization. Aggregate return for year t (RET_t) is CRSP value-weighted stock return, including dividends. Year in the y-axis indicates the ending year of a rolling window. For example, the data point of 1982 is estimated based on the period from 1963-1982. Signed adjusted R^2 is the product of the adjusted R^2 and the sign of the coefficient on ΔX_t. The sample comprises 178,559 firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019 and excludes financial firms, identified based on SIC four-digit codes from 6000-6999.

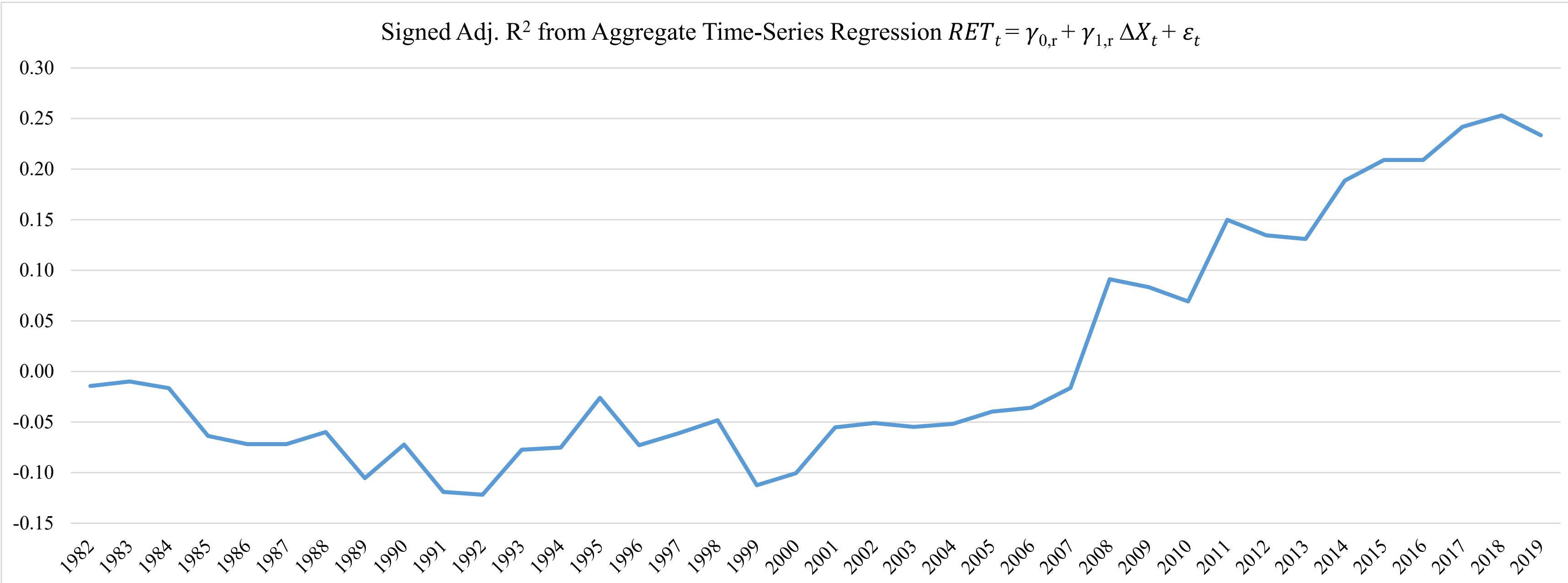

FIGURE C

Firm-Level Time-Series Earnings-Returns Relation

This figure presents the average adjusted R^2 statistic estimated from the firm-level time-series regression with a 20-year window that rolls over every year: $RET_{i.t} = \alpha_{6,i,r} + \alpha_{7,i,r}\Delta X_{i.t} + \varepsilon_{i,t}$. $\Delta X_{i,t}$ is firm i's year t's annual earnings before extraordinary items (Compustat: IB) minus the year t-1's annual earnings before extraordinary items, deflated by the year t's beginning market capitalization (CRSP: PRC×SHROUT). $RET_{i,t}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. For example, a firm's fiscal year ends in December. Its annual return for the year 2000 is the twelve-month cumulative return from April 2000 to March 2001 because most firms announce earnings within three months after the fiscal year end. Firm stock returns are adjusted for delisted returns based on the estimates from Shumway (1997). Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. The sample comprises 112,408 firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019, excludes financial firms, identified based on SIC four-digit codes from 6000-6999, and requires at least 15 years of data in each 20-year rolling window. Year in the y-axis indicates the ending year of a rolling window. For example, the data point of 1982 is estimated based on the period from 1963-1982. We further winsorize the adjusted R^2 at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

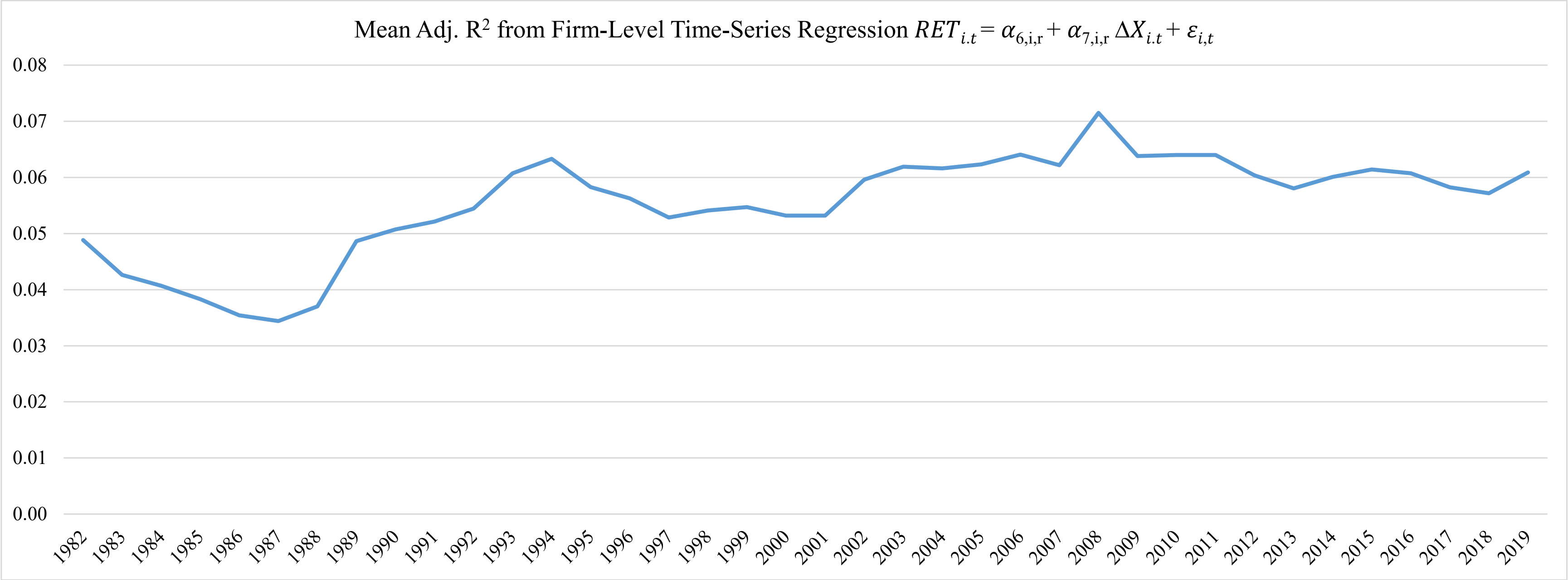

FIGURE D

Incremental Adj. R^2 of Firm-Level Earnings $\Delta X_{i.t}$

This figure presents the incremental average adjusted R^2 estimated from firm-level time-series regressions with a 20-year window that rolls over every year. Incremental R^2 of firm-level earnings $\Delta X_{i.t}$ is Model (1) average R^2 minus Model (2) average R^2. Model (1): $RET_{i.t} = \alpha_{1,i,r} + \alpha_{2,i,r}\Delta X_{i.t} + \alpha_{3,i,r}\Delta X_t + \varepsilon_{i,t}$. Model (2): $RET_{i.t} = \alpha_{4,i,r} + \alpha_{5,i,r}\Delta X_t + \varepsilon_{i,t}$. $\Delta X_{i,t}$ is firm i's year t's annual earnings change, deflated by beginning market capitalization. ΔX_t is aggregate earnings change, measured as the sum of all sample firms' year t's annual earnings before extraordinary items minus the sum of all sample firms' year t-1's annual earnings before extraordinary items, divided by the sum of all sample firms' year t's beginning market capitalization. $RET_{i,t}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. The sample comprises 112,408 firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019, excludes financial firms, identified based on SIC four-digit codes from 6000-6999, and requires at least 15 years of data in each 20-year rolling window. Year in the y-axis indicates the ending year of a rolling window. For example, the data point of 1982 is estimated based on the period from 1963-1982. We further winsorize the adjusted R^2 at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

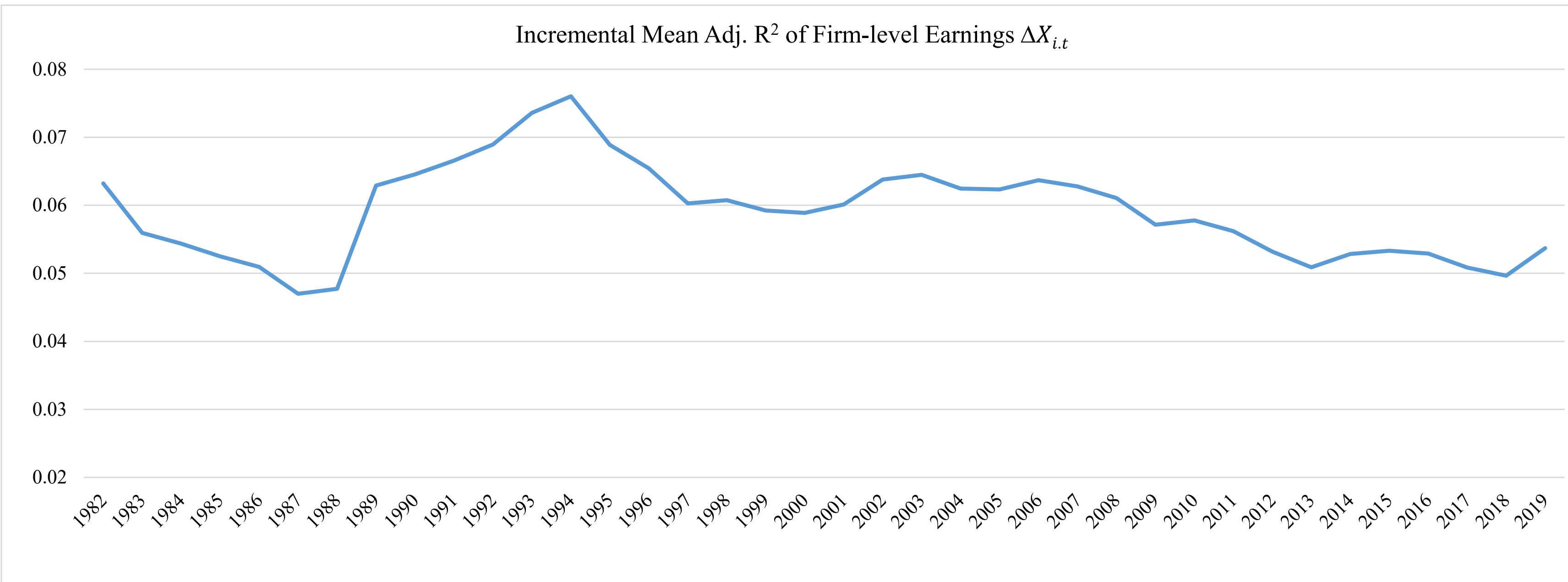

FIGURE E

Incremental Adj. R^2 of Aggregate Earnings ΔX_t

This figure presents the incremental average adjusted R^2 estimated from firm-level time-series regressions with a 20-year window that rolls over every year. Incremental R^2 of aggregate earnings ΔX_t is Model (1) average R^2 minus Model (3) average R^2. Signed R^2 is the product of incremental R^2 of aggregate earnings and the sign of the coefficient on ΔX_t in Model (1). Model (1): $RET_{i.t} = \alpha_{1,i,r} + \alpha_{2,i,r}\Delta X_{i.t} + \alpha_{3,i,r}\Delta X_t + \varepsilon_{i,t}$. Model (3): $RET_{i.t} = \alpha_{6,i,r} + \alpha_{7,i,r}\Delta X_{i.t} + \varepsilon_{i,t}$. $\Delta X_{i,t}$ is firm i's year t's annual earnings change, deflated by beginning market capitalization. ΔX_t is aggregate earnings change, measured as the sum of all sample firms' year t's annual earnings before extraordinary items minus the sum of all sample firms' year t-1's annual earnings before extraordinary items, divided by the sum of all sample firms' year t's beginning market capitalization. $RET_{i,t}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. The sample comprises 112,408 firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019, excludes financial firms, identified based on SIC four-digit codes from 6000-6999, and requires at least 15 years of data in each 20-year rolling window. Year in the y-axis indicates the ending year of a rolling window. For example, the data point of 1982 is estimated based on the period from 1963-1982. We further winsorize the adjusted R^2 at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

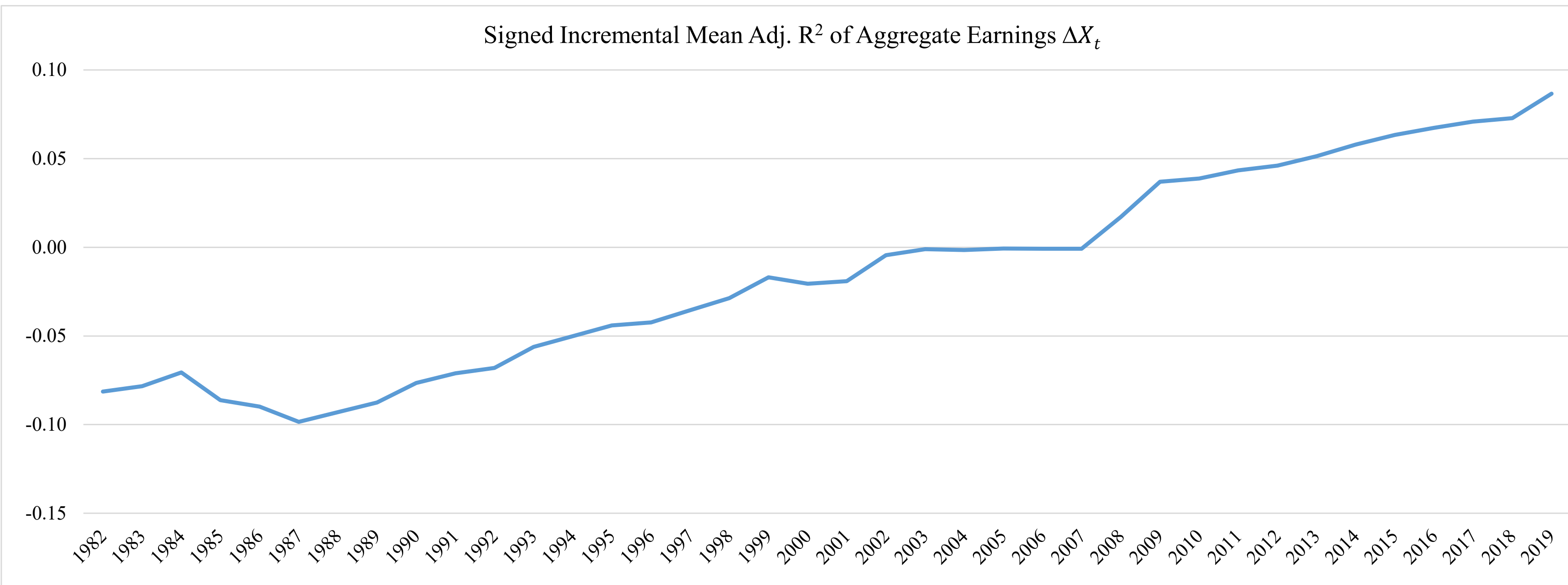

FIGURE F

Firm-Level Earnings Persistence

This figure presents the average coefficient on $\Delta X_{i,t-1}$ estimated from firm-level time-series regressions with a 20-year window that rolls over every year: $\Delta X_{i,t} = \delta_{0,i,r} + \delta_{1,i,r}\Delta X_{i,t-1} + \delta_{2,i,r}\Delta X_{t-1} + \varepsilon_{i,t}$. $\Delta X_{i,t}$ ($\Delta X_{i,t-1}$) is firm i's year t's (t-1's) annual earnings change, deflated by beginning market capitalization. Aggregate earnings change for year t-1 (ΔX_{t-1}) is the sum of all sample firms' year t-1's annual earnings before extraordinary items minus the sum of all sample firms' year t-2's annual earnings before extraordinary items, divided by the sum of all sample firms' year t-1's beginning market capitalization. Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. The sample comprises 112,408 firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019, excludes financial firms, identified based on SIC four-digit codes from 6000-6999, and requires at least 15 years of data in each 20-year rolling window. Year in the y-axis indicates the ending year of a rolling window. For example, the data point of 1982 is estimated based on the period from 1963-1982. We further winsorize the coefficient on $\Delta X_{i,t-1}$ at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

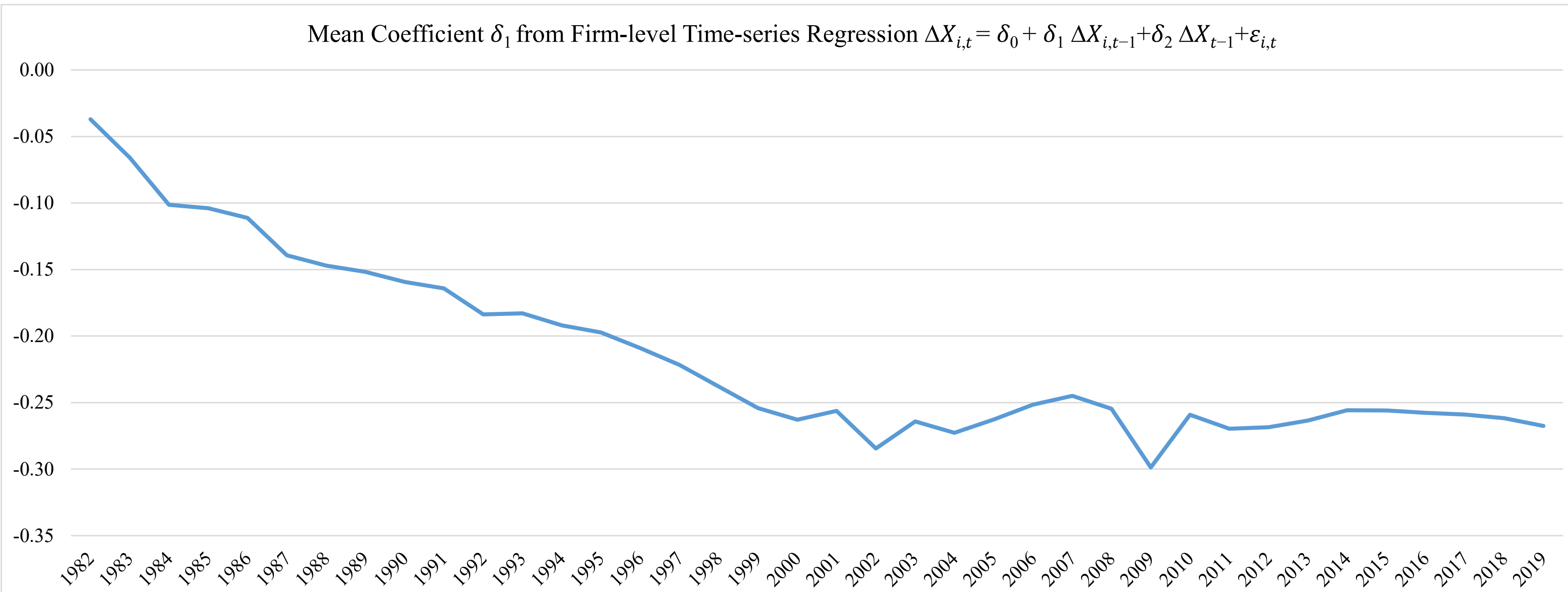

FIGURE G

Firm-Level Earnings and the Previous Year's Aggregate Earnings

This figure presents the average coefficient on ΔX_{t-1} estimated from firm-level time-series regressions with a 20-year window that rolls over every year: $\Delta X_{i,t} = \delta_{0,i,r} + \delta_{1,i,r}\Delta X_{i,t-1} + \delta_{2,i,r}\Delta X_{t-1} + \varepsilon_{i,t}$. $\Delta X_{i,t}$ ($\Delta X_{i,t-1}$) is firm i's year t's (t-1's) annual earnings change, deflated by beginning market capitalization. Aggregate earnings change for year t-1 (ΔX_{t-1}) is the sum of all sample firms' year t-1's annual earnings before extraordinary items minus the sum of all sample firms' year t-2's annual earnings before extraordinary items, divided by the sum of all sample firms' year t-1's beginning market capitalization. Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. The sample comprises 112,408 firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019, excludes financial firms, identified based on SIC four-digit codes from 6000-6999, and requires at least 15 years of data in each 20-year rolling window. Year in the y-axis indicates the ending year of a rolling window. For example, the data point of 1982 is estimated based on the period from 1963-1982. We further winsorize the coefficient on ΔX_{t-1} at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

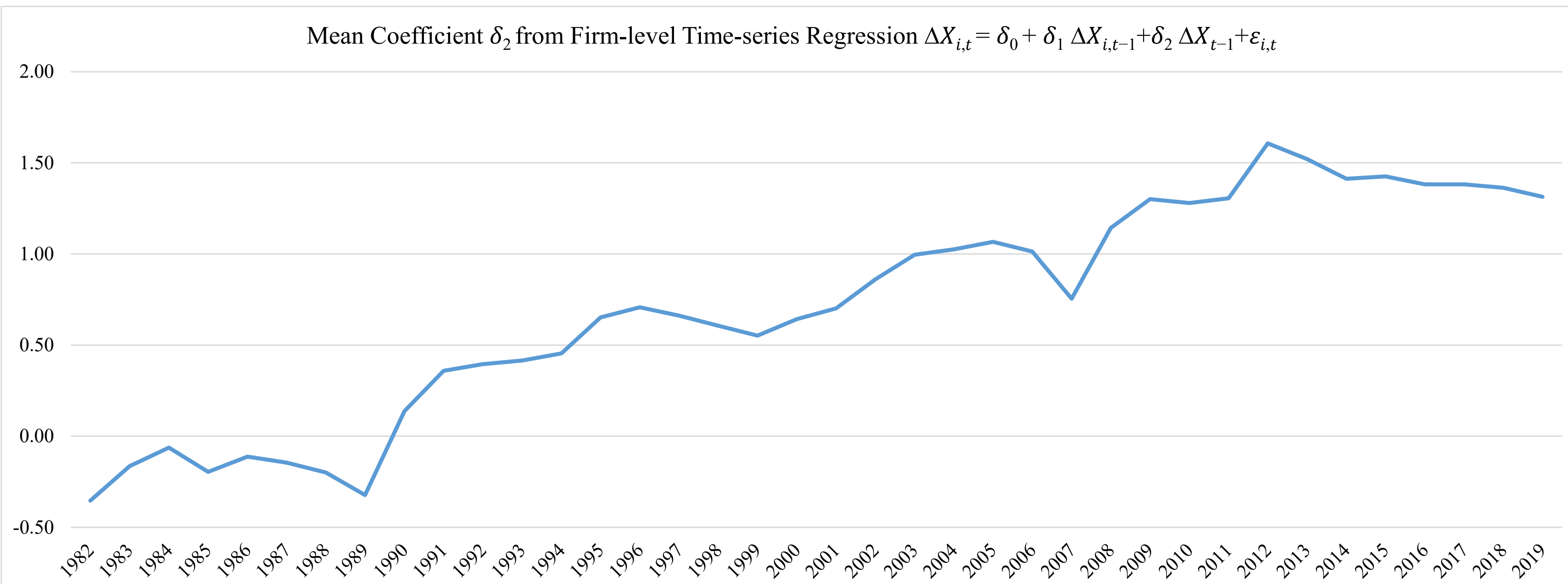

FIGURE H

Large and Small Firms' Incremental Adj. R^2 of Firm-Level Earnings $\Delta X_{i.t}$

This figure presents the incremental average adjusted R^2 estimated from firm-level time-series regressions with a 20-year window that rolls over every year for large and small firms. We partition the sample into three terciles based on beginning market capitalization and compare large firms in the top tercile to small firms in the bottom tercile. Incremental R^2 of firm-level earnings $\Delta X_{i.t}$ is Model (1) average R^2 minus Model (2) average R^2. Model (1): $RET_{i.t} = \alpha_{1,i,r} + \alpha_{2,i,r}\Delta X_{i.t} + \alpha_{3,i,r}\Delta X_t + \varepsilon_{i,t}$. Model (2): $RET_{i.t} = \alpha_{4,i,r} + \alpha_{5,i,r}\Delta X_t + \varepsilon_{i,t}$. $\Delta X_{i,t}$ is firm i's year t's annual earnings change, deflated by beginning market capitalization. ΔX_t is aggregate earnings change, measured as the sum of all sample firms' year t's annual earnings before extraordinary items minus the sum of all sample firms' year t-1's annual earnings before extraordinary items, divided by the sum of all sample firms' year t's beginning market capitalization. $RET_{i,t}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. The sample comprises 112,408 firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019, excludes financial firms, identified based on SIC four-digit codes from 6000-6999, and requires at least 15 years of data in each 20-year rolling window. Year in the y-axis indicates the ending year of a rolling window. For example, the data point of 1982 is estimated based on the period from 1963-1982. We further winsorize the adjusted R^2 at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

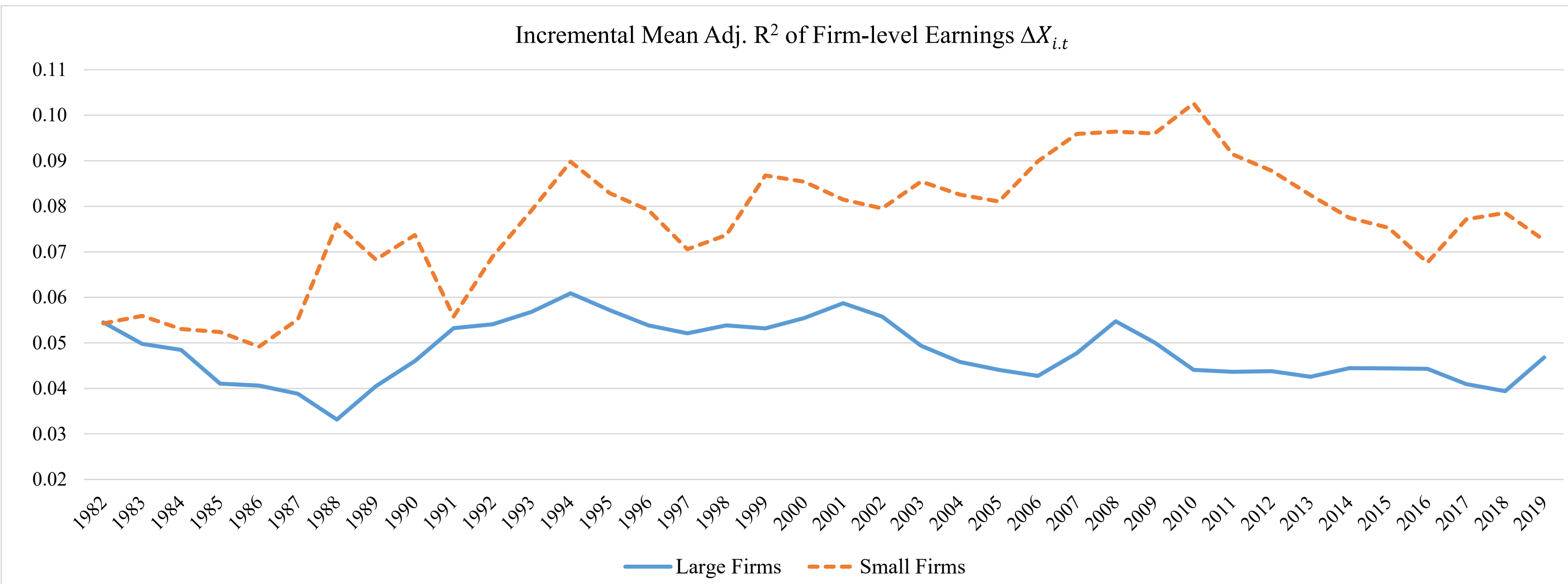

FIGURE I

Large and Small Firms' Incremental Adj. R^2 of Aggregate Earnings ΔX_t

This figure presents the incremental average R^2 estimated from firm-level time-series regressions with a 20-year window that rolls over every year for large and small firms. We partition the sample into three terciles based on beginning market capitalization and compare large firms in the top tercile to small firms in the bottom tercile. Incremental R^2 of aggregate earnings ΔX_t is Model (1) average R^2 minus Model (3) average R^2. Signed R^2 is the product of incremental R^2 and the sign of the coefficient on ΔX_t in Model (1). Model (1): $RET_{i.t} = \alpha_{1,i,r} + \alpha_{2,i,r}\Delta X_{i.t} + \alpha_{3,i,r}\Delta X_t + \varepsilon_{i,t}$. Model (3): $RET_{i.t} = \alpha_{6,i,r} + \alpha_{7,i,r}\Delta X_{i.t} + \varepsilon_{i,t}$. $\Delta X_{i,t}$ is firm i's year t's annual earnings change, deflated by beginning market capitalization. ΔX_t is aggregate earnings change, measured as the sum of all sample firms' year t's annual earnings before extraordinary items minus the sum of all sample firms' year t-1's annual earnings before extraordinary items, divided by the sum of all sample firms' year t's beginning market capitalization. $RET_{i,t}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. The sample comprises 112,408 firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019, excludes financial firms, identified based on SIC four-digit codes from 6000-6999, and requires at least 15 years of data in each 20-year rolling window. Year in the y-axis indicates the ending year of a rolling window. We further winsorize the adjusted R^2 at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

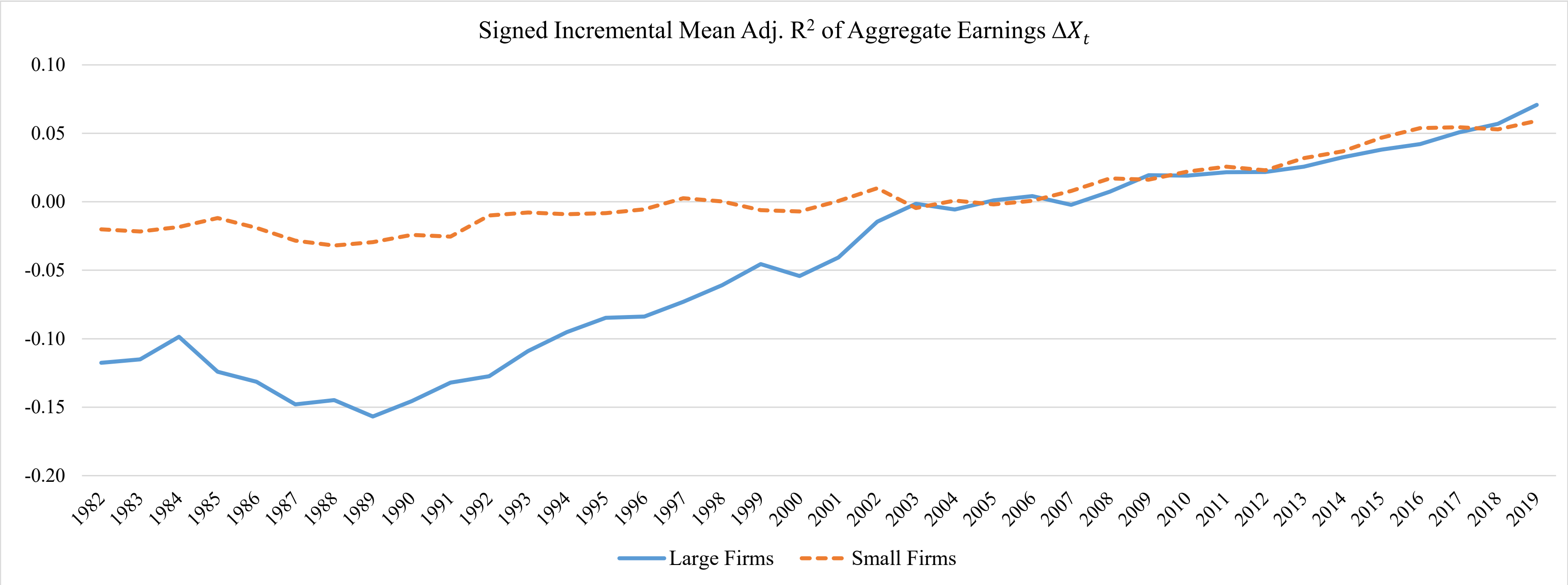

FIGURE J

Large and Small Firms' Firm-Level Earnings Persistence

This figure presents the average coefficient on $\Delta X_{i,t-1}$ estimated from firm-level time-series regressions with a 20-year window that rolls over every year: $\Delta X_{i,t} = \delta_{0,i,r} + \delta_{1,i,r}\Delta X_{i,t-1} + \delta_{2,i,r}\Delta X_{t-1} + \varepsilon_{i,t}$ for large and small firms. We partition the sample into three terciles based on beginning market capitalization and compare large firms in the top tercile to small firms in the bottom tercile. $\Delta X_{i,t}$ ($\Delta X_{i,t-1}$) is firm i's year t's (t-1's) annual earnings change, deflated by beginning market capitalization. Aggregate earnings change for year t-1 (ΔX_{t-1}) is the sum of all sample firms' year t-1's annual earnings before extraordinary items minus the sum of all sample firms' year t-2's annual earnings before extraordinary items, divided by the sum of all sample firms' year t-1's beginning market capitalization. Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. The sample comprises 112,408 firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019, excludes financial firms, identified based on SIC four-digit codes from 6000-6999, and requires at least 15 years of data in each 20-year rolling window. Year in the y-axis indicates the ending year of a rolling window. We further winsorize the coefficient on $\Delta X_{i,t-1}$at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

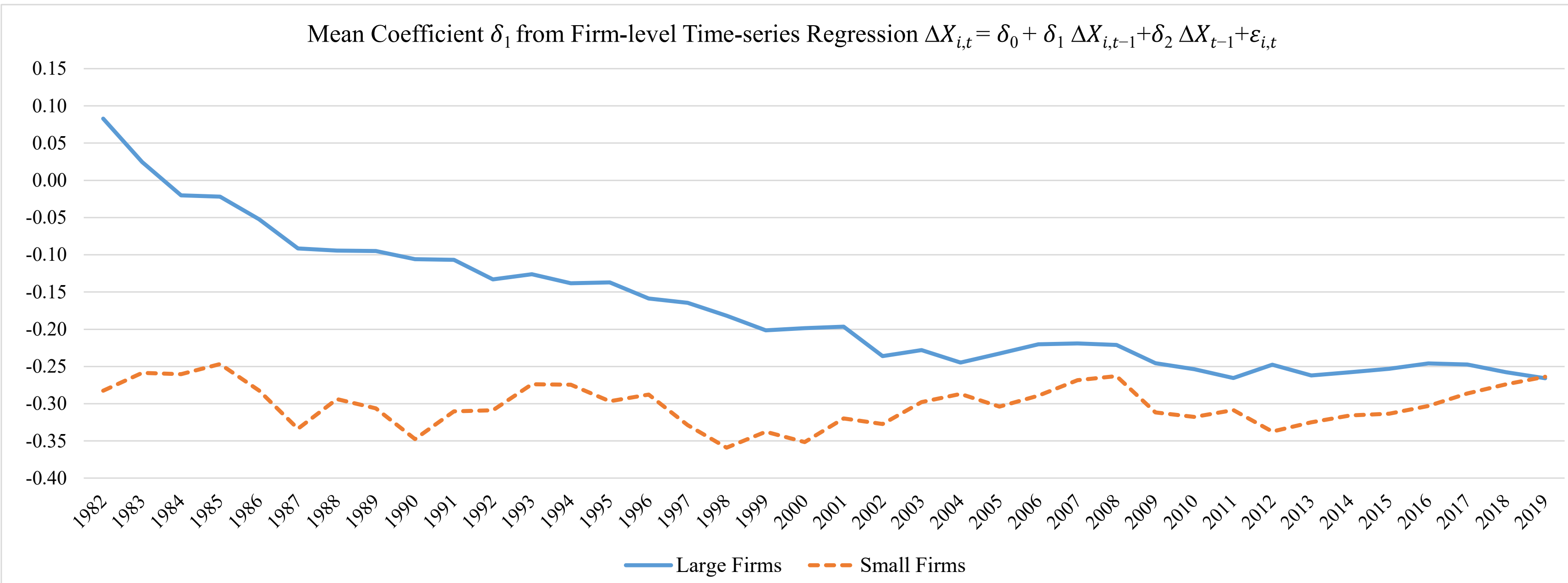

FIGURE K

Incremental Adj. R^2 of Superstar Earnings $\Delta SSX_{i.t}$

This figure presents the incremental average R^2 estimated from firm-level time-series regressions with a 20-year window that rolls over every year for non-superstar firms. Superstar firms are the largest 100 or 25 firms based on beginning market capitalization in each year. The sample comprises 112,408 firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019, excludes financial firms, identified based on SIC four-digit codes from 6000-6999, and requires at least 15 years of data in each 20-year rolling window. We further exclude superstar firms from the sample to avoid mechanical relation. Incremental R^2 of superstar earnings ΔSSX_t is Model (1) average R^2 minus Model (2) average R^2. Signed R^2 is the product of incremental R^2 and the sign of the ΔSSX_t coefficient in Model (1). Model (1): $RET_{i,t} = \theta_{1,i,r} + \theta_{2,i,r}\Delta X_{i,t} + \theta_{3,i,r}\Delta SSX_t + \varepsilon_{i,t-1}$. Model (2): $RET_{i,t} = \theta_{4,i,r} + \theta_{5,i,r}\Delta X_{i,t} + \varepsilon_{i,t-1}$. $\Delta X_{i,t}$ is firm i's year t's annual earnings change, deflated by beginning market capitalization. ΔSSX_t is superstar firms' earnings change, measured as the sum of all superstar firms' year t's annual earnings before extraordinary items minus the sum of all superstar firms' year t-1's annual earnings before extraordinary items, divided by the sum of all superstar firms' year t's beginning market capitalization. $RET_{i,t}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. Year in the y-axis indicates the ending year of a rolling window. We further winsorize the adjusted R^2 at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

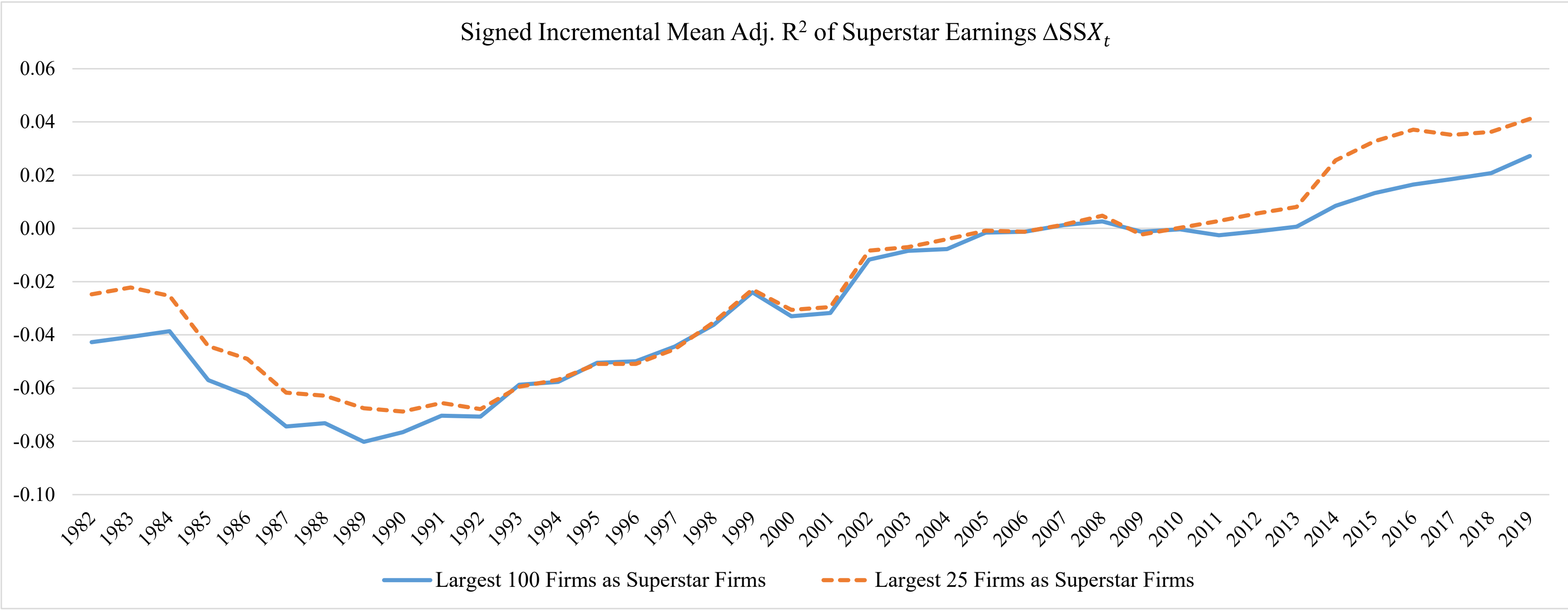

FIGURE L

Growth and Value Firms' Incremental Adj. R^2 of Firm-Level Earnings $\Delta X_{i.t}$

This figure presents the incremental average R^2 estimated from firm-level time-series regressions with a 20-year window that rolls over every year for growth and value firms. We partition the sample into three terciles based on beginning market-to-book and compare growth firms in the top tercile to value firms in the bottom tercile. Incremental R^2 of firm-level earnings $\Delta X_{i.t}$ is Model (1) average R^2 minus Model (2) average R^2. Model (1): $RET_{i.t} = \alpha_{1,i,r} + \alpha_{2,i,r}\Delta X_{i.t} + \alpha_{3,i,r}\Delta X_t + \varepsilon_{i,t}$. Model (2): $RET_{i.t} = \alpha_{4,i,r} + \alpha_{5,i,r}\Delta X_t + \varepsilon_{i,t}$. $\Delta X_{i,t}$ is firm i's year t's annual earnings change, deflated by beginning market capitalization. ΔX_t is aggregate earnings change, measured as the sum of all sample firms' year t's annual earnings before extraordinary items minus the sum of all sample firms' year t-1's annual earnings before extraordinary items, divided by the sum of all sample firms' year t's beginning market capitalization. $RET_{i,t}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. The sample comprises 112,408 firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019, excludes financial firms, identified based on SIC four-digit codes from 6000-6999, and requires at least 15 years of data in each 20-year rolling window. Year in the y-axis indicates the ending year of a rolling window. We further winsorize the adjusted R^2 at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

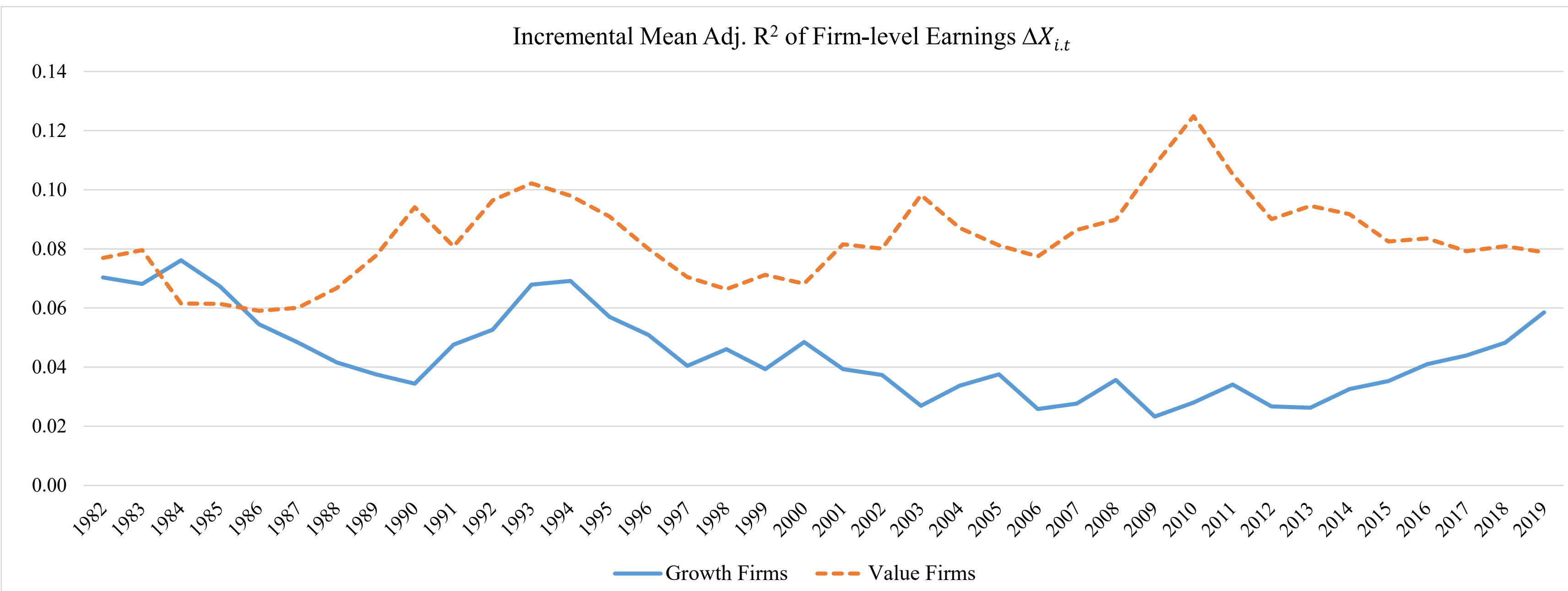

FIGURE M

Growth and Value Firms' Incremental Adj. R^2 of Aggregate Earnings ΔX_t

This figure presents the incremental average adjusted R^2 estimated from firm-level time-series regressions with a 20-year window that rolls over every year for growth and value firms. We partition the sample into three terciles based on beginning market-to-book and compare growth firms in the top tercile to value firms in the bottom tercile. Incremental R^2 of aggregate earnings ΔX_t is Model (1) average R^2 minus Model (3) average R^2. Signed R^2 is the product of incremental R^2 and the sign of the ΔX_t coefficient in Model (1). Model (1): $RET_{i.t} = \alpha_{1,i,r} + \alpha_{2,i,r}\Delta X_{i.t} + \alpha_{3,i,r}\Delta X_t + \varepsilon_{i,t}$. Model (3): $RET_{i.t} = \alpha_{6,i,r} + \alpha_{7,i,r}\Delta X_{i.t} + \varepsilon_{i,t}$. $\Delta X_{i,t}$ is firm i's year t's annual earnings change, deflated by beginning market capitalization. ΔX_t is aggregate earnings change, measured as the sum of all sample firms' year t's annual earnings before extraordinary items minus the sum of all sample firms' year t-1's annual earnings before extraordinary items, divided by the sum of all sample firms' year t's beginning market capitalization. $RET_{i,t}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. The sample comprises 112,408 firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019, excludes financial firms, identified based on SIC four-digit codes from 6000-6999, and requires at least 15 years of data in each 20-year rolling window. Year in the y-axis indicates the ending year of a rolling window. We further winsorize the adjusted R^2 at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

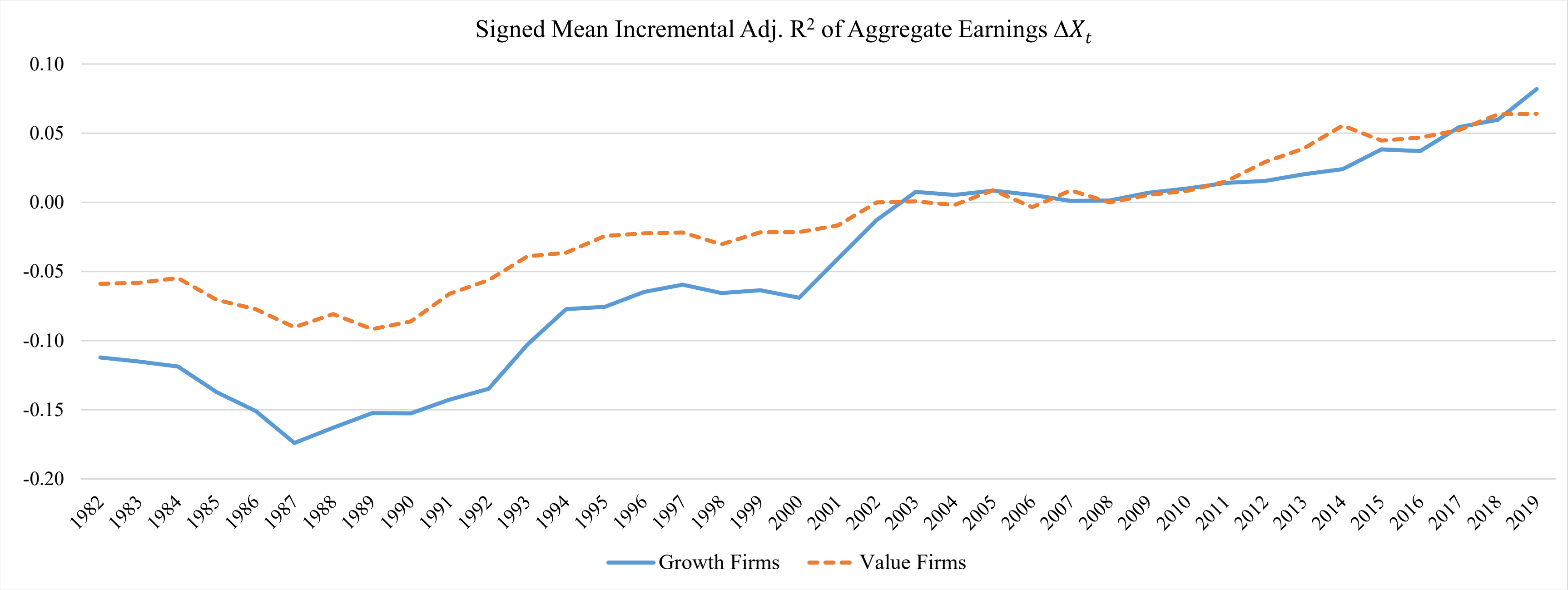

FIGURE N

Growth and Value Firms' Firm-Level Earnings Persistence

This figure presents the average coefficient on $\Delta X_{i,t-1}$ estimated from firm-level time-series regressions with a 20-year window that rolls over every year: $\Delta X_{i,t} = \delta_{0,i,r} + \delta_{1,i,r}\Delta X_{i,t-1} + \delta_{2,i,r}\Delta X_{t-1} + \varepsilon_{i,t}$ for growth and value firms. We partition the sample into three terciles based on beginning market-to-book and compare growth firms in the top tercile to value firms in the bottom tercile. $\Delta X_{i,t}$ ($\Delta X_{i,t-1}$) is firm i's year t's (t-1's) annual earnings change, deflated by beginning market capitalization. Aggregate earnings change for year t-1 (ΔX_{t-1}) is the sum of all sample firms' year t-1's annual earnings before extraordinary items minus the sum of all sample firms' year t-2's annual earnings before extraordinary items, divided by the sum of all sample firms' year t-1's beginning market capitalization. Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. The sample comprises 112,408 firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019, excludes financial firms, identified based on SIC four-digit codes from 6000-6999, and requires at least 15 years of data in each 20-year rolling window. Year in the y-axis indicates the ending year of a rolling window. We further winsorize the coefficient on $\Delta X_{i,t-1}$at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

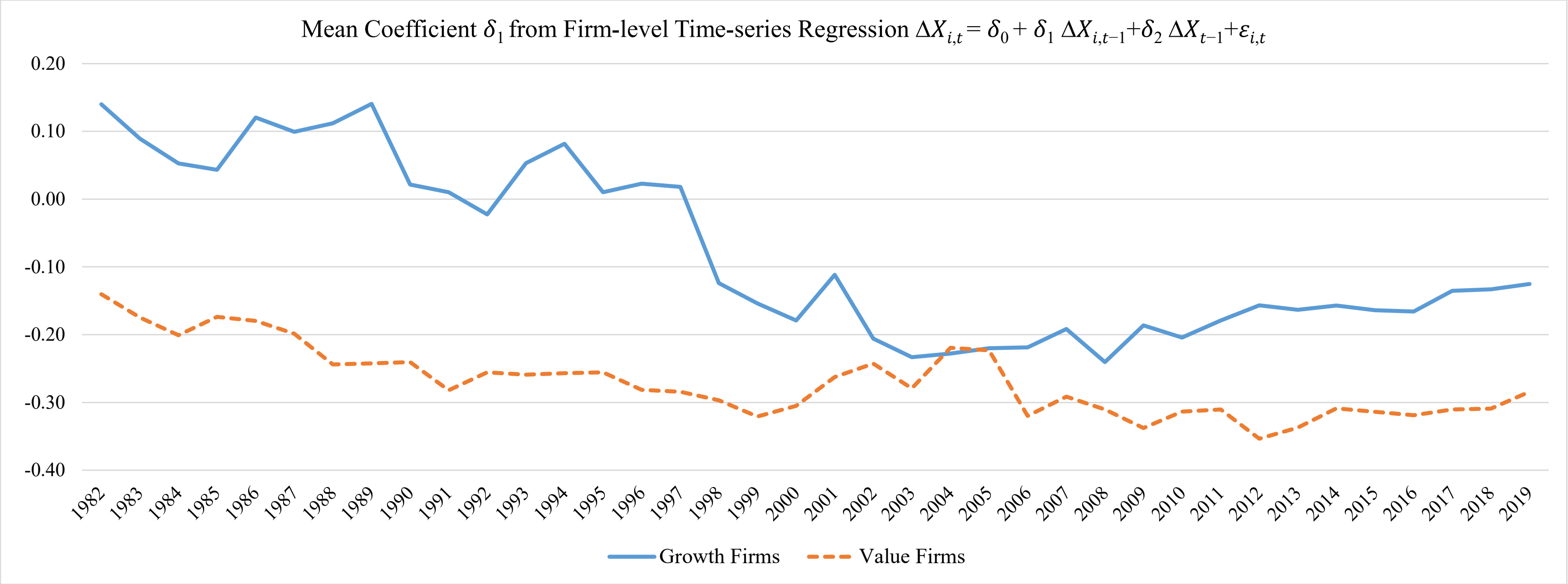

TABLE 1

Summary Statistics of Variable Distributions

This table presents descriptive statistics of the variables used in the analysis. $\Delta X_{i,t}$ is firm i's year t's annual earnings before extraordinary items (Compustat: IB) minus the year t-1's annual earnings before extraordinary items, deflated by the year t's beginning market capitalization (CRSP: PRC×SHROUT). $RET_{i,t}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. For example, a firm's fiscal year ends in December. Its annual return for the year 2000 is the twelve-month cumulative return from April 2000 to March 2001 because most firms announce earnings within three months after the fiscal year end. Firm stock returns are adjusted for delisted returns based on the estimates from Shumway (1997). Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. Aggregate earnings change for year t (ΔX_t) is the sum of all sample firms' year t's annual earnings before extraordinary items minus the sum of all sample firms' year t-1's annual earnings before extraordinary items, divided by the sum of all sample firms' year t's beginning market capitalization. Aggregate return for year t (RET_t) is CRSP value-weighted stock return, including dividends (CRSP: VWRETD). The sample of Panel A comprises U.S. firms with listed common equity securities (CRSP share code: 10 or 11) from 1963-2019. The sample of Panel B excludes financial firms, identified based on the SIC four-digit codes from 6000-6999. The sample of Panel C excludes financial firms and further requires at least 15 years of earnings change and return data used in the firm-level time-series rolling window regression analysis.

Panel A Sample of 210,740 firm-years, including financial firms

	Mean	25th	Median	75th	Std Dev
ΔXi,t	-0.02	-0.03	0.01	0.03	0.44
RETi,t	0.16	-0.21	0.06	0.37	0.69
ΔXt	0.01	0.00	0.01	0.01	0.01
RETt	0.12	0.02	0.13	0.22	0.18

Panel B Sample of 178,559 firm-years, excluding financial firms

	Mean	25th	Median	75th	Std Dev
ΔXi,t	-0.02	-0.03	0.01	0.03	0.44
RETi,t	0.17	-0.23	0.05	0.37	0.74
ΔXt	0.00	0.00	0.01	0.01	0.01
RETt	0.12	0.02	0.13	0.22	0.18

Panel C Reduced sample of 112,408 firm-years, excluding financials

	Mean	25th	Median	75th	Std Dev
ΔXi,t	-0.01	-0.02	0.01	0.03	0.33
RETi,t	0.19	-0.16	0.09	0.37	0.65
ΔXt	0.00	0.00	0.01	0.01	0.01
RETt	0.12	0.02	0.13	0.21	0.18

TABLE 2
Cross-Sectional Earnings-Returns Relation

This table presents results from the annual cross-sectional regression: $RET_{i.t} = \beta_{0,t} + \beta_{1,t}\Delta X_{i.t} + \varepsilon_{i,t}$.

	Excluding Financial Firms			Including Financial Firms			Reduced Sample, excluding Financial Firms		
Year	N	Adj. R2	$\beta 1$	N	Adj. R2	$\beta 1$	N	Adj. R2	$\beta 1$
1963	698	0.15	4.71	723	0.25	12.87			
1964	903	0.22	4.11	941	0.25	8.03	754	0.26	8.47
1965	1062	0.13	5.27	1106	0.16	10.03	874	0.16	9.83
1966	1174	0.10	2.33	1226	0.12	4.94	938	0.15	6.02
1967	1415	0.04	3.84	1481	0.04	3.74	1062	0.03	3.30
1968	1492	0.09	7.24	1561	0.10	7.39	1112	0.11	7.07
1969	1584	0.08	1.96	1658	0.04	2.16	1179	0.04	2.29
1970	1660	0.07	0.98	1742	0.01	0.72	1242	0.00	0.60
1971	1775	0.06	1.10	1868	0.05	2.33	1320	0.05	2.43
1972	1872	0.02	0.54	1982	0.02	1.62	1377	0.02	1.96
1973	1957	0.01	0.30	2076	0.00	0.30	1437	0.00	0.08
1974	2029	0.12	0.35	2172	0.05	0.51	1477	0.05	0.57
1975	3394	0.03	0.43	3746	0.01	0.46	1996	0.00	0.23
1976	3402	0.07	0.66	3758	0.08	1.38	2031	0.07	1.37
1977	3342	0.09	0.71	3702	0.09	1.23	2056	0.08	1.17
1978	3261	0.07	1.20	3624	0.11	2.27	2085	0.11	2.19
1979	3202	0.07	0.82	3592	0.17	2.52	2096	0.19	2.58
1980	3219	0.02	0.63	3631	0.02	1.18	2117	0.02	0.91
1981	3171	0.05	0.57	3583	0.03	0.81	2128	0.03	0.81
1982	3210	0.01	0.24	3634	0.00	-0.01	2139	0.00	-0.11
1983	3446	0.01	0.55	3883	0.02	0.88	2209	0.02	0.92
1984	3486	0.06	0.40	3933	0.01	0.41	2236	0.01	0.34
1985	3577	0.04	0.36	4031	0.00	0.25	2262	0.00	-0.09
1986	3756	0.03	0.24	4217	0.00	0.21	2323	0.00	0.17
1987	3696	0.03	0.24	4180	0.01	0.26	2322	0.00	0.17
1988	3752	0.04	0.24	4291	0.07	0.80	2339	0.04	0.74
1989	3867	0.04	0.27	4464	0.03	0.68	2381	0.03	0.99
1990	3884	0.05	0.17	4490	0.03	0.40	2398	0.03	0.56
1991	3872	0.01	0.20	4463	0.01	0.42	2397	0.01	0.44
1992	3829	0.03	0.34	4410	0.05	1.05	2419	0.04	1.01
1993	3896	0.03	0.49	4493	0.04	1.14	2438	0.06	1.45
1994	4132	0.05	0.43	5098	0.06	1.03	2505	0.09	1.44
1995	4386	0.03	0.61	5398	0.03	1.69	2578	0.02	1.43
1996	4676	0.04	0.47	5749	0.03	1.39	2637	0.03	1.46
1997	4763	0.03	0.46	5802	0.02	1.98	2641	0.02	2.52
1998	4909	0.05	0.30	5906	0.01	0.86	2666	0.01	1.00
1999	4687	0.01	0.52	5652	0.00	1.37	2638	0.00	2.05
2000	4427	0.05	0.23	5465	0.01	0.71	2566	0.01	1.27
2001	4174	0.04	0.17	5185	0.03	0.33	2540	0.03	0.35
2002	4159	0.00	-0.03	5136	0.00	0.02	2557	0.00	0.01
2003	3872	0.04	1.15	4826	0.05	1.75	2522	0.06	1.84
2004	3726	0.05	0.94	4628	0.04	1.60	2503	0.03	1.43
2005	3552	0.02	0.66	4435	0.04	1.92	2460	0.03	1.66
2006	3473	0.04	0.62	4349	0.06	1.43	2383	0.05	1.20
2007	3367	0.03	0.40	4239	0.05	1.02	2298	0.03	0.79
2008	3304	0.13	0.14	4158	0.06	0.30	2218	0.03	0.31
2009	3265	0.04	0.54	4108	0.03	1.07	2143	0.03	1.10
2010	3142	0.03	0.45	3947	0.05	1.16	2080	0.06	1.46
2011	2984	0.04	0.26	3759	0.01	0.44	2005	0.01	0.45
2012	2920	0.05	0.33	3666	0.03	0.65	1940	0.03	0.66
2013	2885	0.02	0.45	3615	0.04	1.46	1875	0.04	1.34
2014	2852	0.02	0.33	3570	0.01	0.65	1800	0.02	0.78
2015	2861	0.11	0.18	3571	0.03	0.30	1721	0.03	0.32
2016	2902	0.02	0.23	3617	0.02	0.66	1640	0.03	0.67
2017	2887	0.00	0.13	3570	0.01	0.52	1558	0.01	0.67
2018	2859	0.01	0.14	3525	0.00	0.18	1476	0.00	0.15
2019	2512	0.02	0.27	3105	0.01	0.58	1314	0.01	0.59

TABLE 3
Aggregate Earnings-Returns Relation

This table presents statistics estimated from the aggregate time-series regression with a 20-year window that rolls over every year: $RET_t = \gamma_{0,r} + \gamma_{1,r}\Delta X_t + \varepsilon_t$. Aggregate earnings change for year t (ΔX_t) is the sum of all sample firms' year t's annual earnings before extraordinary items minus the sum of all sample firms' year t-1's annual earnings before extraordinary items, divided by the sum of all sample firms' year t's beginning market capitalization. Aggregate return for year t (RET_t) is CRSP value-weighted stock return, including dividends (CRSP: VWRETD). Year indicates the ending year of a rolling window. Signed adjusted R^2 is the product of the adjusted R^2 and the sign of the coefficient on ΔX_t.

	Excluding Financial Firms		**Including Financial Firms**		**Reduced Sample, excl. Financials**	
Year	Signed Adj. R2	$\gamma 1$	Signed Adj. R2	$\gamma 1$	Signed Adj. R2	$\gamma 1$
1982	-0.01	-4.44	0.00	-4.04		
1983	-0.01	-4.31	0.01	-3.86	-0.01	-4.26
1984	-0.02	-4.45	0.00	-4.00	-0.02	-4.39
1985	-0.06	-5.45	-0.04	-5.10	-0.06	-5.39
1986	-0.07	-5.27	-0.05	-5.07	-0.07	-5.28
1987	-0.07	-5.08	-0.04	-4.80	-0.07	-5.07
1988	-0.06	-4.80	-0.02	-4.14	-0.06	-4.76
1989	-0.11	-5.53	-0.07	-5.14	-0.10	-5.51
1990	-0.07	-4.94	-0.04	-4.53	-0.07	-4.98
1991	-0.12	-5.60	-0.08	-5.30	-0.12	-5.64
1992	-0.12	-5.65	-0.09	-5.36	-0.12	-5.66
1993	-0.08	-4.60	-0.04	-4.24	-0.08	-4.65
1994	-0.08	-3.77	-0.05	-3.55	-0.08	-3.85
1995	-0.03	-3.03	0.00	-2.62	-0.03	-3.11
1996	-0.07	-3.89	-0.04	-3.53	-0.07	-3.91
1997	-0.06	-3.65	-0.02	-3.14	-0.06	-3.68
1998	-0.05	-3.52	-0.01	-2.94	-0.05	-3.54
1999	-0.11	-4.97	-0.06	-4.42	-0.11	-4.96
2000	-0.10	-5.14	-0.04	-4.47	-0.11	-5.22
2001	-0.06	-0.15	-0.05	0.43	0.05	-0.88
2002	-0.05	-0.87	0.05	-0.46	0.05	-1.09
2003	-0.05	0.34	-0.05	0.79	-0.06	0.08
2004	-0.05	0.76	-0.05	1.17	-0.05	0.60
2005	-0.04	1.60	-0.03	2.02	-0.04	1.68
2006	-0.04	1.81	-0.03	2.22	-0.04	1.95
2007	-0.02	2.62	-0.02	2.65	-0.01	3.10
2008	0.09	5.73	0.24	6.06	0.09	6.62
2009	0.08	5.61	0.30	6.55	0.06	6.00
2010	0.07	4.96	0.29	6.09	0.05	5.17
2011	0.15	6.47	0.37	6.73	0.13	7.25
2012	0.13	6.16	0.36	6.62	0.12	6.78
2013	0.13	6.26	0.35	6.72	0.11	6.86
2014	0.19	7.37	0.41	7.24	0.17	8.35
2015	0.21	7.14	0.44	7.11	0.19	7.92
2016	0.21	7.06	0.44	7.06	0.19	7.80
2017	0.24	7.23	0.47	7.09	0.21	7.91
2018	0.25	7.38	0.46	7.02	0.23	8.15
2019	0.23	7.24	0.44	6.95	0.21	8.07

TABLE 4

Firm-Level Time-Series Earnings-Returns Relation

This table presents statistics estimated from the firm-level time-series regression with a 20-year window that rolls over every year and requires at least 15 years of data in each rolling window: $RET_{i,t} = \alpha_{6,i,r} + \alpha_{7,i,r}\Delta X_{i,t} + \varepsilon_{i,t}$. $\Delta X_{i,t}$ is firm i's year t's annual earnings before extraordinary items (Compustat: IB) minus the year t-1's annual earnings before extraordinary items, deflated by the year t's beginning market capitalization. $RET_{i,t}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. Year indicates the ending year of a rolling window. We further winsorize the adjusted R^2 and the coefficient at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

	Excluding Financial Firms				Including Financial Firms			
Year	Mean Adj. R2	Mean α7	Median Adj. R2	Median α7	Mean Adj. R2	Mean α7	Median Adj. R2	Median α7
1982	0.05	1.78	0.00	1.11	0.05	1.76	0.00	1.11
1983	0.04	1.62	0.00	1.02	0.04	1.61	0.00	1.02
1984	0.04	1.50	0.00	0.93	0.04	1.48	0.00	0.94
1985	0.04	1.28	0.00	0.81	0.04	1.28	0.00	0.81
1986	0.04	1.12	-0.01	0.73	0.04	1.13	-0.01	0.73
1987	0.03	1.04	0.00	0.70	0.04	1.02	0.00	0.70
1988	0.04	1.00	0.00	0.70	0.04	0.99	0.00	0.70
1989	0.05	1.31	0.00	0.86	0.05	1.35	0.01	0.87
1990	0.05	1.33	0.01	0.84	0.05	1.35	0.01	0.84
1991	0.05	1.32	0.01	0.82	0.05	1.33	0.01	0.82
1992	0.05	1.36	0.01	0.83	0.06	1.36	0.01	0.81
1993	0.06	1.55	0.02	0.93	0.06	1.55	0.02	0.92
1994	0.06	1.67	0.02	0.97	0.06	1.65	0.02	0.96
1995	0.06	1.59	0.02	0.94	0.06	1.57	0.02	0.93
1996	0.06	1.68	0.01	0.93	0.06	1.65	0.01	0.93
1997	0.05	1.71	0.01	0.93	0.05	1.67	0.01	0.93
1998	0.05	1.81	0.01	0.96	0.05	1.77	0.01	0.96
1999	0.06	1.95	0.01	0.99	0.05	1.93	0.01	1.00
2000	0.05	1.79	0.01	0.94	0.05	1.76	0.01	0.96
2001	0.05	1.80	0.01	0.91	0.05	1.78	0.01	0.92
2002	0.06	1.76	0.02	0.90	0.06	1.75	0.02	0.90
2003	0.06	1.72	0.02	0.91	0.06	1.73	0.02	0.93
2004	0.06	1.79	0.01	0.93	0.06	1.80	0.01	0.94
2005	0.06	1.84	0.02	0.99	0.06	1.82	0.02	1.00
2006	0.06	1.95	0.02	1.08	0.06	1.94	0.02	1.09
2007	0.06	2.04	0.02	1.12	0.06	2.08	0.02	1.16
2008	0.07	2.26	0.03	1.17	0.08	2.42	0.04	1.25
2009	0.06	1.85	0.02	1.02	0.07	1.95	0.03	1.06
2010	0.06	1.94	0.02	1.03	0.07	2.01	0.03	1.07
2011	0.06	1.75	0.01	0.99	0.07	1.81	0.02	1.02
2012	0.06	1.76	0.01	0.94	0.07	1.81	0.02	0.98
2013	0.06	1.73	0.01	0.92	0.07	1.79	0.02	0.95
2014	0.06	1.73	0.01	0.95	0.07	1.84	0.01	0.99
2015	0.06	1.78	0.01	0.89	0.07	1.90	0.02	0.97
2016	0.06	1.82	0.01	0.85	0.07	1.93	0.01	0.93
2017	0.06	1.74	0.01	0.81	0.07	1.85	0.01	0.89
2018	0.06	1.64	0.00	0.80	0.07	1.70	0.01	0.86
2019	0.06	1.67	0.01	0.79	0.07	1.72	0.01	0.85

TABLE 5

Different Time Trends across Cross-Sectional, Aggregate, and Firm-Level Time-Series Analyses

This table presents the results from regressing the adjusted R^2 statistics on time trend: $Adj.R^2{}_t = \tau_1 + \tau_2 TimeTrend_t + \varepsilon_t$. The cross-sectional analysis adjusted R^2 comes from Table 2, the aggregate time-series signed adjusted R^2 comes from Table 3, and the firm-level time-series average adjusted R^2 comes from Table 4. Time trend equals the four-digit year (at the end of a rolling window), e.g., 1982.

Analysis:	Cross-Sectional			Aggregate Time-Series			Firm-Level Time-Series			
Sample:	Excl. Financials	Incl. Financials	Reduced Sample	Excl. Financials	Incl. Financials	Reduced Sample	Excl. Financial Firms		Incl. Financial Firms	
							Mean	Median	Mean	Median
Intercept	2.34	3.06	2.60	-16.69	-29.24	-16.42	-1.15	-0.67	-1.65	-1.07
t	*3.15*	*3.05*	*2.73*	*-7.26*	*-8.87*	*-7.94*	*-6.05*	*-2.87*	*-9.60*	*-4.70*
Time trend	-0.12%	-0.15%	-0.13%	0.84%	1.47%	0.82%	0.06%	0.03%	0.09%	0.05%
t	*-3.09*	*-3.02*	*-2.70*	*7.26*	*8.90*	*7.95*	*6.35*	*2.91*	*9.95*	*4.75*
Adj. R2	0.21	0.20	0.16	0.63	0.65	0.66	0.54	0.18	0.72	0.40
N	57	57	56	38	38	37	38	38	38	38

TABLE 6

Incremental R^2 of Firm-Level Earnings $\Delta X_{i.t}$ and Aggregate Earnings ΔX_t

This table presents statistics estimated from firm-level time-series regressions with a 20-year window that rolls over every year and require at least 15 years of data in each rolling window. Incremental R^2 of firm-level earnings $\Delta X_{i.t}$ is Model (1) R^2 minus Model (2) R^2. Incremental R^2 of aggregate earnings ΔX_t is Model (1) R^2 minus Model (3) R^2. Signed R^2 is the product of incremental R^2 of aggregate earnings and the sign of the coefficient on ΔX_t in Model (1). Model (1): $RET_{i,t} = \alpha_{1,i,r} + \alpha_{2,i,r}\Delta X_{i,t} + \alpha_{3,i,r}\Delta X_t + \varepsilon_{i,t}$. Model (2): $RET_{i,t} = \alpha_{4,i,r} + \alpha_{5,i,r}\Delta X_t + \varepsilon_{i,t}$. Model (3): $RET_{i,t} = \alpha_{6,i,r} + \alpha_{7,i,r}\Delta X_{i,t} + \varepsilon_{i,t}$. $\Delta X_{i,t}$ is firm i's year t's annual earnings change, deflated by beginning market capitalization. ΔX_t is aggregate earnings change. $RET_{i,t}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. Year indicates the ending year of a rolling window. We winsorize the adjusted R^2 at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

	Excluding Financial Firms				Including Financial Firms			
	Incr. Mean Adj. R2		Incre. Median Adj. R2		Incr. Mean Adj. R2		Incre. Median Adj. R2	
Year	ΔXi,t	ΔXt	ΔXi,t	ΔXt	ΔXi,t	ΔXt	ΔXi,t	ΔXt
1982	0.06	-0.08	0.08	-0.16	0.06	-0.08	0.08	-0.10
1983	0.06	-0.08	0.07	-0.16	0.06	-0.08	0.08	-0.10
1984	0.05	-0.07	0.06	-0.14	0.05	-0.07	0.06	-0.08
1985	0.05	-0.09	0.08	-0.17	0.05	-0.09	0.07	-0.10
1986	0.05	-0.09	0.08	-0.17	0.05	-0.09	0.08	-0.11
1987	0.05	-0.10	0.07	-0.16	0.05	-0.10	0.07	-0.11
1988	0.05	-0.09	0.07	-0.17	0.05	-0.10	0.07	-0.11
1989	0.06	-0.09	0.10	-0.18	0.06	-0.09	0.10	-0.11
1990	0.06	-0.08	0.10	-0.17	0.07	-0.08	0.10	-0.10
1991	0.07	-0.07	0.09	-0.15	0.07	-0.07	0.09	-0.09
1992	0.07	-0.07	0.09	-0.15	0.07	-0.07	0.09	-0.09
1993	0.07	-0.06	0.10	-0.14	0.07	-0.06	0.09	-0.08
1994	0.08	-0.05	0.10	-0.14	0.08	-0.05	0.09	-0.07
1995	0.07	-0.04	0.09	-0.13	0.07	-0.05	0.08	-0.06
1996	0.07	-0.04	0.08	-0.13	0.06	-0.04	0.08	-0.06
1997	0.06	-0.04	0.07	-0.11	0.06	-0.04	0.07	-0.05
1998	0.06	-0.03	0.07	-0.12	0.06	-0.03	0.07	-0.04
1999	0.06	-0.02	0.07	-0.10	0.06	-0.02	0.06	-0.02
2000	0.06	-0.02	0.07	-0.10	0.06	-0.02	0.06	-0.02
2001	0.06	-0.02	0.06	-0.09	0.06	-0.02	0.05	-0.01
2002	0.06	0.00	0.06	-0.08	0.06	0.00	0.05	0.00
2003	0.06	0.00	0.06	-0.08	0.06	0.00	0.05	0.00
2004	0.06	0.00	0.05	-0.08	0.06	0.00	0.05	0.00
2005	0.06	0.00	0.05	-0.07	0.06	0.00	0.05	0.00
2006	0.06	0.00	0.06	-0.06	0.06	0.00	0.05	0.00
2007	0.06	0.00	0.05	0.07	0.06	0.00	0.05	0.00
2008	0.06	0.02	0.06	0.09	0.06	0.02	0.06	0.02
2009	0.06	0.04	0.06	0.09	0.06	0.04	0.07	0.05
2010	0.06	0.04	0.05	0.09	0.06	0.04	0.07	0.05
2011	0.06	0.04	0.05	0.10	0.06	0.04	0.06	0.06
2012	0.05	0.05	0.05	0.09	0.06	0.04	0.06	0.07
2013	0.05	0.05	0.05	0.09	0.05	0.05	0.05	0.07
2014	0.05	0.06	0.05	0.10	0.06	0.06	0.06	0.08
2015	0.05	0.06	0.05	0.11	0.06	0.06	0.06	0.09
2016	0.05	0.07	0.05	0.12	0.06	0.06	0.06	0.09
2017	0.05	0.07	0.05	0.11	0.06	0.07	0.06	0.10
2018	0.05	0.07	0.05	0.17	0.05	0.07	0.06	0.10
2019	0.05	0.09	0.06	0.19	0.06	0.08	0.06	0.12

TABLE 7

Firm-Level Earnings Persistence and its Relationship with Lagged Aggregate Earnings

This table presents statistics estimated from firm-level time-series regressions that roll over every 20 years and require at least 15 years of data in each rolling window: $\Delta X_{i,t} = \delta_{0,i,r} + \delta_{1,i,r}\Delta X_{i,t-1} + \delta_{2,i,r}\Delta X_{t-1} + \varepsilon_{i,t}$. $\Delta X_{i,t}$ ($\Delta X_{i,t-1}$) is firm i's year t's (t-1's) annual earnings change, deflated by beginning market capitalization. Aggregate earnings change for year t-1 (ΔX_{t-1}) is the sum of all sample firms' year t-1's annual earnings before extraordinary items minus the sum of all sample firms' year t-2's annual earnings before extraordinary items, divided by the sum of all sample firms' year t-1's beginning market capitalization. Both firm return and change in earnings are winsorized at +/- 1% in each year to address potential data input errors. Year indicates the ending year of a rolling window. We further winsorize the coefficient at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

	Excluding Financial Firms				Including Financial Firms			
	Mean Coefficient		Median Coefficient		Mean Coefficient		Median Coefficient	
Year	$\delta 1$	$\delta 2$	$\delta 1$	$\delta 2$	$\delta 1$	$\delta 2$	$\delta 1$	$\delta 2$
1982	-0.04	-0.35	-0.07	0.06	-0.03	-0.41	-0.07	0.08
1983	-0.07	-0.16	-0.08	0.04	-0.07	-0.24	-0.08	0.06
1984	-0.10	-0.06	-0.11	0.03	-0.10	-0.14	-0.12	0.04
1985	-0.10	-0.20	-0.11	-0.05	-0.10	-0.26	-0.12	-0.03
1986	-0.11	-0.11	-0.12	-0.03	-0.11	-0.18	-0.13	0.01
1987	-0.14	-0.15	-0.14	0.02	-0.14	-0.17	-0.15	0.05
1988	-0.15	-0.20	-0.14	0.02	-0.15	-0.20	-0.16	0.03
1989	-0.15	-0.32	-0.16	-0.03	-0.16	-0.31	-0.17	-0.04
1990	-0.16	0.14	-0.17	0.04	-0.16	0.25	-0.18	0.12
1991	-0.16	0.36	-0.17	0.13	-0.17	0.47	-0.18	0.20
1992	-0.18	0.40	-0.21	0.20	-0.19	0.47	-0.21	0.26
1993	-0.18	0.42	-0.21	0.19	-0.19	0.51	-0.22	0.26
1994	-0.19	0.45	-0.22	0.19	-0.19	0.55	-0.22	0.25
1995	-0.20	0.65	-0.23	0.22	-0.20	0.72	-0.24	0.29
1996	-0.21	0.71	-0.25	0.28	-0.21	0.78	-0.25	0.36
1997	-0.22	0.66	-0.26	0.23	-0.22	0.70	-0.25	0.32
1998	-0.24	0.61	-0.26	0.22	-0.23	0.64	-0.26	0.26
1999	-0.25	0.55	-0.28	0.18	-0.25	0.57	-0.28	0.21
2000	-0.26	0.64	-0.29	0.13	-0.25	0.63	-0.29	0.15
2001	-0.26	0.70	-0.29	0.14	-0.25	0.68	-0.28	0.16
2002	-0.28	0.86	-0.30	0.12	-0.28	0.75	-0.30	0.16
2003	-0.26	1.00	-0.30	0.17	-0.26	0.83	-0.30	0.18
2004	-0.27	1.03	-0.31	0.15	-0.26	0.85	-0.30	0.15
2005	-0.26	1.07	-0.29	0.19	-0.25	0.84	-0.29	0.19
2006	-0.25	1.01	-0.28	0.19	-0.24	0.77	-0.28	0.18
2007	-0.24	0.75	-0.28	0.16	-0.24	0.56	-0.27	0.16
2008	-0.25	1.14	-0.29	0.15	-0.16	1.05	-0.27	0.26
2009	-0.30	1.30	-0.30	0.30	-0.24	1.21	-0.30	0.31
2010	-0.26	1.28	-0.29	0.32	-0.23	1.41	-0.27	0.29
2011	-0.27	1.31	-0.29	0.30	-0.24	1.44	-0.27	0.26
2012	-0.27	1.61	-0.29	0.37	-0.24	1.70	-0.27	0.30
2013	-0.26	1.52	-0.29	0.36	-0.24	1.68	-0.27	0.30
2014	-0.26	1.41	-0.29	0.34	-0.24	1.62	-0.27	0.28
2015	-0.26	1.43	-0.29	0.33	-0.24	1.58	-0.28	0.28
2016	-0.26	1.38	-0.29	0.34	-0.25	1.50	-0.27	0.27
2017	-0.26	1.38	-0.29	0.34	-0.25	1.47	-0.27	0.25
2018	-0.26	1.36	-0.29	0.32	-0.25	1.44	-0.27	0.25
2019	-0.27	1.31	-0.29	0.31	-0.26	1.38	-0.27	0.24

TABLE 8

Difference between Firm-level and Aggregate Earnings

Panel A Incremental Adj. R^2 of Firm-level and Aggregate Earnings

This table presents the results from regressing Table 6 (signed) incremental adjusted R^2 statistics on time trend: $Adj.R^2{}_t = \tau_1 + \tau_2 TimeTrend_t + \varepsilon_t$. Time trend equals the four-digit year at the end of a rolling window, e.g., 1982. The p-value for the difference in the incremental adjusted R^2 between firm-level and aggregate earnings is calculated based on normalized statistics, $(R^2 - \overline{R^2})/\sigma_{R^2}$.

	Incr. Adj. R2 of Firm-Level Earnings				Incr. Adj. R2 of Aggregate Earnings			
	Excl. Financial Firms		Incl. Financial Firms		Excl. Financial Firms		Incl. Financial Firms	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Intercept	0.39	2.33	0.22	1.74	-8.49	-20.18	-9.94	-12.96
t	*1.94*	*7.40*	*1.14*	*6.44*	*-21.65*	*-16.51*	*-24.23*	*-21.47*
Time trend	-0.02%	-0.11%	-0.01%	-0.08%	0.42%	1.01%	0.50%	0.65%
t	*-1.66*	*-7.21*	*-0.84*	*-6.21*	*21.66*	*16.48*	*24.26*	*21.50*
Adj. R2	0.05	0.58	-0.01	0.41	0.95	0.87	0.96	0.95
	p-value for diff (firm-level minus aggregate)				*<0.01*	*<0.01*	*<0.01*	*<0.01*

Panel B Firm-Level Earnings Persistence and Lagged Aggregate Earnings

This table presents the results from regressing Table 7 coefficient estimates on time trend: $\delta_{k,t} = \tau_1 + \tau_2 TimeTrend_t + \varepsilon_t$. Time trend equals the four-digit year at the end of a rolling window, e.g., 1982. The p-value for the difference in the coefficients on lagged firm-level and aggregate earnings is calculated based on normalized statistics, $(\delta_k - \overline{\delta_k})/\sigma_{\delta_k}$.

	Coefficient on Lagged Firm-Level Earnings				Coefficient on Lagged Aggregate Earnings			
	Excl. Financial Firms		Incl. Financial Firms		Excl. Financial Firms		Incl. Financial Firms	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Intercept	10.18	11.38	7.04	9.54	-77.29	-18.64	-104.96	-12.53
t	*8.56*	*10.43*	*5.30*	*7.84*	*-10.23*	*-11.94*	*-17.57*	*-6.24*
Time trend	-0.52%	-0.58%	-0.36%	-0.49%	3.89%	0.94%	5.28%	0.64%
t	*-8.74*	*-10.65*	*-5.43*	*-8.04*	*10.27*	*12.08*	*17.68*	*6.54*
Adj. R2	0.71	0.77	0.34	0.66	0.81	0.73	0.88	0.44
	p-value for diff (firm-level minus aggregate)				*<0.01*	*<0.01*	*<0.01*	*<0.01*

TABLE 9 Incremental Adj. R^2 of Superstar Earnings $\Delta SSX_{i.t}$
Panel A

This table presents the signed incremental average R^2 estimated from firm-level time-series regressions with a 20-year window. Superstar firms are the largest 100 or 25 firms based on beginning market capitalization in each year. We exclude superstar firms to avoid mechanical relation. Incremental R^2 of superstar earnings ΔSSX_t is Model (1) R^2 minus Model (2) R^2. Signed R^2 is the product of incremental R^2 and the sign of the ΔSSX_t coefficient in Model (1). Model (1): $RET_{i,t} = \theta_{1,i,r} + \theta_{2,i,r}\Delta X_{i,t} + \theta_{3,i,r}\Delta SSX_t + \varepsilon_{i,t-1}$. Model (2): $RET_{i,t} = \theta_{4,i,r} + \theta_{5,i,r}\Delta X_{i,t} + \varepsilon_{i,t-1}$. $\Delta X_{i,t}$ is firm i's year t's annual earnings change, deflated by beginning market capitalization. ΔSSX_t is superstar firms' earnings change, measured as the sum of all superstar firms' year t's annual earnings before extraordinary items minus the sum of all superstar firms' year t-1's annual earnings before extraordinary items, divided by the sum of all superstar firms' year t's beginning market capitalization. $RET_{i,t}$ is firm i's twelve-month cumulative return from the fourth month after the fiscal year t-1's end. We further winsorize the adjusted R^2 at +/- 1% for each rolling window before calculating the mean value to limit the impact of influential observations.

	Signed Incr. Mean Adj. R2 of Supstar Earnings					
	Excluding Financial Firms			Including Financial Firms		
Superstar Firms:	Top 100	Top 50	Top 25	Top 100	Top 50	Top 25
1982	-0.04	-0.02	-0.02	-0.03	-0.02	-0.02
1983	-0.04	-0.02	-0.02	-0.02	-0.02	-0.02
1984	-0.04	-0.03	-0.03	-0.02	-0.02	-0.02
1985	-0.06	-0.04	-0.04	-0.04	-0.04	-0.05
1986	-0.06	-0.05	-0.05	-0.05	-0.05	-0.05
1987	-0.07	-0.06	-0.06	-0.06	-0.06	-0.06
1988	-0.07	-0.06	-0.06	-0.06	-0.05	-0.06
1989	-0.08	-0.06	-0.07	-0.06	-0.06	-0.07
1990	-0.08	-0.06	-0.07	-0.06	-0.06	-0.07
1991	-0.07	-0.06	-0.07	-0.06	-0.05	-0.07
1992	-0.07	-0.06	-0.07	-0.06	-0.06	-0.07
1993	-0.06	-0.05	-0.06	-0.05	-0.05	-0.07
1994	-0.06	-0.05	-0.06	-0.05	-0.05	-0.06
1995	-0.05	-0.04	-0.05	-0.04	-0.04	-0.06
1996	-0.05	-0.04	-0.05	-0.04	-0.04	-0.06
1997	-0.04	-0.03	-0.05	-0.04	-0.03	-0.05
1998	-0.04	-0.03	-0.04	-0.03	-0.03	-0.04
1999	-0.02	-0.01	-0.02	-0.02	-0.01	-0.03
2000	-0.03	-0.02	-0.03	-0.03	-0.02	-0.04
2001	-0.03	-0.02	-0.03	-0.03	-0.02	-0.03
2002	-0.01	0.00	-0.01	-0.01	0.00	-0.02
2003	-0.01	0.00	-0.01	-0.01	0.00	-0.01
2004	-0.01	0.00	0.00	0.00	0.00	-0.01
2005	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.01	0.01	0.00
2009	0.00	0.00	0.00	0.02	0.01	0.00
2010	0.00	0.00	0.00	0.02	0.01	0.00
2011	0.00	0.00	0.00	0.02	0.02	0.00
2012	0.00	0.00	0.01	0.02	0.03	0.00
2013	0.00	0.00	0.01	0.03	0.03	0.01
2014	0.01	0.01	0.03	0.04	0.06	0.03
2015	0.01	0.01	0.03	0.05	0.07	0.03
2016	0.02	0.02	0.04	0.05	0.07	0.03
2017	0.02	0.02	0.04	0.05	0.07	0.03
2018	0.02	0.02	0.04	0.05	0.07	0.04
2019	0.03	0.03	0.04	0.06	0.09	0.04

TABLE 9 (Continued)

Incremental Adj. R^2 of Superstar Earnings $\Delta SSX_{i.t}$

Panel B

This table presents the results from regressing the Panel A signed incremental average R^2 statistics on time trend: $Adj.R^2{}_t = \tau_1 + \tau_2 TimeTrend_t + \varepsilon_t$. Time trend equals the four-digit year (at the end of a rolling window), e.g., 1982.

Sample:	Excl. Financial Firms			Incl. Financial Firms		
Superstar Firms:	Top 100	Top 50	Top 25	Top 100	Top 50	Top 25
Intercept	-5.29	-4.25	-5.27	-6.13	-6.76	-5.39
t	*-10.63*	*-8.57*	*-8.12*	*-9.76*	*-8.76*	*-7.47*
Time trend	0.26%	0.21%	0.26%	0.31%	0.34%	0.27%
t	*10.62*	*8.56*	*8.11*	*9.77*	*8.76*	*7.46*
Adj. R2	0.81	0.74	0.74	0.81	0.78	0.70

TABLE 10 Differences between Firms

Panel A Large and Small Firms

This table presents the results from regressing Figure H incremental adjusted R^2 of firm-level earnings, Figure I signed incremental adjusted R^2 of aggregate earnings, or Figure J earnings persistence coefficient on time trend: $Adj.R^2{}_t or \delta_{1,t} = \tau_1 + \tau_2 TimeTrend_t + \varepsilon_t$. Time trend equals the four-digit year at the end of a rolling window, e.g., 1982. The p-value for the difference between large and small firms is calculated based on normalized statistics, $(R^2 - \overline{R^2})/\sigma_{R^2}$ or $(\delta_k - \overline{\delta_k})/\sigma_{\delta_k}$.

	Large Firms						Small Firms					
	Incr. Adj. R2 of Firm-Level Earnings		Incr. Adj. R2 of Aggregate Earnings		Firm-Level Earnings Persistence		Incr. Adj. R2 of Firm-Level Earnings		Incr. Adj. R2 of Aggregate Earnings		Firm-Level Earnings Persistence	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Intercept	0.32	2.78	-12.20	-14.68	14.73	17.11	-1.29	-0.64	-4.58	-6.62	-0.14	0.59
t	*1.75*	*9.25*	*-17.84*	*-16.33*	*10.78*	*10.84*	*-3.74*	*-1.53*	*-13.66*	*-15.04*	*-0.17*	*0.72*
Time trend	-0.01%	-0.14%	0.61%	0.73%	-0.75%	-0.87%	0.07%	0.04%	0.23%	0.33%	-0.01%	-0.05%
t	*-1.50*	*-9.10*	*17.84*	*16.33*	*-10.91*	*-10.98*	*3.95*	*1.71*	*13.68*	*15.07*	*-0.19*	*-1.12*
Adj. R2	0.02	0.62	0.92	0.91	0.80	0.83	0.34	0.04	0.87	0.88	-0.03	0.00
p-value for diff (large minus small)							*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*

Panel B Growth and Value Firms

This table presents the results from regressing Figure K incremental adjusted R^2 of firm-level earnings, Figure L signed incremental adjusted R^2 of aggregate earnings, or Figure M earnings persistence coefficient on time trend: $Adj.R^2{}_t or \delta_{1,t} = \tau_1 + \tau_2 TimeTrend_t + \varepsilon_t$. Time trend equals the four-digit year at the end of a rolling window, e.g., 1982. The p-value for the difference between growth and value firms is calculated based on normalized statistics, $(R^2 - \overline{R^2})/\sigma_{R^2}$ or $(\delta_k - \overline{\delta_k})/\sigma_{\delta_k}$.

	Growth Firms						Value Firms					
	Incr. Adj. R2 of		Incr. Adj. R2 of		Firm-Level		Incr. Adj. R2 of		Incr. Adj. R2 of		Firm-Level	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Intercept	1.60	4.80	-12.70	-16.54	18.70	22.41	-0.98	0.51	-7.85	-10.66	5.57	4.74
t	*3.97*	*8.22*	*-16.55*	*-21.85*	*9.13*	*10.66*	*-2.66*	*1.30*	*-16.00*	*-11.83*	*4.62*	*5.26*
Time trend	-0.08%	-0.24%	0.63%	0.82%	-0.94%	-1.13%	0.05%	-0.02%	0.39%	0.53%	-0.29%	-0.25%
t	*-3.86*	*-8.12*	*16.54*	*21.81*	*-9.15*	*-10.70*	*2.89*	*-1.09*	*16.01*	*11.82*	*-4.84*	*-5.60*
Adj. R2	0.35	0.57	0.90	0.92	0.65	0.71	0.15	0.00	0.91	0.84	0.40	0.48
p-value for diff (large minus small)							*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*	*<0.01*