IS CONDITIONAL PERSISTENCE FULLY PRICED?

by

Eli Amir*
Itay Kama**

Working Paper No 13/2011 July 2011

Research No. 06210100

* Email: Eamir@london.edu

** Email: Kamaitay@post.tau.ac.il

This paper was partially financed by the Henry Crown Institute of Business Research in Israel.

Is Conditional Persistence Fully Priced?

Abstract

Amir, Kama and Livnat (2011) argue that the market reaction to an accounting variable should depend not on its unconditional persistence (a variable's autocorrelation coefficient), but on its conditional persistence (the power of a variable's persistence to explain the persistence of a variable higher in the hierarchy). They provide evidence supporting this argument using the DuPont decomposition of ratios. We conjecture that equity investors do not fully price accounting information based on their conditional persistence, but instead are fixated on the traditional concept of unconditional persistence in valuing stocks, leading to predictable post-SEC filing stock returns. First, we show that conditional persistence is reflected in contemporaneous stock returns. Then, we construct a trading strategy based on the distance between the conditional and the unconditional persistence of operating profit margins (OPM) and asset turnover (ATO). We find that buying stocks of firms with relatively high conditional persistence of OPM, and selling stocks of firms with relatively low conditional persistence of OPM, earns positive and significant abnormal stock returns for buy-and-hold periods of 90, 180, and 365 days starting after SEC filings. Furthermore, when the conditional persistence of OPM is relatively low, the post-announcement drift related to earnings surprises diminishes substantially, and post-announcement drift related to revenue surprises largely disappears. Our findings suggest that *conditional persistence* is not fully priced and may provide a plausible explanation for earnings and revenue surprise drifts.

Key words: Financial Statement Analysis, Persistence, Conditional Persistence, Market Reaction, DuPont Decomposition, Ratios

JEL Codes: G14, M41

Is Conditional Persistence Fully Priced?

1. Introduction

Recent studies have looked at the stock market reaction to various financial ratios when financial statement information is released.[1] For instance, Soliman (2008) examines the effect of return on net operating assets (RNOA) and its DuPont components – operating profit margin (OPM) and asset turnover (ATO) – on current and subsequent stock returns. Prior studies have also examined the persistence of earnings and earnings components (for example, Lipe, 1986; Wilson, 1987; Sloan, 1996; and Ertimur et al., 2003). These studies find that different components of earnings have different persistence and should therefore be priced differentially by equity investors. In addition, Ertimur et al. (2003), Jegadeesh and Livnat (2006a), and Kama (2009) find that revenues have greater persistence than earnings and expenses. Surprisingly, although revenues have greater persistence than earnings, investors prefer an increase in earnings to an increase in revenues.

To reconcile the greater persistence of revenues with the weaker market reaction to revenues, Amir, Kama and Livnat (2011), hereafter AKL, distinguish between two types of persistence measures – *conditional persistence* and *unconditional persistence*. The traditional measure of unconditional persistence is the autocorrelation coefficient obtained from a variable's time-series. Conditional persistence is the new concept they define as the marginal contribution of a component variable's persistence to the persistence of a variable higher in the hierarchy, claiming that the persistence of earnings components is important for

[1] Ratio analysis is perhaps the most popular tool used in financial statement analysis. Ratios are used in bankruptcy prediction (Ohlson, 1980), credit rating (Kaplan and Urwitz, 1979), prediction of takeovers (Palepu, 1986), prediction of the sign of earnings changes (Ou and Penman, 1989), prediction of stock returns (Penman and Zhang, 2006), and valuation (Nissim and Penman, 2001). See also Cottle et al. (1988); Penman (2010); Palepu et al. (2004); and White et al. (2003).

valuation only to the extent that it provides information about the persistence of the primary variable of interest for equity valuation.

The concept of conditional persistence is particularly useful when accounting variables are decomposed into components, as is often the case for financial ratios in general and the DuPont decomposition of RNOA, in particular. The traditional DuPont decomposition ties ratios together in a structured way, emphasizing the established hierarchy among them (Nissim and Penman, 2001). Financial ratios are building blocks in the construction of residual income, but certain ratios at a lower level of the hierarchy provide finer information about ratios at a higher level, and hence may be more useful for investors than ratios with greater persistence that are at the same level in the hierarchy.

AKL measure the unconditional persistence of unexpected changes in operating profit margins (UOPM) and unexpected changes in operating asset turnover (UATO) and find that UATO is unconditionally more persistent than UOPM. Then, they examine how the persistence of UATO and UOPM affect the persistence of URNOA, and find that the persistence of UOPM is more powerful than the persistence of UATO in explaining the persistence of URNOA, that is, the conditional persistence of UOPM is larger than that of UATO. Hence, they predict and find a stronger market reaction to UOPM than to UATO. They further decompose UOPM and UATO into two second-order components and find that the market reaction to these components depends, as expected, on the conditional persistence rather than the unconditional persistence.

The new concept of conditional persistence – the marginal contribution of the persistence of a component lower in the hierarchy to that of a variable higher in the hierarchy – is particularly useful when analyzing a set of accounting variables (for example, financial ratios) with a clear hierarchy. It is, therefore, an important factor in understanding the market reactions and valuation of accounting variables. As this concept is relatively new and computationally complicated, it is interesting to examine whether equity investors are fixated on the traditional concept of unconditional persistence in valuing stocks based on accounting information, instead of using conditional persistence, as the basis for pricing equity securities.

To examine whether this is indeed the case, we estimate the conditional and the unconditional persistence of UOPM for each firm at every quarter. We rank all companies, each quarter, according to their conditional and unconditional persistence of UOPM, and assign integers for each company starting with a value of "1" for the company with the lowest conditional persistence of UOPM. We repeat this process for unconditional persistence of UOPM. Then we measure for each firm/quarter the difference between the ranks of conditional and unconditional persistence of UOPM, and divide this difference by the number of companies in the quarter. We refer to this difference as *adjusted conditional persistence* of UOPM – ACP(UOPM). Adjusted conditional persistence of UATO – ACP(UATO) – is calculated in a similar manner.

We begin with analyzing the association between contemporaneous buy-and-hold abnormal stock returns (one day before the preliminary earnings announcement until one day after the SEC filing) and adjusted conditional persistence, controlling for UOPM and UATO. We also condition the analysis on the sign of URNOA. This is done because when URNOA is positive (negative) higher adjusted conditional persistence means good news (bad news). Empirical results indicate that when URNOA is positive, an increase in ACP(UOPM) or in ACP(UATO) leads to higher abnormal stock returns. Also, an increase in ACP(UOPM) combined with negative URNOA leads to lower abnormal stock returns. That is, the concept of conditional persistence is at least partially priced by the market.

To examine whether the concept of conditional persistence is *fully* priced by the market, we construct a trading strategy based on adjusted conditional persistence of UOPM

[ACP(UOPM)] and UATO [ACP(UATO)]. We use both portfolio and regression analyses, and find that buying stocks of firms with high ACP(UOPM), and selling stocks of firms with low ACP(UOPM) earns positive and significant abnormal stock returns for buy-and-hold windows of 90, 180 and 365 days starting after the SEC filings. The annualized subsequent abnormal return from that strategy is about 4% (after controlling for unexpected earnings, unexpected revenues, UOPM, UATO, the sign of URNOA, and several risk factors). Our tests suggest that these abnormal stock returns are unlikely to be associated with risk; rather the results are consistent with the claim that the conditional persistence of operating profit margins is not fully priced by equity investors.

We also examine whether conditional persistence provides a partial explanation for the post-earnings-announcement drift documented in Bernard and Thomas (1989, 1990), Chan et al. (1996) and others. Since this drift is often attributed to incorrect estimation of earnings persistence, we examine whether the level of conditional persistence is associated with the magnitude of the post-earnings-announcement drift. We show that the drift, combined with low adjusted conditional persistence of UOPM, is less than half of the drift combined with high adjusted conditional persistence of UOPM. Moreover, when the adjusted conditional persistence of UOPM is low, there is no drift with respect to revenue surprises. Jegadeesh and Livnat (2006a, 2006b) argue that earnings surprises combined with revenue surprises in the same direction have higher persistence, resulting in a drift, with respect to the revenue surprise. However, when the adjusted conditional persistence of UOPM is low, the marginal contribution of revenue surprises to the persistence of earnings surprises is negligible.

The main contribution of our study is showing that conditional persistence is not fully priced by equity investors,, possibly because investors are fixated on the traditional measure of unconditional persistence, placing little or no weight on the hierarchy inherent in financial ratios. Furthermore, since the drifts associated with earnings and revenue surprises is partially attributed to incorrect estimation of earnings persistence, our results suggest that putting insufficient weight on the conditional persistence of operating profit margins provides a plausible explanation for that anomaly.

The study proceeds as follows: In the next section we review the literature and motivate the study. Section 3 discusses the sample and variable definitions and provides descriptive statistics on the main variables. Section 4 provides the results, and section 5 concludes the study.

2. Related Literature

Return on net operating assets (RNOA) is normally decomposed into operating profit margin (OPM) and total asset turnover (ATO), $RNOA = OPM \times ATO$. OPM, measured as core earnings before interest and after tax divided by net sales, provides information on the sensitivity of operating income to product prices and changes in cost structure. ATO, measured as net sales divided by net operating assets (NOA), captures efficiency in utilizing the firm's net investment and the quality of asset management. Changes in OPM and ATO provide information about the persistence of residual income and RNOA, as both residual income and RNOA are sensitive to changes in product prices, input prices, and efficiency in utilizing the net operating assets. In addition, changes (and levels) of OPM and ATO provide value-relevant information about future residual income beyond earnings and revenue surprises.

Fairfield and Yohn (2001), Penman and Zhang (2006), and Soliman (2008) show that decomposing changes in RNOA into changes in ATO and OPM improves the accuracy of forecasted RNOA. Specifically, they find that the change in ATO, but not the change in OPM, explains future RNOA after controlling for current RNOA. Nissim and Penman (2001) use the residual income valuation model to develop a link between equity values on one side and RNOA and leverage on the other side. They track the behavior and persistence of these ratios over time. Fairfield et al. (2009) show that industry analysis has no incremental information in forecasting profitability but it is useful in predicting future sales growth. Soliman (2008) uses cross-sectional regressions with annual returns as the dependent variable and finds that RNOA and its two components, OPM and ATO, are value-relevant. He also finds that only the change in ATO is significant in explaining short-window stock returns around earnings announcements, but changes in OPM and RNOA are not significant. He argues that the market reacts to changes in ATO but not to changes in RNOA and OPM because only changes in ATO are significant in predicting future changes in return on net operating assets.

The persistence of RNOA and its components has also been examined extensively. For example, Romer (1986), Nissim and Penman (2001), and Penman and Zhang (2006) find that the *unconditional* persistence of ATO is larger than that of OPM. This finding, by itself, does not necessarily mean that ATO is a more important factor in explaining stock returns than OPM. Analogously, Jegadeesh and Livnat (2006a) and Kama (2009) have shown that the persistence of revenues is higher than that of earnings but that the market reaction to earnings surprises is stronger than that to revenue surprises.

AKL explain these conflicting findings by introducing a new concept of persistence – conditional persistence – and showing that the conditional persistence of OPM is larger than that of ATO. They equate a variable's unconditional persistence with its autocorrelation measured independently of other variables and its conditional persistence with its marginal contribution in explaining the persistence of a variable higher in the hierarchy, claiming that the usefulness of each component in valuation should depend on its marginal contribution to earnings quality, as argued by Penman and Zhang (2006). If earnings quality is associated with the persistence of RNOA, AKL argue, the usefulness of each RNOA component should be related to its conditional persistence. In particular, if the conditional persistence of one RNOA component is higher than that of another component, this should also be reflected in its stronger association with excess stock returns. Applying this new concept to the DuPont components, they predict and find that, when the conditional persistence of a component variable is higher than that of another component variable with the same hierarchy rank, the market reaction to information disclosed about the variable with the higher conditional persistence will be stronger than for the other variable. This new concept is particularly useful when accounting variables are disaggregated into variables lower in the hierarchy, as is the case for the DuPont decomposition of financial ratios.

The findings of AKL suggest that the pricing of RNOA by equity investors depends on their ability to correctly price RNOA components based on the conditional persistence of these components. Our aim is to examine whether equity investors consider the conditional persistence of RNOA components in setting equity prices. We do this by constructing a trading strategy that highlights the distinction between conditional and unconditional persistence and looking at current and post-SEC filing stock returns.

3. Sample, Variables and Descriptive Statistics

Following Nissim and Penman (2001) and AKL, we calculate RNOA as core operating income after tax (COI) divided by net operating assets (NOA). OPM is calculated as COI divided by net revenues, and asset turnover (ATO) is calculated as net revenue divided by NOA. Unexpected RNOA and its components (URNOA, UOPM, and UATO) are measured as raw ratios minus these ratios in the same quarter last year.

Earnings surprises are computed as standardized unexpected earnings (SUE) – the standardized difference between EPS and expected EPS: $SUE_{i,t} = \frac{EPS_{i,t} - E(EPS_{i,t})}{S_{i,t}}$.

$E(EPS_{it})$ is expected earnings per share for firm *i* in quarter *t*, measured as $E(EPS_{i,t}) = EPS_{i,t-4} + D_{i,t}$, where $EPS_{i,t-4}$ is earnings in the same quarter last year, and D_{it} is an average drift over the last 8 quarters – $D_{i,t} = \frac{1}{8}\sum_{j=1}^{8}(EPS_{i,t-j} - EPS_{i,t-j-4})$. S_{it} is the standard error of the unexpected EPS – $S_{i,t} = \frac{1}{7}\sqrt{\sum_{j=1}^{8}(EPS_{i,t-j} - E(EPS)_{i,t-j})^2}$. Standardized unexpected revenue (SURG) is calculated in a similar manner.

We compute size-adjusted buy-and-hold stock returns for current and post-SEC filing windows. Current stock returns, AR(C), are computed for each firm/quarter from one day before the preliminary earnings announcement until one day after the SEC filing. We also compute three post-SEC filing returns for 90, 180 and 365 days. Specifically, AR(90), AR(180), and AR(365) are excess buy-and-hold non-overlapping size-adjusted returns for a window of 90, 180, and 365 days, respectively. These windows start two days after the current SEC filing date.

The sample includes all companies with complete stock returns and financial data available on Compustat and CRSP during 1991-2008 with market value of equity above $10 million at quarter-end. We exclude financial institutions (1-digit SIC = 6) and public utilities (2-digit SIC = 49) because the structure of their financial statements is incompatible with those of other companies. To limit the effect of extreme observations, each quarter we rank the sample according to each of the RNOA components, SUE, SURG and buy-and-hold excess returns, and remove the extreme one percent of the observations on each side. Table 1 lists the number of observations each year. The sample includes 83,936 firm-quarter observations for 3,849 different firms.

(Table 1 about here)

Table 2 contains descriptive statistics for key variables. In addition to the main research variables described above, we report statistics for book-to-market ratios (B/M), measured as book value of equity at quarter-end divided by market value of common equity, and firm size (MV), measured as market value of common equity at quarter-end.

Mean buy-and-hold current abnormal returns for the contemporaneous and post-SEC filing returns are zero, by construction. To ensure that post-SEC filing returns are non-overlapping, AR(180) includes firm/quarter observations for the second and the fourth quarters, and AR(365) includes observations for the fourth quarter. Thus, the numbers of available observation for AR(180) and AR(365) are roughly one half and one quarter, respectively, of the number of observations for a 90-day window. The distribution of post-SEC filing returns is slightly skewed to the right as the median is slightly negative.

Consistent with AKL, mean quarterly RNOA, OPM and ATO are 0.03, 0.05 and 0.61, respectively. Mean and median unexpected ratios (URNOA, UOPM, and UATO) are around zero, by construction. Consistent with Jegadeesh and Livnat (2006b), mean SUE is negative (-0.09), while median SUE is positive (0.02). Also consistent with prior studies, the distribution of book-to-market ratios is skewed to the right as the mean (0.61) is larger than the median (0.49).

(Table 2 about here)

4. Results

4.1 Estimating conditional and adjusted conditional persistence

To estimate conditional persistence for UOPM and UATO – denoted as CP(UOPM) and CP(UATO) – for each firm *i* at quarter-end *t*, we follow AKL using a three-step procedure: First we estimate unconditional persistence for URNOA, UOPM, and UATO for each firm/quarter and denote it as $P(URNOA)_{it}$, $P(UOPM)_{it}$, and $P(UATO)_{it}$, respectively.

Unconditional persistence, $P(X)_{it}$, is measured for each firm *i* at quarter-end *t*, as the first auto-correlation over the previous eight quarters. Second, we estimate the following regression for each firm using the previous eight quarters:

$$P(URNOA)_{it} = \alpha_{0it} + \alpha_{1it} P(UOPM)_{it} + \alpha_{2it} P(UATO)_{it} + \varepsilon_{it} \qquad (1)$$

This way we obtain slope coefficients for each firm/quarter because we always use the lagged eight quarters for estimation. We also compute the mean of each explanatory variable using the previous eight quarters – $Mean(UOPM)_{it}$ and $Mean(UATO)_{it}$. Third, we compute the conditional persistence for each firm/quarter as follows:

$$CP(UOPM)_{it} = \alpha_{1it} \times Mean(UOPM)_{it} \text{ ; } CP(UATO)_{it} = \alpha_{2it} \times Mean(UATO)_{it}$$

Next, we measure for each firm/quarter the distance between the conditional and unconditional persistence of UOPM and UATO. We focus on the distance because our main argument is that investors are fixated on unconditional rather than conditional persistence of OPM and ATO in setting equity prices. Initially, we rank all companies, each quarter, according to their unconditional persistence, $P(X)_{it}$, assigning integer values starting with "1" for the company with the lowest $P(X)_{it}$. Then, we rank all companies, each quarter, according to their conditional persistence, $CP(X)_{it}$, assigning integer values starting with "1" for the company with the lowest conditional persistence. To complete the process we compute the difference between the ranks and divide by the number of companies in the quarter, N_t:

$$ACP(UOPM)_{it} = \{Rank[CP(UOPM)_{it}] - Rank[P(UOPM)_{it}]\} / N_t$$

$$ACP(UATO)_{it} = \{Rank[CP(UATO)_{it}] - Rank[P(UATO)_{it}]\} / N_t$$

Thus, we obtain a measure of the distance between conditional and unconditional persistence and refer it as *adjusted conditional persistence* (ACP). $ACP(UOPM)_{it}$ and $ACP(UATO)_{it}$ could in theory range between -1 and 1, although in practice their distribution is narrower.

Table 3 provides information on the distribution of the different persistence measures for each of the ratios. Consistent with prior literature, the unconditional persistence of unexpected changes in asset turnover, P(UATO), is larger, at the 0.01 level, than both the unconditional persistence of unexpected change in RNOA and OPM – P(URNOA) and P(UOPM). However, the conditional persistence of UOPM is larger (at the 0.01 level), than that of UATO (0.18 compared with 0.10, consistent with AKL). As for the adjusted conditional persistence, means ACP(UOPM) and ACP(UATO) are zero, by construction.

(Table 3 about here)

Table 4 presents Spearman correlations for scaled-quintile variables. To obtain a scaled-quintile for a specific variable we rank, each quarter, all firms according to the value of each specific variable and assign them into quintiles. The variable is then transformed into a scaled-quintile variable with values ranging from zero to one according to the respective quintile, in a similar manner to Rajgopal at al. (2003): “0” in the bottom, “0.25” in the second quintile, “0.50” in the third quintile, “0.75” in the fourth quintile, and “1” in the upper quintile. The transformation is made on a quarter-by-quarter basis. We compute pair-wise Spearman correlations, each quarter, and average these correlations over all quarters. The correlations are reported in Table 4.

Consistent with AKL, the correlation between URNOA and UOPM is larger (at the 0.01 level) than the correlation between URNOA and UATO (0.81 compared with 0.51). Also, the correlation between P(URNOA) and P(UOPM) is larger (at the 0.01 level) than the correlation between P(URNOA) and P(UATO) (0.71 compared with 0.30). That is, changes in RNOA are explained primarily by the firm’s ability to generate operating profits from sales, and less so by changes in asset turnover. The correlation between URNOA and SUE, and between UOPM and SUE are quite high by constructions (Spearman = 0.57).

The correlation between the conditional and unconditional persistence of UOPM is 0.45, larger (at the 0.01 level) than the correlation between conditional and unconditional persistence of UATO**,** which is 0.21. The lower rank correlation for UATO indicates that unconditional and conditional persistence of UATO could be far from each other, which explains the relatively weak market response to unexpected changes in UATO. The difference in correlations between UOPM and UATO is also reflected in the distributions of ACP(UOPM) and ACP(UATO) – our measure of the distance between conditional and unconditional persistence. As Table 3 shows, 90% of the observations in the sample have ACP(UOPM) between -0.52 and 0.47, compared with range of -0.68 and 0.55 for 90% of ACP(UATO).

The correlation between the adjusted conditional persistence and the unconditional (conditional) persistence is negative (positive), by construction, for both UOPM and UATO. Finally, rank correlations between adjusted conditional persistence of UOPM and UATO and the three risk factors, BETA, book-to-market ratio (B/M), and size, are relatively low, ranging between -0.06 and 0.08. These low correlations suggest that adjusted conditional persistence is unlikely to be associated with risk.

(Table 4 about here)

4.2 Contemporaneous analysis

To estimate the market reaction to the adjusted conditional persistence of UOPM and UATO – ACP(UOPM) and ACP(UATO), we use the following cross-sectional model:

$$\begin{aligned} AR(C)_{it} &= \alpha_{0t} + \alpha_{1t} D_{PRNOA,it} + \alpha_{2t} ACP(UOPM)_{it}^{quin} + \alpha_{3t} D_{PRNOA,it} ACP(UOPM)_{it}^{quin} \\ & \alpha_{4t} ACP(UATO)_{it}^{quin} + \alpha_{5t} D_{PRNOA,it} ACP(UATO)_{it}^{quin} + \alpha_{6t} UOPM_{it}^{quin} + \alpha_{7t} UATO_{it}^{quin} \\ & + \alpha_{8t} SUE_{it}^{quin} + \alpha_{9t} SURG_{it}^{quin} + \alpha_{10t} BETA_{it}^{quin} + \alpha_{11t} \, B/M_{it}^{quin} + \alpha_{12t} SIZE_{it}^{quin} + \varphi_{it} \end{aligned} \quad (2)$$

The dependent variable in Equation (2), AR(C), is buy-and-hold abnormal stock returns from one day prior to the preliminary earnings announcement until one day after the SEC filing.

The primary explanatory variables in the model are adjusted conditional persistence of UOPM and UATO – ACP(UOPM) and ACP(UATO), respectively. We also include unexpected changes in operating profit margin and unexpected changes in asset turnover (UOPM, UATO) as two explanatory variables in the model, as well as five controls that have been used as explanatory variables for stock returns in previous studies: standardized unexpected earnings (SUE), standardized unexpected revenue (SURG), and three commonly used risk variables – BETA, book-to-market ratio (B/M) and market value of equity as a measure of firm size (SIZE).

All the explanatory variables in the model are transformed to scaled-quintile variables with values ranging from 0 to 1 according to the respective quintile. The transformation is made on a quarter-by-quarter basis. To complete the model presented in Equation (2), we differentiate between positive and negative unexpected changes in return on net operating assets (URNOA) by defining a dummy variable – $D_{PRNOA,it}$ – equal to “1” (“0”) if URNOA is positive (negative) for firm *i* in quarter *t*. We then interact this variable with the adjusted conditional persistence variables ACP(UOPM) and ACP(UATO). The reason for doing this is that the effect of adjusted conditional persistence on stock returns should depend on the sign of the variable higher on the hierarchy, namely URNOA. For instance, consider two companies with positive URNOA, with one company having a high adjusted conditional persistence while the other has a low adjusted conditional persistence. Clearly the market should react more positively to the URNOA announced by the company with the high adjusted conditional persistence. However, if both companies have a negative URNOA, the market should react less negatively to the company with the low adjusted conditional persistence. Hence, the association between current abnormal stock returns and adjusted conditional persistence should depend on the sign of URNOA.

We estimate four specifications of Equation (2) for each quarter and report in Table 5 average coefficients and *t*-statistics as in Fama and MacBeth (1973). The first specification (Spec. 1) excludes UATO and its adjusted conditional persistence, while the second specification (Spec. 2) excludes UOPM and its adjusted conditional persistence. Results for these specifications show that the average coefficients on ACP(UOPM) and ACP(UATO) are not significantly different from zero. The third specification (Spec. 3) includes both ACP(UOPM) and ACP(UATO) as explanatory variables. The results show that only the average coefficient on ACP(UATO) is positive and significant (at the 0.05 level). In the fourth specification (Spec. 4) we allow ACP(UOPM) and ACP(UATO) to interact with D_{PRNOA}. The results for this specification show that when URNOA is negative the average coefficient on ACP(UOPM) is negative (-0.55), and significant at the 0.01 level. However, when URNOA is positive the average coefficient on ACP(UOPM) is higher (at the 0.01 level); it is also positive (-0.55+1.24=0.69), and significantly higher than zero at the 0.02 level. As for ACP(UATO), when URNOA is negative the average coefficient on ACP(UATO) is insignificantly different from zero. However, when URNOA is positive the average coefficient on ACP(UATO) is higher at the 0.10 level, and is positive (0.11+0.35=0.46), and significantly higher than zero at the 0.01 level.

As for the control variables, the average coefficients on UOPM and UATO are positive, as expected, and significant at the 0.01 level in all specifications. Also, consistent with AKL, the coefficient on UOPM is significantly higher (at the 0.01 level) than the coefficient on UATO.

The average coefficients on SUE and SUG are also positive, as expected, and significant at the 0.01 level. Also, the coefficient on SUE is significantly higher (at the 0.01 level) than the coefficient on SURG, consistent with Jegadeesh and Livnat (2006a). As for the risk factors, the average coefficients on B/M and SIZE are positive and significant at the

0.01 level in all specifications. However, the average coefficient on BETA is insignificantly different from zero.

Overall, the analysis in Table 5 shows that when URNOA is positive, an increase in the *adjusted conditional persistence* of both UOPM and UATO leads to higher abnormal stock returns. Also, an increase in the *adjusted conditional persistence* of UOPM coupled with negative URNOA leads to lower abnormal stock returns. That is, the contemporaneous analysis indicates that *adjusted conditional persistence* is priced by the market. The question whether it is fully priced is addressed next.

(Table 5 about here)

4.3 Subsequent abnormal stock returns

We begin our examination of the association between adjusted conditional persistence and subsequent abnormal stock returns with a portfolio analysis. Table 6, Panel A, presents results for the association between adjusted conditional persistence of UOPM [ACP(UOPM)] and subsequent returns, and Panel B presents results for the association between adjusted conditional persistence of UATO [ACP(UATO)] and subsequent returns. Panel C presents results for the association between subsequent returns and adjusted conditional persistence of both UOPM and UATO, conditioned on the sign of URNOA.

First, we rank, each quarter, all available firms according to their ACP(UOPM) and divide them into equal-size quintile portfolios. We then compute mean abnormal returns for three post-SEC filing windows of 90, 180 and 365 days for each of the quintiles. Specifically, AR(90), AR(180), and AR(365) are excess buy-and-hold non-overlapping size-adjusted returns for windows of 90, 180, and 365 days, respectively, starting two days after the current SEC filing date. We repeat the analysis with decile instead of quintile portfolios.

The association between ACP(UATO) and subsequent returns is examined in a similar manner.

Table 6, Panel A, shows that selling stocks of firms in the lowest quintile of ACP(UOPM), and buying stocks of firms in the highest quintile of ACP(UOPM), yields post-SEC filing abnormal returns of 0.73%, 1.25%, and 2.62% for windows of 90, 180, and 365 days, respectively. All returns are significant at the 0.01 level. Moreover, the increase in post-SEC filing abnormal returns from the lowest to the highest quintile of ACP(UOPM) is generally monotonic. We also divide all available observations into deciles and find stronger results. Selling stocks of firms in the lowest decile of ACP(UOPM), and buying stocks of firms in the highest decile of ACP(UOPM), yields post-SEC filing abnormal returns of 0.83%, 2.00%, and 3.77% for windows of 90, 180, and 365 days, respectively.

Results for ACP(UATO) are materially different than those for ACP(UOPM). As Panel B shows, there is no significant difference in post-SEC filing abnormal returns between the lowest and the highest quintiles (or deciles) of ACP(UATO) for the three return windows used. For a window of 365 days, there is a difference in post-SEC filing abnormal returns between the lowest and the highest quintiles of ACP(UATO). However, it is significantly different from zero only at the 0.10 level.

Recall that the conditional persistence of UOPM (UATO) is defined as the marginal contribution of the persistence of UOPM (UATO) in explaining the persistence of URNOA, the variable higher in the hierarchy according to AKL. Therefore, the market reaction to higher adjusted conditional persistence of UOPM or UATO should be stronger (weaker) when URNOA is positive (negative). We therefore divide the sample into two sub-samples according to the sign of URNOA.

Table 6, Panel C, shows that when URNOA is negative, there is no difference in post-SEC filing abnormal returns between the lowest and the highest quintiles (or deciles) of

ACP(UOPM). However, when URNOA is positive, selling stocks of firms in the lowest quintile (decile) of ACP(UOPM), and buying stocks of firms in the highest quintile (decile) of ACP(UOPM), yields post-SEC filing abnormal returns of 1.21% (1.30%) for a window of 90 days (significant at the 0.01 level).[2] As for ACP(UATO), there is no significant difference in post-SEC filing abnormal returns between the lowest and the highest quintiles (or deciles) of ACP(UATO) for both negative and positive URNOA.

The results in Table 6 suggest that with respect to UOPM, a hedge strategy based on adjusted conditional persistence of UOPM yields significant subsequent abnormal returns in quarterly, semi-annual and annual terms, that is, the market does not fully price adjusted conditional persistence. Recall that the construction of adjusted conditional persistence is based primarily on the distance between conditional and unconditional persistence. Hence, the results suggest that the market is likely fixated on the traditional measure of unconditional persistence rather than on the conditional persistence of unexpected changes in profit margins.

(Table 6 about here)

We continue with a multivariate regression analysis that controls for risk and other information variables. This analysis is aimed at investigating whether our portfolio results can be explained by risk, or are subsumed by variables, such as unexpected earnings and unexpected revenues, used in prior studies as explanatory variables for future abnormal stock returns. We estimate the following quarterly cross-sectional regression models:

$$\begin{aligned} AR(X)_{it} &= \beta_{0t} + \beta_{1t} ACP(UOPM)_{it}^{quin} + \beta_{2t} UOPM_{it}^{quin} + \beta_{3t} SUE_{it}^{quin} \\ &+ \beta_{4t} SURG_{it}^{quin} + \beta_{5t} BETA_{it}^{quin} + \beta_{6t} B/M_{it}^{quin} + \beta_{7t} SIZE_{it}^{quin} + \omega_{it} \end{aligned} \tag{3}$$

$$\begin{aligned} AR(X)_{it} &= \gamma_{0t} + \gamma_{1t} ACP(UATO)_{it}^{quin} + \gamma_{2t} UATO_{it}^{quin} + \gamma_{3t} SUE_{it}^{quin} \\ &+ \gamma_{4t} SURG_{it}^{quin} + \gamma_{5t} BETA_{it}^{quin} + \gamma_{6t} B/M_{it}^{quin} + \gamma_{7t} SIZE_{it}^{quin} + \eta_{it} \end{aligned} \tag{4}$$

---

[2] The number of available quarterly observations for AR(90) is more than double that of the AR(180) and the AR(365) samples, which enables us to differentiate between positive and negative URNOA.

Table 7, Panel A, presents results for four specifications of Equation (3). The dependent variable in Spec. 1 and Spec. 2 is post-SEC filing returns for 90 days [AR(90)]. The dependent variable in Spec. 3 is post-SEC filing abnormal returns for 180 days [AR(180)], and in Spec. 4 it is post-SEC filing returns for 365 days [AR(365)].

Spec. 1 is a benchmark that includes only the control variables. In particular, we include standardized unexpected earnings (SUE), standardized unexpected revenue (SURG), and the three risk factors used earlier (BETA, B/M, and SIZE). As before, the explanatory variables are transformed, each quarter, to scaled-quintile variables with values ranging from zero to one. The results show that the average coefficients on unexpected earnings and unexpected revenues (SUE and SURG) are positive and significant at the 0.01 level, as in previous studies (for instance, Jegadeesh and Livnat, 2006a, 2006b; and Kama, 2009). The average coefficients on the three risk factors (BETA, B/M, and SIZE) are not significantly different from zero, which is consistent with Rajgopal et al. (2003).

Spec. 2, Spec. 3 and Spec. 4 add two variables to Spec. 1: unexpected changes in operating profit margins (UOPM), and adjusted conditional persistence of UOPM – ACP(UOPM). Both are transformed, each quarter, to scaled-quintile variables. The results show that the average coefficients on ACP(OPM) are 0.43 for AR(90), 1.11 for AR(180), and 2.16 for AR(365), all significant at the 0.05 level or higher. That is, a hedge strategy based on adjusted conditional persistence of UOPM yields significant abnormal return of 2.16% in annual terms, controlled for change in profit margin, unexpected earnings, unexpected revenues and risk factors.

Panel B presents results for three specifications of Equation (4). The dependent variables are AR(90), AR(180), and AR(365), for Spec. 1, Spec. 2 and Spec. 3, respectively. In addition to SUE, SURG, BETA, B/M and SIZE, we add two explanatory variables: unexpected changes in asset turnover (UATO) and the adjusted conditional persistence of

UATO. Similarly to Panel A, the explanatory variables are transformed to scaled-quintile variables. We find that the average coefficients on ACP(UATO) are insignificantly different form zero for the three return windows. Consistent with AKL and Soliman (2008), the average coefficients on UATO is significant at the 0.01 level in all three specifications.

Overall, the results in Table 7 reinforce our conclusion that *adjusted conditional persistence* is not fully priced by the market. Rather, the profitable hedge strategy based on adjusted conditional persistence of UOPM is robust to the inclusion of changes in OPM, unexpected earnings, unexpected revenues and three risk variables.

(Table 7 about here)

As explained above, the market should react more positively (negatively) to higher adjusted conditional persistence of UOPM or UATO when URNOA is positive (negative). To incorporate into the regression analysis the effect of the sign of URNOA, we use a dummy variable – $D_{PRNOA,\ it}$ – equal to “1” if URNOA is positive for firm *i* in quarter *t*, and “0” otherwise. Table 8 presents average coefficients and *t*-statistics for the following quarterly cross-sectional regression model:

$$\begin{aligned} AR(90)_{it} &= \delta_{0t} + \delta_{1t} D_{PRNOA,it} + \delta_{2t} ACP(UOPM)_{it}^{quin} + \delta_{3t} D_{PRNOA,it} ACP(UOPM)_{it}^{quin} \\ &\delta_{4t} ACP(UATO)_{it}^{quin} + \delta_{5t} D_{PRNOA,it} ACP(UATO)_{it}^{quin} + \delta_{6t} UOPM_{it}^{quin} + \delta_{7t} UATO_{it}^{quin} \quad (5) \\ &+ \delta_{8t} SUE_{it}^{quin} + \delta_{9t} SURG_{it}^{quin} + \delta_{10t} BETA_{it}^{quin} + \delta_{11t} B/M_{it}^{quin} + \delta_{12t} SIZE_{it}^{quin} + \varphi_{it} \end{aligned}$$

The dependent variable in all three specifications presented in Table 8 is post-SEC filing returns for 90 days [AR(90)].[3] As before, all explanatory variables are transformed to a scaled-quintile format. Spec. 1 includes UOPM, ACP(UOPM) and an interaction between ACP(UOPM) and D_{PRNOA}. Spec. 2 includes UATO, ACP(UATO), and an interaction variable of ACP(UATO) and D_{PRNOA}. Spec. 3 includes information on both UOPM and UATO. All specifications include SUE, SURG and the three risk factors.

[3] The number of available quarterly observations is more than double that of the AR(180) and the AR(365) samples, which enables us to differentiate between positive and negative URNOA.

The results in Spec. 1 and Spec. 3 show that the average coefficients on ACP(UOPM) are negative but insignificantly different from zero. That is, an increase in the adjusted conditional persistence of UOPM combined with negative URNOA leads to negative but insignificant subsequent abnormal returns. However, the average coefficients on the interaction between ACP(UOPM) and D_{PRNOA} is positive and significant at the 0.01 level. This also means that an increase in the adjusted conditional persistence of UOPM combined with positive URNOA leads to positive subsequent abnormal returns of about 1% for a buy-and-hold window of 90 days (significant at the 0.01 level).[4]

Looking at unexpected changes in asset turnover (UATO), results in Spec. 2 and Spec. 3 show that the average coefficients on ACP(UATO) are also negative but insignificantly different from zero. That is, an increase in the adjusted conditional persistence of UATO coupled with negative URNOA leads to negative but insignificant subsequent abnormal returns. However, the average coefficients on the interaction between ACP(UATO) and D_{PRNOA} are positive and significant at the 0.05 level. That is, the difference in subsequent abnormal returns between an increase in ACP(UATO) combined with negative URNOA, and an increase in ACP(UATO) combined with positive URNOA is positive and significant (0.84% and 1.01% in the Spec. 2 and Spec. 3, respectively). Note an increase in the adjusted conditional persistence of UATO combined with positive URNOA leads to positive subsequent abnormal returns of about 0.50%, which is not reliably different from zero.[5]

(Table 8 about here)

To complete our analysis, we examine whether our findings regarding the market under-reaction to the conditional persistence of OPM, overlap with the post-earnings and post-revenues announcement drifts documented in previous studies. Since these studies have attributed part of the post-earnings-announcement drift to incorrect estimation of earnings

---

[4] (1.06% – 0.09% =) 0.97% in Spec. 1, and (1.19%-0.24% =) 0.95% in Spec. 3.

[5] (0.84% – 0.47% =) 0.37% in Spec. 2, and (1.01%-0.49% =) 0.52% in Spec. 3.

persistence, it is possible that our findings are associated with the existing earnings and revenue anomalies.

Panel A and Panel B of Table 9 present results for the interaction between ACP(UOPM) and SUE and SURG, respectively. First, we rank all companies, each quarter, according to their ACP(UOPM), SUE, and SURG, and assign them into quintiles. Then, in Panel A (Panel B) we construct variable-sized portfolios of observations that fall into the extreme quintiles of ACP(UOPM) and SUE (SURG). For example, a combination of ACP(UOPM)1/SUE1 includes observations in the lowest quintile of both ACP(UOPM) and SUE. The table presents size-adjusted stock returns for a post-SEC filing window of 90 days [AR(90)].

Results in Panel A (Panel B) suggest that when SUE (SURG) is in its lowest quintile, there is no difference in AR(90) between the lowest and the highest quintiles of ACP(UOPM). In contrast, when SUE (SURG) is in its highest quintile, selling stocks of firms in the lowest quintile of ACP(UOPM), and buying stocks of firms in the highest quintile of ACP(UOPM), yields AR(90) of 1.53% (1.83%) for a window of 90 days (significant at the 0.01 level). The interaction of ACP(UOPM) with SUE and SURG yields similar results to the interaction with URNOA. The market reacts more positively (negatively) to higher adjusted conditional persistence of UOPM when SUE or SURG are positive (negative), because the higher persistence of UOPM contributes to the persistence of good (bad) news.

As for the post-announcement drift, Table 9, Panel A (Panel B), shows that, for the full sample, selling stocks of firms in the lowest quintile of SUE (SURG), and buying stocks of firms in the highest quintile of SUE (SURG), yields AR(90) of 1.90% (1.32%), significant at the 0.01 level. Panel A shows that when ACP(UOPM) is in its lowest quintile [ACP(UOPM)1], the difference in AR(90) between the lowest and the highest quintiles of

SUE is only 1.11%, as compared with 2.95% when ACP(UOPM) is in the highest quintile [ACP(UOPM)5].[6] Moreover, Panel B indicates that when ACP(UOPM) is in its lowest quintile [ACP(UOPM)1], there is no difference in AR(90) between the lowest and the highest quintiles of SURG. In contrast, Panel B shows when ACP(UOPM) is in its upper quintile [ACP(UOPM)5], the difference in AR(90) between the lowest and the highest quintiles of SURG is 2.24% (significant at the 0.01 level). That is, when the adjusted conditional persistence is relatively low, there is no drift associated with revenues.

The results in Table 9 suggest that the level of ACP(UOPM) significantly affects the magnitude of the post-earnings-announcement drift. Thus, the concept of conditional persistence provides a plausible explanation for the post-announcement drift anomaly. We show that post-earnings-announcement drift coupled with low ACP(UOPM) is less than half of the post-earnings-announcement drift coupled with high ACP(UOPM). Furthermore, when ACP(UOPM) is in its lowest quintile, there is no drift with respect to the revenue surprise. Jegadeesh and Livnat (2006a, 2006b) argue that the drift, with respect to the revenue surprise, derives from the finding that the persistence of earning surprises increases when it is driven by revenue surprises (rather than by expense surprises). However, when the adjusted conditional persistence of UOPM is in its lowest quintile, the marginal contribution of revenue surprise to the persistence of earnings is insignificant.

(Table 9 about here)

Overall, the results in Table 5 (contemporaneous analysis) indicate that the *conditional persistence* is *priced* by the market. However, the results in Tables 6-9 (*subsequent abnormal stock returns from hedge strategy*) indicate that buying stocks of firms with high adjusted conditional persistence of UOPM and selling stocks of firms with low adjusted

[6] When ACP(UOPM) is in its lowest quintile, and SUE is in its highest quintile, AR(90) is positive but significant only at the 0.10 level.

conditional persistence of UOPM earns a positive and significant abnormal stock returns for buy-and-hold windows of 90, 180 and 365 days subsequent to SEC filings.

To assess the economic significance of our results, we compare our findings to those in prior "post-announcement" studies. Jegadeesh and Livnat (2006a) find that, in a portfolio analysis without controls, the annualized difference in subsequent return between the lowest and the highest quintiles of SUE (SURG) is about 5.5% (4.5%). Sloan (1996) indicates that, in a portfolio analysis based on the magnitudes of cash and accrual components of earnings, using deciles without controls, the annualized subsequent abnormal return is about 10.4%. Rajgopal et al. (2003) design trading portfolios (using deciles) for order backlog, and find that the annualized subsequent abnormal return from that strategy is about 4.8%, controlling for earnings to price ratio and the three risk factors (BETA, B/M, and SIZE). In our study, the annualized subsequent abnormal return from a strategy based on *adjusted conditional persistence* (coupled with positive URNOA) is about 5% in a portfolio analysis without controls, and about 4%, controlling for unexpected changes in profit margin, unexpected changes in asset turnover, standardized unexpected earnings, standardized unexpected revenue, and three risk factors (BETA, book-to-market, and size). That is, the market does not fully price the adjusted conditional persistence of profit margins.

5. Concluding remarks

Previous studies have argued that different components of earnings have different persistence and should therefore be priced differentially. In a recent study, AKL make a distinction between two types of persistence measures: unconditional persistence is defined as the autocorrelation coefficient obtained from a variable's time-series; conditional persistence is defined as the marginal contribution of a component variable's persistence to the persistence of a variable higher in the hierarchy. They argue and find that the persistence of earnings components is important for valuation only to the extent that it provides information about the persistence of the primary variable of interest for valuation.

Using the distinction between conditional and unconditional persistence, this study examines whether investors base their valuation on the conditional persistence of ratios, or are fixated on the traditional unconditional persistence. We measure the adjusted conditional persistence of unexpected changes in operating profit margin (UOPM), as the distance between the conditional and the unconditional persistence of UOPM. We measure the adjusted conditional persistence of unexpected changes in asset turnover (UATO) similarly.

Analyzing the contemporaneous association between excess stock returns and the adjusted conditional persistence of UOPM and UATO, we find that equity investors react to the adjusted conditional persistence of both UOPM and UATO. This result suggests that the relative magnitude of conditional persistence is priced by the market. Then, we examine whether the market fully prices conditional persistence, and find higher (lower) stock returns subsequent to SEC filings for companies with high (low) adjusted conditional persistence of UOPM. In particular, a hedge strategy based on the adjusted conditional persistence of UOPM yields positive and significant abnormal post-SEC filing stock returns. That is, the market does not fully price the conditional persistence of operating profit margins. We also examine whether the conditional persistence of operating profit margins overlaps with the post-earnings-announcement drift. We show that when the adjusted conditional persistence of UOPM is low, the drift associated with earnings surprises is significantly reduced, and the drift associated with revenue surprises largely disappears.

So far, the literature has focused on the market’s under-reaction to accounting information such as earnings, revenues, and order-backlog. Our main contribution is the finding that the concept of conditional persistence is not fully priced by equity investors. That is, the market seems to be fixated on the time series properties of each single accounting variable, partially ignoring the co-movements of variables over time. We also find a link between the conditional persistence of operating profit margins and the post-earnings-announcement drift.

References

Amir, E., I. Kama, and J. Livnat. (2011). Conditional versus unconditional persistence of RNOA components: Implications for valuation. *Review of Accounting Studies*, 16, 302-327.

Bernard, V.L., and J.K. Thomas. (1989). Post-earnings-announcement drift: Delayed price response or risk premium? *Journal of Accounting Research*, 27, 1-36.

Bernard, V.L., and J.K. Thomas. (1990). Evidence that stock prices do not fully reflect the implications of current earnings for future earnings. *Journal of Accounting and Economics*, 13, 305-340.

Chan, L.K.C., N. Jegadeesh, and J. Lakonishok. (1996). Momentum strategies. *Journal of Finance*, 51, 1681-1713.

Cottle, S., R.F. Murray, and F.E. Block. (1988). *Graham and Dodd's Security Analysis* (5th edition). McGraw Hill.

Ertimur, Y., J. Livnat, and M. Martikainen. (2003). Differential market reaction to revenue and expense surprise. *Review of Accounting Studies*, 8, 185-211.

Fairfield, P., and T. Yohn. (2001). Using asset turnover and profit margin to forecast changes in profitability. *Review of Accounting Studies*, 6, 371-385.

Fairfield, P.M., S. Ramnath, and T.L. Yohn. (2009). Do industry-level analyses improve forecasts of financial performance? *Journal of Accounting Research*, 47, 147-178.

Fama, E. F., and J. Macbeth. (1973). Risk, return, and equilibrium: Empirical tests. *Journal of Political Economy*, 81, 607-636.

Jegadeesh, N., and J. Livnat. (2006a). Revenue surprises and stock returns. *Journal of Accounting and Economics* 41, 147-171.

Jegadeesh, N., and J. Livnat. (2006b). Post-earnings-announcement drift: The role of revenue surprises. *Financial Analysts Journal* 62, 22-34.

Kama, I. (2009). On the market reaction to revenue and earnings surprises. *Journal of Business Finance and Accounting*, 36, 31-50.

Kaplan, R.S., and G. Urwitz. (1979). Statistics models of bond ratings: A methodology inquiry. *Journal of Business*, 52, 231-261.

Lipe, R.C. (1986). The information contained in the components of earnings. *Journal of Accounting Research*, 24, 37-64.

Nissim, D., and S.H. Penman. (2001). Ratio analysis and equity valuation: From research to practice. *Review of Accounting Studies*, 6, 109-154.

Ohlson, J.A. (1980). Financial ratios and the probabilistic prediction of bankruptcy. *Journal of Accounting Research*, 18, 109-131.

Ou, J.A., and S.H. Penman. (1989). Financial statement analysis and the prediction of stock returns. *Journal of Accounting and Economics*, 11, 295-329.

Palepu, K.G. (1986). Predicting takeover targets: A methodological and empirical analysis. *Journal of Accounting and Economics*, 8, 3-35.

Palepu, K.G., P.M. Healy, and V.L. Bernard. (2004). *Business Valuation and Analysis* (3rd edition). South Western.

Penman, S.H. (2010). *Financial Statement Analysis and Security Valuation* (4th edition). McGraw Hill.

Penman, S.H., and X. Zhang. (2006). Modeling sustainable earnings and P/E ratios using financial statement information. Working Paper, Columbia University and University of California, Berkeley.

Rajgopal, S., T. Shevlin, and M. Venkatachalam. (2003). Does the stock market fully appreciate the implications of leading indicators for future earnings? Evidence from order backlog. *Review of Accounting Studies,* 8, 461-492.

Romer, P.M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94, 1002-1037.

Sloan, R.G. (1996). Do stock prices fully reflect information in accruals and cash flows about future earnings? *The Accounting Review*, 71, 289-315.

Soliman, M.T. (2008). The use of DuPont analysis by market participants. *The Accounting Review*, 83, 823-853.

White, G.I., A.C. Sondhi, and D. Fried. (2003). *The Analysis and Use of Financial Statements* (3rd edition). John Wiley.

Wilson, G.P. (1987). The incremental information content of the accrual and funds components of earnings after controlling for earnings. *The Accounting Review*, 62, 293-322.

Table 1
Sample selection

Year	Full Sample
1991	1,261
1992	4,179
1993	4,776
1994	4,986
1995	5,169
1996	5,396
1997	5,433
1998	5,391
1999	5,368
2000	5,157
2001	5,011
2002	5,091
2003	5,111
2004	5,085
2005	4,818
2006	4,504
2007	4,222
2008	2,978
Observations	83,936
Companies	3,849

Note: The sample includes all companies with complete stock returns and financial data available on Compustat and CRSP with market value of equity above $10 million at quarter-end. We exclude financial institutions (1-digit SIC = 6) and public utilities (2-digit SIC = 49). We also remove the extreme 1% of observations (on both sides) in terms of Return on Net Operating Assets (RNOA), components of RNOA, standardized unexpected earnings (SUE), standardized unexpected revenue (SURG) and current abnormal returns (AR(C)).

Table 2
Descriptive statistics

Variable	N	Mean	Std. Dev.	5th Pctl.	25th Pctl.	Median	75th Pctl.	95th Pctl.
AR (C)	83,936	0.00	0.12	-0.18	-0.06	-0.00	0.06	0.21
AR (90)	83,936	0.00	0.21	-0.30	-0.12	-0.01	0.10	0.34
AR (180)	40,891	0.00	0.31	-0.44	-0.18	-0.02	0.14	0.51
AR (365)	19,385	0.00	0.44	-0.61	-0.27	-0.04	0.20	0.81
RNOA	83,936	0.03	0.06	-0.03	0.01	0.02	0.04	0.10
OPM	83,936	0.05	0.10	-0.08	0.02	0.05	0.09	0.17
ATO	83,936	0.61	0.50	0.15	0.33	0.48	0.73	1.49
URNOA	83,936	-0.01	1.40	-0.06	-0.01	0.00	0.01	0.05
UOPM	83,936	0.00	0.17	-0.10	-0.01	0.00	0.01	0.09
UATO	83,936	-0.00	3.46	-0.28	-0.05	0.00	0.05	0.24
SUE	83,936	-0.09	1.60	-2.71	-0.68	0.02	0.69	2.32
SURG	83,936	0.10	1.42	-2.33	-0.82	0.24	0.99	2.29
B/M	83,936	0.61	0.49	0.14	0.31	0.49	0.77	1.17
MV	83,936	3,838.2	17,869.9	24.5	112.4	443.0	1,752.8	14,259.2

Note: Variables are defined as follows: **AR(C)** is current excess buy-and-hold abnormal return from one day before the preliminary earnings announcement until one day after the SEC filing; **AR(90), AR(180), and AR(365)** are excess buy-and-hold non-overlapping size-adjusted stock returns for windows of 90, 180, and 365 (calendar) days, respectively, starting two days after the current SEC filing date; **RNOA** is return on net operating assets, measured as quarterly operating income, divided by net operating assets; **OPM** is core operating profit margin after tax, measured as quarterly core operating income after tax divided by sales; **ATO** denotes asset turnover; measured as quarterly sales divided by net operating assets; **URNOA, UOPM**, **UATO** are unexpected variables, measured as the difference between the current variable and its level in the same quarter last year; **SUE** is standardized unexpected earnings, measured as quarterly earnings per share minus earnings per share in the same quarter last year minus a drift, scaled by the standard deviation of earnings in the prior eight quarters; **SURG** (standardized unexpected revenue) is similar to SUE but with sales per share; **B/M** is the book-to-market ratio, measured as book value of common equity at quarter-end divided by market value of common equity; **MV** is market value of common equity at quarter-end (in millions of dollars).

Table 3
Conditional and unconditional persistence

Variable	Mean	Std. Dev.	5th Pctl.	25th Pctl.	Median	75th Pctl.	95th Pctl.
P(URNOA)	0.28	0.37	-0.38	0.01	0.31	0.57	0.81
P(UOPM)	0.25	0.37	-0.39	-0.01	0.27	0.54	0.80
P(UATO)	0.38	0.36	-0.32	0.16	0.46	0.66	0.86
Coefficient [P(UOPM)]	0.69	0.56	-0.23	0.41	0.77	1.01	1.43
Coefficient [P(UATO)]	0.24	0.53	-0.48	-0.02	0.18	0.48	1.09
CP(UOPM)	0.18	0.29	-0.20	0.00	0.14	0.33	0.65
CP(UATO)	0.10	0.28	-0.21	-0.01	0.04	0.18	0.58
ACP (UOPM)	-0.00	0.30	-0.52	-0.18	0.01	0.19	0.47
ACP (UATO)	0.00	0.36	-0.68	-0.23	0.03	0.26	0.55

Notes:

1. The table presents descriptive statistics for the unconditional and conditional persistence of URNOA and its components UOPM and UATO.
2. The unconditional persistence, P(X), is measured for each firm/quarter, as the first auto-correlation over the previous eight quarters.
3. The conditional persistence, CP(X), is measured for each firm/quarter using the following procedure: We estimate the following regression for each firm using the previous eight quarters:
$$P(URNOA)_{it} = \alpha_{0it} + \alpha_{1it} P(UOPM)_{it} + \alpha_{2it} P(UATO)_{it} + \varepsilon_{it} \quad (1)$$
We obtain slope coefficients for each firm/quarter as we always use the lagged eight quarters for estimation. We also compute the mean of each explanatory variable using the previous eight quarters – Mean(UOPM)_{it} and Mean(UATO)_{it}. Then, we compute the conditional persistence for each firm/quarter as follows:
$$CP(UOPM)_{it} = \alpha_{1it} \times Mean(UOPM)_{it}$$
$$CP(UATO)_{it} = \alpha_{2it} \times Mean(UATO)_{it}$$
4. To compute adjusted conditional persistence, ACP(X), we rank all companies, each quarter, according to their unconditional persistence, P(X), assigning integer values starting with “1” for the company with the lowest P(X). Then, we rank all companies, each quarter, according to their conditional persistence, CP(X), assigning integer values starting with “1” for the company with the lowest conditional persistence. To complete the process we compute the difference between the ranks and divide by the number of companies in the quarter, N_t:
$$ACP(UOPM)_{it} = \{Rank[CP(UOPM)_{it}] - Rank[P(UOPM)_{it}]\} / N_t$$
$$ACP(UATO)_{it} = \{Rank[CP(UATO)_{it}] - Rank[P(UATO)_{it}]\} / N_t$$
Thus, we obtain a measure of the distance between conditional and unconditional persistence and define it as adjusted conditional persistence (ACP). ACP(UOPM) and ACP(UATO) range between -1 and 1.
5. See Table 2 for definitions of other variables.

Table 4
Rank correlations of scaled-quintile variables

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	**URNOA^{quin}**		0.81	0.51	-0.03	-0.03	0.02	0.02	-0.03	0.04	-0.04	0.57	0.22	0.00	-0.11	0.03
2.	**UOPM^{quin}**			0.27	-0.03	-0.04	0.03	0.01	-0.03	0.04	-0.04	0.57	0.19	-0.02	-0.14	0.04
3.	**UATO^{quin}**				-0.03	-0.02	0.02	0.03	-0.03	0.04	-0.04	0.30	0.24	0.03	-0.01	-0.03
4.	**P(URNOA)^{quin}**					0.71	0.30	0.36	0.19	-0.33	-0.11	-0.00	0.01	-0.07	-0.03	0.05
5.	**P(UOPM)^{quin}**						0.12	0.45	0.07	-0.46	-0.04	-0.01	0.00	-0.08	0.01	0.01
6.	**P(UATO)^{quin}**							0.07	0.21	-0.05	-0.59	0.02	0.02	-0.08	-0.04	0.04
7.	**CP(UOPM)^{quin}**								-0.02	0.47	-0.08	0.02	-0.00	-0.05	0.11	-0.06
8.	**CP(UATO)^{quin}**									-0.09	0.57	0.01	0.01	-0.05	-0.12	0.12
9.	**ACP(UOPM)^{quin}**										-0.03	0.02	-0.01	0.03	0.08	-0.06
10.	**ACP(UATO)^{quin}**											-0.01	-0.01	0.02	-0.06	0.06
11.	**SUE^{quin}**												0.24	0.02	-0.06	0.03
12.	**SURG^{quin}**													0.00	-0.07	0.04
13.	**BETA^{quin}**														0.18	-0.28
14.	**BM^{quin}**															-0.48
15.	**SIZE^{quin}**															

Note: The table presents average quarterly Spearman correlations for unexpected RNOA (URNOA) and its components (UOPM and UATO), their persistence [P(X], conditional persistence [CP(X)] and adjusted conditional persistence [ACP(X)] as well as for the control variables. Variables are transformed to a scaled-quintile variable with values ranging from 0 to 1. See Table 1 for sample selection, and Table 2 for definitions of variables.

Table 5
The association between current abnormal returns and adjusted conditional persistence

Coefficient	Exp. Sign	Spec. 1 UOPM	Spec. 2 UATO	Spec. 3 Both	Spec. 4 Conditional on sign of URNOA
Intercept		-5.19*** (-13.1)	-5.08*** (-12.1)	-5.65*** (-13.6)	-5.16*** (-11.9)
D_{PRNOA}	?				-0.05 (-0.2)
$ACP(UOPM)^{quin}$	?	0.10 (0.9)		0.06 (0.6)	-0.55*** (-3.2)
$D_{PRNOA}ACP(UOPM)^{quin}$	+				1.24*** (4.8)
$ACP(UATO)^{quin}$	?		0.20 (1.5)	0.27** (2.0)	0.11 (0.7)
$D_{PRNOA}ACP(UATO)^{quin}$	+				0.35* (1.7)
$UOPM^{quin}$	+	1.97*** (13.1)		1.83*** (12.4)	1.22*** (6.1)
$UATO^{quin}$	+		1.36*** (10.0)	1.18*** (8.7)	0.93*** (6.2)
SUE^{quin}	+	2.46*** (14.0)	3.22*** (18.2)	2.26*** (12.7)	2.16*** (11.8)
$SURG^{quin}$	+	1.59*** (10.5)	1.43*** (9.1)	1.38*** (8.9)	1.39*** (8.9)
$BETA^{quin}$	?	-0.02 (-0.0)	-0.08 (-0.2)	-0.03 (-0.1)	-0.01 (-0.0)
B/M^{quin}	?	1.66*** (7.2)	1.45*** (6.3)	1.67*** (7.3)	1.67*** (7.3)
$SIZE^{quin}$	?	2.39*** (7.9)	2.35*** (7.7)	2.43*** (8.0)	2.43*** (8.0)
Adj-R^2		0.04	0.04	0.04	0.04
Observations		82,684	82,684	82,684	82,684

Notes:

1. The table presents results of estimating the association between current abnormal stock returns, AR(C), and adjusted conditional persistence (ACP) of UOPM and UATO.
2. Abnormal stock returns are computed as buy-and-hold returns starting from one day before the preliminary earnings announcement until one day after the SEC filing date.
3. The table presents average coefficients and corresponding *t*-statistics (in parentheses) from estimating the following cross-sectional regression model on a quarter-by-quarter basis:

$$AR(C)_{it} = \alpha_{0t} + \alpha_{1t} D_{PRNOA,it} + \alpha_{2t} ACP(UOPM)_{it}^{quin} + \alpha_{3t} D_{PRNOA,it} ACP(UOPM)_{it}^{quin}$$
$$\alpha_{4t} ACP(UATO)_{it}^{quin} + \alpha_{5t} D_{PRNOA,it} ACP(UATO)_{it}^{quin} + \alpha_{6t} UOPM_{it}^{quin} + \alpha_{7t} UATO_{it}^{quin} \quad (2)$$
$$+ \alpha_{8t} SUE_{it}^{quin} + \alpha_{9t} SURG_{it}^{quin} + \alpha_{10t} BETA_{it}^{quin} + \alpha_{11t}\, B/M_{it}^{quin} + \alpha_{12t} SIZE_{it}^{quin} + \varphi_{it}$$

   All explanatory variables are transformed to a scaled-quintile variable with values ranging from 0 to 1. See Table 2 for definitions of variables.
4. We define a dummy variable – $D_{PRNOA,\ it}$ – equal to 1 if URNOA is positive for firm i in quarter t. See Table 2 for definitions of other variables.
5. Coefficient estimates are multiplied by 100.
6. *, **, *** – denote significance of difference from zero at the 0.10, 0.05, and 0.01 levels, respectively.

Table 6
Subsequent abnormal stock returns – Hedge portfolio analysis

Panel A: ACP(UOPM)

ACP (UOPM)	AR (90)	AR (180)	AR (365)
Quintile 1	-0.27*	-0.54*	-0.90
Quintile 2	-0.01	-0.42	0.92
Quintile 3	0.07	-0.58*	0.14
Quintile 4	0.14	0.60*	1.21*
Quintile 5	0.46***	0.71**	1.72**
Quintile5 - Quintile1	0.73***	1.25***	2.62***
Decile10 - Decile1	0.83***	2.00***	3.77***

Panel B: ACP(UATO)

ACP (UATO)	AR (90)	AR (180)	AR (365)
Quintile 1	0.07	0.02	-0.91
Quintile 2	0.11	-0.19	0.89
Quintile 3	0.19	-0.03	1.57**
Quintile 4	0.18	0.16	0.91
Quintile 5	-0.16	-0.18	0.64
Quintile5 - Quintile1	-0.23	-0.20	1.55*
Decile10 - Decile1	-0.67*	-0.06	1.63

Panel C: Conditioned on the sign of current URNOA – AR(90)

	URNOA < 0 N = 41,617	URNOA > 0 N = 42,319
ACP (UOPM): Quintile5 – Quintile1	0.00	1.21***
ACP (UOPM): Decile10 – Decile1	0.03	1.30***
ACP (UATO): Quintile5 – Quintile1	-0.53	0.25
ACP (UATO): Decile10 – Decile1	-0.63	-0.51

Notes:

1. The table presents the market reaction to adjusted conditional persistence of UOPM (Panel A) and UATO (Panel B). Panel C presents the market reaction to adjusted conditional persistence of UOPM and UATO, conditioned on the sign of URNOA.
2. We report mean size-adjusted abnormal returns (percentages) over return windows of 90, 180 and 365 days starting on the second day after the SEC filing date.
3. The bottom line reports the cumulative abnormal returns from a hedge strategy of taking positions on stocks of firms with the highest values of ACP and selling stocks of firms with the lowest values of ACP. We report also the difference between the highest and lowest deciles of ACP (Decile10 – Decile1).
4. See Table 2 for definitions of variables.
5. *, **, *** – denote significance of difference from zero at the 0.10, 0.05, and 0.01 levels, respectively.

Table 7
Subsequent abnormal stock returns – Regression analysis

Panel A: ACP (UOPM)

	AR(90)	AR(90)	AR(180)	AR(365)
Coefficient	**Spec. 1**	**Spec. 2**	**Spec. 3**	**Spec. 4**
Intercept	-1.25	-2.07*	-2.11	-5.20
	(-1.3)	(-2.2)	(-0.9)	(-1.1)
$ACP(UOPM)^{quin}$		0.43**	1.11***	2.16**
		(2.0)	(2.6)	(2.4)
$UOPM^{quin}$		2.25***	3.68***	3.50
		(6.4)	(4.1)	(1.6)
SUE^{quin}	1.71***	0.47	0.52	0.90
	(5.5)	(1.6)	(0.8)	(0.5)
$SURG^{quin}$	0.77***	0.65***	1.25***	0.28
	(3.8)	(3.3)	(2.7)	(0.3)
$BETA^{quin}$	-0.85	-0.87	-2.55	-1.04
	(-0.8)	(-0.9)	(-1.0)	(-0.2)
B/M^{quin}	0.61	0.83	1.22	4.71
	(0.9)	(1.3)	(0.6)	(1.3)
$SIZE^{quin}$	0.19	0.28	-1.18	0.55
	(0.3)	(0.4)	(-0.6)	(0.2)
$Adj\text{-}R^2$	0.02	0.03	0.03	0.04
Observations	82,684	82,684	82,684	82,684

Panel B: ACP (UATO)

	AR(90)	AR(180)	AR(365)
Coefficient	**Spec. 2**	**Spec. 3**	**Spec. 4**
Intercept	-2.16**	-2.29	-6.62
	(-2.3)	(-0.9)	(-1.4)
$ACP(UATO)^{quin}$	-0.10	0.34	1.74
	(-0.4)	(0.5)	(1.5)
$UATO^{quin}$	3.11***	5.01***	7.74***
	(9.4)	(5.9)	(4.6)
SUE^{quin}	0.94***	1.36**	1.38
	(3.2)	(2.3)	(0.8)
$SURG^{quin}$	0.14	0.36	-1.32
	(0.7)	(0.7)	(-1.3)
$BETA^{quin}$	-0.85	-2.48	-1.08
	(-0.8)	(-0.9)	(-0.2)
B/M^{quin}	0.58	0.90	4.64
	(0.9)	(0.5)	(1.4)
$SIZE^{quin}$	0.37	-1.09	0.72
	(0.5)	(-0.6)	(0.2)
Adj-R^2	0.03	0.03	0.04
Observations	82,684	82,684	82,684

Notes:

1. The table presents results of estimating Equations (3) and (4) – the effect of adjusted conditional persistence (ACP) of UOPM (Panel A) and UATO (Panel B) on buy-and-hold returns of 90, 180 and 365 days, starting two days after the SEC filing date. It presents average coefficients and corresponding *t*-statistics (in parentheses) from estimating the following quarterly cross-sectional regression models:

$$AR(X)_{it} = \beta_{0t} + \beta_{1t}ACP(UOPM)_{it}^{quin} + \beta_{2t}UOPM_{it}^{quin} + \beta_{3t}SUE_{it}^{quin} + \beta_{4t}SURG_{it}^{quin} + \beta_{5t}BETA_{it}^{quin} + \beta_{6t}\,B/M_{it}^{quin} + \beta_{7t}SIZE_{it}^{quin} + \omega_{it} \quad (3)$$

$$AR(X)_{it} = \gamma_{0t} + \gamma_{1t}ACP(UATO)_{it}^{quin} + \gamma_{2t}UATO_{it}^{quin} + \gamma_{3t}SUE_{it}^{quin} + \gamma_{4t}SURG_{it}^{quin} + \gamma_{5t}BETA_{it}^{quin} + \gamma_{6t}\,B/M_{it}^{quin} + \gamma_{7t}SIZE_{it}^{quin} + \eta_{it} \quad (4)$$

   All explanatory variables are transformed to a scaled-quintile variable with values ranging from 0 to 1. See Table 2 for definitions of variables.
2. Coefficient estimates are multiplied by 100.
3. *, **, *** – denote significance of difference from zero at the 0.10, 0.05, and 0.01 levels, respectively.

Table 8
Hedge strategy conditioned on the sign of current URNOA

	AR(90)		
	Spec. 1	Spec. 2	Spec. 3
Coefficient	**UOPM**	**UATO**	**Both**
Intercept	-1.71*	-2.03**	-2.24**
	(-1.8)	(-2.1)	(-2.3)
D_{PRNOA}	0.79**	0.63*	-0.79*
	(2.4)	(1.9)	(-1.7)
$ACP(UOPM)^{quin}$	-0.09		-0.24
	(-0.3)		(-0.9)
$D_{PRNOA}ACP(UOPM)^{quin}$	1.06***		1.19***
	(2.6)		(2.8)
$ACP(UATO)^{quin}$		-0.47	-0.49
		(-1.4)	(-1.5)
$D_{PRNOA}ACP(UATO)^{quin}$		0.84**	1.01**
		(2.0)	(2.4)
$UOPM^{quin}$	1.05***		1.62***
	(2.6)		(3.9)
$UATO^{quin}$		2.58***	2.75***
		(7.4)	(7.7)
SUE^{quin}	0.19	0.36	-0.07
	(0.7)	(1.2)	(-0.2)
$SURG^{quin}$	0.60***	0.15	0.11
	(3.1)	(0.7)	(0.5)
$BETA^{quin}$	-0.87	-0.84	-0.85
	(-0.9)	(-0.8)	(-0.9)
B/M^{quin}	0.80	0.70	0.76
	(1.2)	(1.1)	(1.2)
$SIZE^{quin}$	0.30	0.40	0.44
	(0.4)	(0.5)	(0.6)
Adj-R^2	0.03	0.03	0.03
Observations	82,684	82,684	82,684

Notes:

1. The table presents results of estimating Equation (5) – the association between adjusted conditional persistence of UOPM and UATO and post-SEC filing buy-and-hold abnormal returns of 90 days starting two days after the SEC filing date.
2. Equation (5) allows the coefficients on ACP(UOPM) and ACP(UATO) to be different conditioned on the sign of current URNOA.
3. We present average coefficients and corresponding *t*-statistics (in parentheses) from estimating Equation (5) each quarter.
4. The model:

$$
\begin{aligned}
AR(90)_{it} &= \delta_{0t} + \delta_{1t} D_{PRNOA,it} + \delta_{2t} ACP(UOPM)_{it}^{quin} + \delta_{3t} D_{PRNOA,it} ACP(UOPM)_{it}^{quin} \\
&\delta_{4t} ACP(UATO)_{it}^{quin} + \delta_{5t} D_{PRNOA,it} ACP(UATO)_{it}^{quin} + \delta_{6t} UOPM_{it}^{quin} + \delta_{7t} UATO_{it}^{quin} \quad (5) \\
&+ \delta_{8t} SUE_{it}^{quin} + \delta_{9t} SURG_{it}^{quin} + \delta_{10t} BETA_{it}^{quin} + \delta_{11t} \, B/M_{it}^{quin} + \delta_{12t} SIZE_{it}^{quin} + \varphi_{it}
\end{aligned}
$$

   Explanatory variables are transformed to a scaled-quintile and scaled-decile variable with values ranging from 0 to 1.

5. $D_{PRNOA,\ it}$ – a dummy variable equal to “1” if current URNOA is positive for firm i in quarter t. See Table 2 for definitions of other variables.
6. Coefficient estimates are multiplied by 100.
7. *, **, *** – denote significance of difference from zero at the 0.10, 0.05, and 0.01 levels, respectively.

Table 9
Post-announcement drift and conditional persistence

Panel A – Post-earnings-announcement drift

	AR(90)		
	SUE1	**SUE5**	**SUE5 – SUE1**
Full Sample (N=83,936)	-0.81***	1.09***	1.90***
ACP(UOPM)1	-0.51	0.60*	1.11**
ACP(UOPM)5	-0.82**	2.13***	2.95***
ACP(UOPM)5 – ACP(UOPM)1	-0.31	1.53***	

Panel B – Post-revenue-announcement-drift

	AR(90)		
	SURG1	**SURG 5**	**SURG 5 – SURG 1**
Full Sample (N=83,936)	-0.54***	0.78***	1.32***
ACP(UOPM)1	-0.35	-0.37	-0.02
ACP(UOPM)5	-0.78**	1.46***	2.24***
ACP(UOPM)5 – ACP(UOPM)1	-0.43	1.83***	

Notes:
1. Panel A presents market reaction to combinations of adjusted conditional persistence of UOPM [ACP(UOPM)] and standardized unexpected earnings (SUE). Panel B presents market reaction to combinations of ACP(UOPM) and standardized unexpected revenue (SURG).
2. First, we rank all companies, each quarter, according to their ACP(UOPM), SUE, and SURG, and assign them into quintiles. Then, in Panel A (Panel B) we construct variable-sized portfolios of observations that fall into the extreme quintiles of ACP(UOPM) and SUE (SURG). For example, a combination of ACP(UOPM)1/SUE1 includes observations in the lowest quintile of both ACP(UOPM) and SUE.
3. We report mean size-adjusted abnormal returns (in percentage) over a window of 90 days starting on the second day after the SEC filing date.
4. *, **, *** – denote significance of difference from zero at the 0.10, 0.05, and 0.01 levels, respectively.