Towards a New Financial Statement Analysis

Christina Dargenidou

University of Exeter
C.Dargenidou@exeter.ac.uk

and

Stephen Penman*

Columbia Business School and Bocconi University
shp38@columbia.edu

First Draft
March 2024

*Corresponding author. The comments of Matthias Breuer and Pengguo Wang are much appreciated.

Towards a New Financial Statement Analysis

Abstract. This paper designs a financial statement analysis that forecasts both future profitability and the risk to that profitability. It does so by modifying standard profitability analysis with accounting information that conveys risk. Accordingly, it supplies a comprehensive financial statement analysis to evaluate equity value from expectations of future profitability discounted for the risk to profitability. Empirical tests confirm that the revised financial statement analysis not only predicts future profitability and the risk to profitability but also stock returns and the risk to stock returns.

Keywords: Financial statement analysis, forecasting profitability, risk to equity investing

Towards a New Financial Statement Analysis

Introduction

The standard financial statement analysis of textbooks carries out an analysis of profitability, with summary measures like return on equity (ROE) decomposed into their determinants such as profit margin, asset turnover, and leverage. These drivers explain past profitability, but considerable research has demonstrated they also forecast future profitability as an input into valuation. However, to value investments, investors not only seek information about expected profitability but also the risk to that profitability. This paper lays out a financial statement analysis that informs about both. Empirical tests validate the analysis.

Traditional financial statement analysis supplements profitability analysis with risk metrics such as book leverage, current ratios, quick ratios, and interest coverage, but these metrics are more appropriate for conveying solvency and liquidity for credit analysis than for equity analysis. Research on equity risk points to earnings volatility and, by applying quantile regressions, has also provided an ex ante indicator of volatility by forecasting the dispersion of earnings outcomes, for example in Konstantinidi and Pope (2016) and Chang, Monahan, Ouazad, and Vasvari (2021). With an understanding that it is systematic risk that is priced, research has also introduced accounting betas, as in in Beaver, Kettler, and Scholes (1970), Rosenberg and McKibben (1973), Nekrasov and Shroff (2009), and Ellahie (2021). This paper complements that research with a formal financial statement analysis that informs about risk, one that decomposes ROE in the ROE betas in some of these papers.

The starting point for the revised analysis is the recognition that accounting profitability measures are not the "return on investment" typically attributed to them. Accordingly, a financial statement decomposition of profitability takes on a different profile.

The Economic Return on Investment and the Accounting Rate of Return

A measure of the rate of return on investment ideally compares the return to investment (in the numerator of the calculation) to the amount of investment (in the denominator), a measure that appropriately separates stocks from the flows they generate. That measure of "real" profitability is the one economists have in mind and the interpretation often made in profitability analysis. However, accounting profitability mixes stocks and flows. Some investments are charged against earnings in the numerator, mixing investment with the return to investment, with the consequence that the investment is not in the denominator; accounting profitability is not economic profitability. This is increasingly so with much of investment now days in so-called intangible assets that are expensed against earnings: Research and development (R&D) expenditure, brand building, investment in supply chains and product distribution systems, customer loyalty programs, human capital, organization and start-up costs, and software, to name a few. Taking the measure at face value, low profitability is judged as poor investment performance, but that is not necessarily so if it is reduced by expensed investment that potentially generates profitability.

But there is method in the madness.

Conditionally, that low profitability is high future profitability. *If* the expensed investment is successful, the accounting rate of return will be high because, first, earnings are realized, second because amortization and depreciation will be missing from the numerator (the investment has already been expensed), and third, the investment will be missing from the denominator. Accordingly, a low book return due to this accounting does not convey low profitability but rather potentially high profitability should earnings be realized. However, the conditional *if* operates: The investment might not pay off. That is, the low profitability conveys risk. While the

standard analysis views the book rate of return as "profitability," the accounting informs that the measure is an indicator of profitability only conditionally, and that conditionality implies risk. That cues a new financial statement analysis that elicits information about risk to future profitability.

That serves the investor. In standard valuation models expected payoffs (the numerator in a valuation model) are discounted for the risk to expected payoffs (the denominator), and the investor desires information about both. So he and she look for a financial statement analysis that deals with both aspects of the valuation problem.

Accounting Principles that Determine the Book Rate of Return Convey Risk

Accounting principles determine earnings and book value and thus the book rate of return and the information it conveys.

First, the realization principle under which earnings are not recognized until earnings are realized and risk is resolved. So expected earnings not yet booked are earnings still at risk. Stock prices rationally price those expected earnings, but the accounting principle says that those prices must be discounted for the risk that the expected earnings might not be realized.

Second, conservative accounting for investment. For all investments, earnings from the investment are at risk of not being realized. However, under conservative accounting, investment that is particularly risky is not booked to the balance sheet but rather expensed against earnings in the income statement. The investment is thus missing from the balance sheet, but this omission highlights its higher risk. Effectively, this accounting treatment says that particularly risky investment cannot be booked to the balance sheet with the pretence that it provides collateral.

The combination of these two principles implies that the book rate of return conveys risk. Expensing particularly risky investment yields a low book return due to the numerator effect, so that low book return informs about the risk. (The book return is on lagged book value, so the denominator is unaffected.) With the investment expensed, it is subsequently missing from the balance sheet so, *if* earnings from the investment are realized, they are on a low base in the book rate of return. The resulting high book return indicates the risk has been resolved favourably, conveying lower risk. However, a firm can also report a low book return because investment is unsuccessful, so a financial statement analysis is required to sort this out.

Accounting standards enforce the realization principle with revenue recognition under ACS 606 and IFRS 15: Revenue and the earnings from those revenues are recognized only when performance of contracts is complete with receipt of cash "highly certain." Expensed investments are differentiated from those booked to the balance sheet based on risk to payoffs under the criterion of "probability of future benefits." In FASB Statement No. 2 (ACS 730) R&D expenditure is expensed due to the "uncertainty of future benefits." IAS 38 applies the criterion of "probable future economic benefits" to distinguish between "research" (which is expensed) and "development" (which is capitalized in the balance sheet). This accounting informs that expenditure on research into a cancer cure, with no product or revenue as yet (and there might not be), has higher outcome uncertainty than inventory that is yielding revenue or plant that produces that inventory.

But the uncertainty criterion is applied more generally. Uncertainty is a criterion for recognizing contingent assets and liabilities in IAS 37 and for recognizing contingent liabilities in FASB Statement No. 5. Investment in internally developed software is expensed until a point of "technical feasibility" under FASB Statement No. 86 with the Board now (in 2024)

considering a "probable benefits" criterion. Investment in brands (advertising and promotion) appears to be driven by the same assessment: The advertising might not pay off. So with investment in human capital: The employees might leave and take their human capital to a competitor. Investment in supply chains and distribution systems, customer loyalty programs, and more, are all largely expensed to the income statement. Even IAS 16 on property, plant, and equipment requires benefits to be "probable" for the asset to be booked. Under the IASB Conceptual Framework, an asset is defined as having future economic benefits but, when it comes to the Recognition section, booking an asset (or liability) is qualified in the case of "low probability of an inflow or outflow of economic benefits" (para. 5.12-5.17). This is not to imply that the FASB and IASB have the precise calibration in every case but to merely to underscore an accounting principle that is approximated in practice.

The accounting might just be accountants being conservative, though such prudence is not a bad trait when faced with risk. However, the two accounting principles convey priced risk as matter of asset pricing theory in Penman and Zhang (2020) where they inform about the discount factor in a general no-arbitrage pricing model. Due to these accounting principles, Penman and Zhang (2020) also show that the book rate of return conveys the risk in the discount rate. Empirical validation is in Penman and Yehuda (2018), Penman and Zhang (2021), and Andronoudis, Dargenidou, Konstantinidi, and Pope (2019). Penman (2021) provides an overview.[1]

[1] Rather than proceeding with a expanded analysis that exploits these accounting features (as in this paper), a response might be to change the accounting so that the standard financial statement holds. That is the call for capitalization of intangible asset expenditures on the balance sheet, for example, in Lev (2001, 2019), Lev and Gu (2016), and Srivastava (2014). That warrants investigation and Barker, Lennard, Penman, and Teixeira (2022) establish uncertainty thresholds for capitalization. However, two issues challenge capitalization. First, many expenditures on intangible assets are joint with those that generate current revenues, like advertising, customer loyalty programs, and payments to employees for human capital. Disentangling the asset component is problematical. Second, capitalization requires an amortization scheme and an amortiztion scheme against uncertain revenues is also problematic, intoducing mismatching in the income statement as recognized in Barker and Penman

A Financial Statement Analysis of Risk and Return

Preamble

Equity investors' informational requirements are conveyed by a valuation model. Given the investor is buying future dividends and given clean-surplus accounting that substitutes accounting earnings and book value for dividends (along with a boundary condition),

$$Equity\ Value_t = Book\ Value_t + \frac{(ROE_{t+1} - r).Book\ Value_t}{1+r} + \frac{(ROE_{t+2} - r).Book\ Value_{t+1}}{(1+r)^2}$$

$$+ \frac{(ROE_{t+3} - r).Book\ Value_{t+2}}{(1+r)^3} + \cdots$$

where the ellipsis indicates that the going concern continues with the same metric for subsequent periods in the future. See Peasnell 1982 and Ohlson 1995 for example. This simplification is with a constant required return, *r*, but can be modified for time-varying discount rates to which financial statement analysis can be brought, for example, with an assessment of so-called duration risk (but which we do not entertain in this paper). Given the book value of equity, value is indicated by future ROE relative to the required return applied to expected book values, otherwise called residual earnings over the required return applied to book value (net assets).[2]

This brings the focus to the summary profitability measure, ROE, as in the decomposition in standard financial statement analysis brought to enhance the prediction of ROE. However, that

(2020): What is the amortization scheme for an R&D investment with no revenue or product as yet (and there might not be)? A fuzzy amortization scheme damages the matching in the income statememt (and the numberator of the book rate of return) that conveys information about realization. A financial statement analysis of that income will not uncover the drivers of profitability and, in addition, the information about risk conveyed by the as-is accounting is lost.

[2] For periods after t+1, ROE is technically expected earnings on expected book value, not expected ROE. That is implicit when we refer to expected ROE. The model as stated here is not its general form in no-arbitrage pricing theory where expected payoffs are discounted to certainty equivalent with an added covariance term applying the risk discount. That is the form in Penman and Zhang (2020) that connects accounting principles to the discount factor. We use the expedient textbook model for simplicity but also with a view of bringing the financial statement analysis to the classroom and to practice.

analysis pertains to the numerator of the valuation, leaving open the question of whether financial statement analysis can also indicate risk and thus the denominator feature, *r*, of the valuation. Indeed, the valuation model says that the two are one issue: The required return in the denominator is the discount for the risk that the expected numerator will not be realized, and it is the hurdle rate in the numerator. It is a financial analysis that deals with both the numerator and denominator together that we envision, an analysis that comprehensively deals with the investor's valuation problem, forecasting payoffs and the risk to payoffs.

The residual income model promotes this perspective but so does the theory of finance where the risk to investing involves both expected payoffs and the covariance of these payoffs with the pricing kernal. This is clear from the Lintner ratio (Lintner 1969,1970) where, under the Capital Asset Pricing Model (CAPM):

$$Risk = \frac{Cov(R^m_{t+1}, x_{t+1})}{E(x_{t+1})}$$

where x_{t+1} is the one-period payoff and R^m_{t+1} is the return on the market portfolio. This expression, sometimes called the Fama ratio, is recognized in Fama and Miller (1972), Fama (1977), and, in the accounting literature, in Lambert, Leuz and Verrecchia (2007). See Johnstone (2016). Simply, for a given expected payoff, the higher the covariance, the higher the risk. And, for a given covariance, a higher expected payoff means a lower risk.[3] Penman and Zhang (2020) show that the accounting principles affecting the book rate of return also affect the Lintner ratio with its two components. Accordingly, risk is indicated by both expected profitability and the risk to that profitability via the refined financial statement analysis built from those accounting principles.

[3] Intuitively, a firm with a beta of 1.3 and an expected payoff of 100 is less risky than one with the same beta and an elected payoff of 2.

With ROE being a payoff, the unified analysis deals with expected ROE and the risk to ROE. However, ROE is a measure of earnings per dollar of book value and expected residual earnings are also determined by the expected book value at future dates. Our financial statement analysis deals only with ROE, so is incomplete, leaving open the question of a financial statement analysis of growth in book value.

The Analysis of Leverage

Risk and return for equities come from business operations with added risk from leverage with debt financing. The deterministic financing leverage equation, recognized in financial statement analysis texts, separates the two:

$$ROE_t = RNOA_t + \left[\frac{Net\ Debt_{t-1}}{Equity_{t-1}} \times (RNOA_t - Net\ Borrowing\ Rate_t)\right]$$

for all t, where $RNOA_t = \frac{Operating\ Income\ (after\ tax)_t}{Net\ Operating\ Assets_{t-1}} \equiv \frac{OI_t}{NOA_{t-1}}$ is the Return on Net Operating Assets, $\frac{Net\ Debt_{t-1}}{Equity_{t-1}}$ is book leverage, and the *Net Borrowing Rate* = $\frac{Net\ Interest_t}{Net\ Debt_{t-1}}$ is also after tax.[4] The effect of leverage is clear: Leverage adds to ROE provided the spread between *RNOA* and the net borrowing rate is positive. The risk to leverage is also clear: ROE is reduced if that spread turns negative. The explanation of risk to ROE is supplied, determined by the risk to *RNOA*, the amount of leverage, an interaction between leverage and the *RNOA* spread, and the risk to after-tax borrowing rates. The equation is in the same form as the leverage equation for expected equity return in Modigliani and Miller (1958); it is the complementary accounting equation to that representation.

[4] ROE is the book rate of return for common shareholders. Net interest thus includes preferred dividends and net debt includes preferred equity. Return on Assets (ROA) is often reported as the book rate of return for operations, but this ignores operating liabilities in business operations and includes debt assets (financial assets) in the denominator. See Nissim and Penman (2003).

With book leverage read from the balance sheet, net interest in the income statement, and tax rates is the tax footnote, the effect of leverage on ROE is readily determinable, for the financing leverage equation is deterministic. The focus for analysis thus comes to *RNOA*, for it is the risk to *RNOA* that is the equity risk for given leverage. It is the financial statement of risk to *RNOA*, operating profitability, to which we turn.

The Analysis of Operating Profitability

The classic DuPont analysis explains the profitability of business operations by decomposing *RNOA* into profit margin and asset turnover:

$$RNOA = \frac{Operating\ Profit\ Margin}{Sales} \times \frac{Sales}{Net\ Operating\ Assets}$$

≡ Operating Profit Margin (*OPM*) x Asset Turnover (*ATO)*

Fairfield and Yohn (2001), Nissim and Penman (2001), Fairfield, Whisenant and Yohn (2003), Soliman (2008), and Wahlen and Wieland (2011) are among papers that have applied the analysis in a valuation context, as do textbooks.

The Operating Profit Margin

The expensing of investments comingles expenses to gain current sales (revenue) with those from expensed investments to gain future sales, and this mismatching affects the current profit margin from sales. Separating the two along with income not from sales,

$$OPM_t = \frac{Matched\ Profit_t}{Sales_t} - \frac{Mismatched\ Expenses_t}{Sales_t} + \frac{Income\ Not\ From\ Sales_t}{Sales_t}$$

$$= \frac{Matched\ Profit_t}{Sales_t} \times \left(1 - \frac{Mismatched\ Expenses_t}{Matched\ Profit_t}\right) + \frac{Income\ Not\ From\ Sales_t}{Sales_t}$$

Matched Profit is current sales revenue minus matched expenses incurred to generate those sales, including cost of goods sold and the amortization of investments booked to the balance

sheet against those sales. This captures the profitability of current sales under the realization principle that conveys risk resolved; matched profit conveys the ability to realize earnings from sales to resolve uncertainty.

The second term in the first line isolates the effect of mismatched expensed investments due to conservative accounting. These investments project future sales and earnings that are not conveyed by matched profit from past investments. Earnings expectations increase, not only because of the investment, but also because there will be no depreciation or amortization (the investment cost has already been expensed). However, the expected earnings are unrealized, still at risk under accounting principles. Denomination in realized sales reinforces the measure of risk: The amount of risky investment to gain future sales, relative to the amount of sales the firm can currently realize, indicates the risk to realizing future revenues. That is a financial statement ratio that cues our financial statement analysis.

Mismatching also involves other items not to do with sales—realized and unrealized gains and losses on securities and asset dispositions, share of income in subsidiaries under the equity method, restructuring charges and asset write-downs, other one-time special items, and extraordinary items and discontinued operations. These are in the third term. With a view to forecasting, DuPont analysis focuses on the sustainable profit margin that excludes these items for, with the exception of share of income in subsidiarites, most of them are mean-zero in expectation (unpredictable). So they are excluded in an analysis of the sustainable *OPM*, as they are in our empirical analysis. That said, unrealized gains and losses and impairments could indicate risk and realized gains could indicate risk resolved, so would be included in an expanded financial statement analysis of risk.

In the second line of the *OPM* decomposition, defined for positive matched profit, the risk in mismatched expenses relative to matched profit acts as a multiplier to matched profit. That is, *OPM* is levered up (down) by lower (higher) expensed investments. That is additional leverage to operating (fixed cost) leverage; just as fixed expenses as a percentage of total expenses increase (decrease) *OPM* as sales increase (decrease), so mismatched expenses as a percentage of total expenses increase (decrease) *OPM* as sales and matched profit from sales increase.

Under a steady-state condition, otherwise called the cancelling error property of accounting, mismatched expenses do not affect *OPM*. This is demonstrated in the exercise in first accounting class where students are asked to show that income is the same when capitalized and amortizing R&D and expensing it immediately when there is no growth in R&D. That is because previously expensed investment returns higher matched profit from that investment but new expensed investment cancels that matched profit to yield the matched profit that would be reported had the expensed investment been capitalized and amortized. Effectively, in steady state mismatched expenses become the equivalent of matched expenses from capitalization and amortization. In steady state,

$$OPM_t = \frac{Matched\ Profit_t}{Sales_t} \times (1 - \alpha),$$

where α is the ratio of mismatched expensed investment to matched profit in steady state.

So, $\frac{Mismatched\ Expenses_t}{Matched\ Profit_t} > \alpha$ indicates growth in expensed investment that reduces operating income and conveys higher risk while $\frac{Mismatched\ Expenses_t}{Matched\ Profit_t} < \alpha$ indicates declining expensed investment and lower risk. Again, the realization principle complements the conservative accounting to convey risk: Higher (lower) expensed investment relative to lower (higher) realized matched profit indicates higher (lower) risk.

The Asset Turnover

With realized sales in the numerator, the asset turnover (*ATO*) also conveys risk for, under the revenue recognition principle, realized sales indicate the ability to get paying customers and risk being resolved. With sales revenue not yet realized, sales are still at risk and the numerator of the *ATO* is lower. In addition, net operating assets (NOA) in the denominator convey further risk information. With conservative accounting, expensed investments are not on the balance sheet, resulting in lower NOA. So, if realized sales are on low NOA from investments previously expensed, the resulting high *ATO* informs that those particularly risky investments have actually paid off, resolving the high risk from these investments favourably; the firm has been successful with risky investing and thus has lower risk. Alternatively, a firm with expected revenue yet to be realized reports a lower *ATO* and higher risk.

The denominator of the ATO also conveys information. If that is low because particularly risky investments yielding the sales numerator are not on the balance sheet, then the firm (on a continuing basis) is generating further sales from risky investments, indicating those sales are at risk. So, for example, a firm with successful R&D and thus a high *ATO* might appear to have resolved risk but, with patents expiring, future sales are at risk. Thus the prediction from ATO is unclear.

However, it is the information conveyed by the financial statement numbers jointly that is pertinent. First, the interpretation of the *ATO* depends on the matched profit the sales are generating. Second, mismatched investment expenses perpetuate sales such that $\frac{Mismatched\ Expenses_t}{Matched\ Profit_t} > \alpha$ further conveys sales are at risk. These features are to be evaluated on how they convey information jointly, and that is in the RNOA.

The Operating Profit Margin and Asset Turnover Together

Adding *ATO* to *OPM* (and ignoring income not from sales) brings these components together:

$$RNOA_t = \frac{Matched\ Profit_t}{Sales_t} \times ATO_t \times \left(1 - \frac{Mismatched\ Expenses_t}{Matched\ Profit_t}\right) \qquad \text{(FSA)}$$

This decomposition identifies components in *OPM* and *ATO* that potentially convey future profitability and the risk to future profitability. However, as in the standard DuPont analysis, the components interact to convey this information, with the mismatching multiplier now applied to *ATO* as well as the matched profit margin. Alternative combinations of matched profit margin, ATO, and expensed investment relative to α define a firm's risk and return profile.

A few examples illustrate. A start-up biotech with little revenue and matched profit as yet and thus also a low *ATO*, and with considerable R&D to gain future sales, is risky. That is captured in the decomposition: A negative expensed investment multiplier (due to mismatched investment/matched profit greater than 1.0) turns a matched profit into an operating loss common with startups, many of which do not survive. In contrast to the start-up, a mature pharmaceutical realizes sales and profits from past expensed R&D, and thus reports a higher matched profit margin and *ATO*: It is lower risk. However, coming from risky investments, further sales are as risk and it becomes riskier with growth in R&D to maintain sales such that mismatched expenses relative to matched profit > α.

Consider Amazon.com, Inc. which for many years up to 2014 reported losses because of expensed investment in R&D, software, promotion (and more), even on rising sales. It looked "unprofitable" but was potentially very profitable if those investments were to pay off. However, while reporting losses, Amazon was reporting positive matched profit on rising sales, indicating its ability to realize profits from its investments. And, indeed, its RNOA subsequently grew considerably as the earlier expensed investments paid off with profits.

In 2021, Apple and Microsoft reported high margins from current sales, high sales on low NOA but, with low mismatched investments in relation to matched profit (21.5% and 15.5%, respectively), were relatively low risk. Twitter, with expensed R&D and advertising at 61.1% of matched profit in 2021 is risky. A pipe-line company with low asset turnover is risky—there is a lot of NOA to cover— but with off-setting high matched profits it is less risky and there is little R&D to add risk.

It is common to conduct DuPont analysis within industries because average *RNOA*, *OPM*, and *ATO* vary across industry. Our analysis is with data pooled over industries with the focus on how accounting and the resulting measures convey risk and return rather than industry classification. Indeed, with the measures differing across industries, the analysis can be seen explaining differences in industry risk and return. Within industry analysis could be an extension, distinguishing mature firms with realized profits from start-ups for example.

Setting Up the Empirical Tests

The empirical analysis assesses the extent to which this financial statement analysis projects both future profitability and the risk to profitability. That is complemented with an assessment of how the financial statement analysis projects stock returns and the risk to stock returns.

The Data

The sample period covers U.S. listed firms on Compustat for years 1975 to 2017, though payoff variables are up to 2021. Financial firms (to which a DuPont analysis does not apply) are excluded as are utility firms where financial statement profitability measures can be governed by regulation. We require the following items to be available for a firm-year to be included: net income (#NI), book value of equity (#CEQ), sales revenue (#SALE) greater than zero, and income statements and balance sheets from which operating income and net operating assets can

be calculated. These criteria yield a sample of 140,700 firm-year observations. The derivation of the sample is summarized in the Appendix.

For mismatched items, Compustat sometimes reports a number as missing. These are either reported as zero, aggregated with other items in the financial reports, or reported but not found by Compustat. We follow the practice of setting these to zero, relying on the finding in Casey, Gao, Kirschenheiter, Li, and Pandit (2016) that setting to zero satisfies certain articulating accounting equations 82.7% of the time.

Stock returns in the tests are annual buy-and-hold compounded monthly returns from CRSP following the third month after fiscal-year end. By that time the financial statements containing the DuPont information must be published, by law. The subsequent twelve months are those during which accounting outcomes that the analysis forecasts arrive at the market (in four quarterly reports). Standard adjustments are made for firms not surviving for the full return period.

Target Variables

With valuation in mind, we specify the payoff variable in a valuation context where the risk to profitability is also risk to value. With the focus on operations, the valuation model is modified to exclude the effects of financing leverage that are readily determinable (above). Given clean surplus accounting for operating activities whereby $NOA_\tau = NOA_{\tau-1} + OI_t - FCF_t$, the value of operations (enterprise value),

$$Value_{t,T}^{Operations} = NOA_t + \sum_{\tau=1}^{T} \frac{OI_{t+\tau} - r \cdot NOA_{t+\tau-1}}{(1+r)^\tau}$$

$$= \frac{\sum_{\tau=1}^{T} OI_{t+\tau} \; + \; ((1+r)^{T-\tau} - 1)FCF_{t+\tau}}{(1+r)^{T} - 1}$$

$$= \frac{\sum_{\tau=1}^{T} (Matched\ Profit_{t+\tau} \; + \; ((1+r)^{T-\tau} - 1)FCF_{t+\tau} - Mismatched\ Expense_{t+\tau})}{(1+r)^{T} - 1}$$

approaches

$$Value_t^{Operations} = \sum_{\tau=1}^{\infty} \frac{FCF_{t+\tau}}{(1+r)^{\tau}}$$

as T → ∞ provided the standard transversality condition is met. All variables for τ > 0 are expected values. The discount rate, *r* is that for operations (rather than the levered discount rate in the levered residual income model above), and this is understood. *OI* is operating income and *FCF* is free cash flow, the dividend from the operating activities to the financing activities, that is, cash to pay net dividends to shareholders and net debtholders.[5] Expected income not from sales is set to mean zero (unpredictable, as most are). The progression from the first line to the second is usually with levered earnings and book value (as in Ohlson 1995, Appendix 3), but now on an unlevered basis. The second line says that operations return operating income plus free cash flow—the dividend whch investors can invest at the rate, *r*—with this expected payoff then capitalized to determine value. Dividing through by NOA_t, the target variable that yields the enterprise price-to-book is given by

$$\frac{Value_{t,T}^{Operations}}{NOA_t} =$$

$$\frac{\sum_{\tau=1}^{T} Matched\ Profit_{t+\tau} \; + \; ((1+r)^{T-\tau} - 1)FCF_{t+\tau} - Mismatched\ Expense_{t+\tau})}{NOA_t} \Big/ (1+r)^{T} - 1$$

[5] To appreciate that free cash flow is a dividend from the operating activities to be distributed to debt and equity investors, consider the cash conservation equation: *FCF* = Net dividends to equity + Payoffs to net debt holders. If there is no net debt, *FCF* = Net dividends to equity.

The denomination in NOA_t is the same denomination as in *RNOA*. This requires a forecast of future investments to be booked as mismatched expenses, not part of the revised DuPont analysis (though an expanded analysis could include it). Thus, the target variable for the empirical analysis is

$$Future\ Payoff\ (T) = \frac{\sum_{\tau=1}^{T} Matched\ Profit_{t+\tau} + ((1+r)^{T-\tau}-1)FCF_{t+\tau}}{NOA_t}$$

$$= \frac{\sum_{\tau=1}^{T} Matched\ Profit_{t+\tau} + ((1+r)^{T-\tau}-1)FCF_{t+\tau}}{\sum_{\tau=1}^{T} Sales_{t+\tau}} \times \frac{\sum_{\tau=1}^{T} Sales_{t+\tau}}{NOA_t}$$

for all T. We ask whether the expanded DuPont analysis in year t projects this payoff for T = 1, 2, 3, and 4. Further, we ask whether the analysis conveys the distribution of future payoffs around this expectation. Thus both expected profitability and the risk to profitability are investigated.

A second payoff variable simply involves the forecasted matched profit indicated by the financial statement analysis:

$$Future\ Matched\ Profitability\ (T) = \frac{\sum_{\tau=1}^{T} Matched\ Profit_{t+\tau}}{NOA_t}$$

$$= \frac{\sum_{\tau=1}^{T} Matched\ Profit_{t+\tau}}{\sum_{\tau=1}^{T} Sales_{t+\tau}} \times \frac{\sum_{\tau=1}^{T} Sales_{t+\tau}}{NOA_t}$$

With both targets, the analysis forecasts future matched profit margins and asset turnovers and their interaction. And the risk to the target involves the risk to future profit margins profit margins and asset turnovers and their interaction.

Financial Statement Variables

The calculation of financial statement variables that forecast these target variables is detailed in the Appendix. The measurement of Mismatched Expense presents some difficulties. Research (in Kovacs 2004, Peters and Taylor 2017, and Enache and Srivastava 2018, for example) has estimated that a significant amount of expensed investment is in SG&A. That includes investment in software, human capital, customer loyalty, distribution systems and supply chains, among others. However, due to lack of disclosure, these investments cannot be identified separately from other items in SG&A that match to current revenues. Advertising and promotion expense can usually be found in footnotes and, as this expenditure can yield both current and future sales, it is classified as quasi-mismatched expense. To this we add a third of SG&A (excluding advertising and promotion) as quasi-mismatched expense.[6] Tests are conducted with and without the quasi-mismatched expenses. The lack of disclosure clearly frustrates us, but also frustrates an investor who might employ the expanded DuPont analysis.

Accordingly,

Mismatched Expense (including Quasi-Mismatched Expense)
= Advertising Expense + R&D expense + SG&A expense excluding advertising/3

Matched Profit
= Operating Income (before tax) + Mismatched Expense (including Quasi-Mismatched Expense) − Other Mismatched Operating Income

See the Appendix for more detail. The numbers are before tax as the tax number is partially due to tax planning rather than operations. These calculations leave share of income from

[6] While 1/3 of SG&A is arbitrary, these is some support for it in Peters and Taylor (2017). This may not be a problem that is solvable, even with disclosure. Many investments are made jointly with expenses to generate current revenues, and these are not easily disentangled. As well as advertising and promotion, examples are bonuses to retain employees paid with annual salaries, awards to customers to buy currently but also for future loyalty, and premiums paid to suppliers to entice them into permanent supply chains.

subsidiaries under the equity method in Matched Profit. That is not matched profit from top-line sales in the holding company and might include mismatched expenses in subsidiaries. But, unlike gains and losses on securities and asset sales and impairment charges, it is part of sustainable income in *RNOA* going forward. (That number is typically small.)

Summary Distributions of Variables

Panel A of Table 1 summarizes the distribution of the main numbers in the financial statement analysis. Median *RNOA* at 14.3% is higher than the mean of 1.1% indicating the effect of negative operating income in the sample. This is reflected in the difference between median and mean operating profit margin (*OPM*) where the latter is negative. That is largely due to mismatched expenses from expensing investments (MEXP), 19% of sales at the mean while only 9.1% at the median. While these expensed investments reduce *RNOA* and *OPM*, matched profit margin (MPM) increases them, with a 9.6% mean and 15.4% median. The mismatching multiplier (MMULT) that levers positive matched profit margin is 0.261 at the mean and 0.474 at the median. When matched profit margin is positive, it is multiplied by 0.261 on average to get the effect of mismatched investments on *OPM*. But there is considerable variation around these measures of central tendency, and it is the information in that variation that our tests investigate. Quasi-mismatched expenses to sales contribute 9.3% to the total mismatched expenses to sales on averages, with the latter 19.0% on average. So a relatively large portion of mismatched expense comes from R&D.

Time-Series Correlations

Figures 1a to 1e report the variation of selected variables over time. The effect of MPM on *RNOA* in Figure 1a is clear; their medians move closely together. Figure 1b brings in the mismatched investments. The mismatching multiplier is also tracking the variation in *RNOA*

(though there is some deviation in the last few years). In Figure 1c, *RNOA* also varies closely with *ATO*.

The expensed investment multiplier, MMULT is given by (one minus) the ratio of expensed investment relative to matched profit, so decreases with higher mismatched expenses for a given matched profit and increases with matched profit. Figure 1d tracks the multiplier against mismatched expense/sales, effectively indicating the effect of matched profit on the multiplier. The two move in opposite directions: Mismatched expenses dominate the multiplier.

Cross-sectional Correlations

The time-series correlations between *RNOA* and its drivers are perhaps expected but do depend on the correlation among drivers. Cross-sectional correlations are quantified in Panel B of Table 1. These are correlations to keep in mind with the empirical tests. *RNOA* is positively correlated with *OPM* and *ATO* according to the DuPont decomposition and with MPM and the mismatching multiplier (MMULT), with the latter due to the negative effect of MEXP/Sales. As is commonly recognized, *OPM* and *ATO* are negatively correlated: Firms with high (low) *OPM* have low (high) ATO. MPM is positively correlated with MEXP/Sales: Firms with higher MPM have more expensed investments. MPM is also positively correlated with the multiplier, MMULT which is determined by mismatched expenses relatively to MPM. *ATO* has little correlation with MPM, nor with MEXP or MMULT. As is Figure 1d, MEXP and MMULT are negatively correlated. For a given MPM, this is by construction but it is also the case (unconditionally) in the cross-section.

Empirical Tests

These are two sets of empirical tests. The first investigates whether the analysis variables predict profitability outcomes and the risk in the variation in those outcomes. The second asks whether

those same variables predict forward stock returns and the risk to those returns. The two tests should mutually corroborate if the predicted risk to profitability is risk to be priced and the market prices that risk efficiently. If that maintained hypothesis is not correct, the second set of tests point to a trading strategy based on the financial statement analysis (though we do not distinguish between the two interpretations).

Predicting Future Profitability

The future profitability variables are the target variables above. The prediction tests are in two forms, first with portfolios formed on the numbers from the financial statement analysis and, second, with regressions with those same numbers predicting the target outcomes. Regressions impose linearity but return interpretable coefficients, albeit subjective to econometric assumptions. They also hold conditional variables constant at a point. The portfolios analysis does not assume linearity and report actual outcomes to portfolio investments based on the analysis. However, in a nested sorting to form portfolios, a sort on a variable within a portfolio formed on the conditional variable could in part sort on the conditional variable if the two are correlated. In Table 1, Matched Profit Margin (MPM) is 0.52 rank correlated with Mismatched Expense/Sales.

The tests predict cumulative payoffs to the financial statement analysis up to T = 4. The results for T = 1, 2, and 3 are similar but, for brevity, are not reported in the paper. Although investments potentially payoff in T > 4, survivorship bias increasingly becomes a concern (an issue we address later).

Portfolio Tests

The portfolio tests follow the decomposition in the financial statement analysis design. Figure 2 lays it out. RNOA in the equation labelled (FSA) above is broken down into three levels. Level 1

is an assignment of firms to portfolios based matched profit margin (MPM). Level 2 then assigns firms in each MPM portfolio to portfolios based on asset turnover (ATO). In each sort, the top (bottom) 30% from the ranking are High (Low) portfolios (as in all panels in Figure 2). The resulting nine portfolios are labelled 11-33 in Figure 2. Level 3 sorts the Level 2 portfolios similarly by the degree of mismatching given by the mismatching multiplier (MMULT), labelled 111-333 in the second panel of the figure. The final set of portfolios in the last panel of Figure 2, 111-113 to 333-331, sort on the degree of mismatching within each MPM-ATO portfolio at Level 2. These are nested sorts appropriate for joint (interactive) information the financial statement variables convey. These all are portfolios that an investor can construct in real (historical) time.

As a prelude to the tests, Table 2 reports Spearman correlations between MPM and ATO within the nine portfolios in the Level 2 decomposition. Under accounting principles, low profit margins indicate lower realization of risk-resolving earnings, and low profit margins with a low ATO indicate the low earnings are from low sales realizations. So low MPM observed with low ATO indicates higher risk, that is, earnings and sales yet to be realized, still at risk. The correlation for the Low-Low MPM-ATO portfolio is indeed positive. Realized earnings yield relatively higher MPM and, if those realizations are from investments previously expensed, a high ATO. The correlation for the High-High MPM-ATO is thus also positive. For Medium MPM-ATO portfolios, the correlations are closer to zero and negative on the diagonal from Low-High MPM-ATO to High-Low MPM-ATO. However, the degree of mismatching also enters, and thus the Level 3 analysis and Panel B of Table 1 reports a rank correlation of MPM and expensed investment-to-sales of 0.52.

Panel A of Table 3 reports the mean matched profit payoff for the two target variables over four years for Level 2 portfolios numbered 11 to 33 in Figure 2. Higher matched profit margin (MPM) forecasts higher payoffs and, for a given level of MPM, higher ATO forecasts higher future matched profit. High MPM together with high ATO predicts particularly high subsequent matched profit and low MPM and low ATO predict relatively low matched profit. Differences across the diagonal return significant z-statistics (under the MPM-ATO matrix).

The panel repeats the exercise with the Level 3 analysis for the degree of mismatching with portfolios labelled 111 to 333 in Figure 2, that is, for low, medium, and high mismatching. The spread on MPM-ATO is evident at all levels of mismatching. The payoff differences reported for portfolio 333 (with high MPM, high ATO, and high mismatching) versus portfolio 111 (with low MPM, low ATO, and low mismatching) indicate the incremental effect of mismatching to the payoff forecasts, returning significant test statistics.

However, the pertinent question is how the degree of mismatching adds to the forecasts. So the panel reports the differences in future matched profitability for high versus low mismatching *within* each Level 2 MPM-ATO portfolio in Panel A. That follows the numbered scheme of the effect of mismatching in the last panel in Figure 2. This test is important, for MPM is rank correlated with mismatched expenses in Table 1 so the findings above for MPM and ATO could be attributable to mismatching. For both payoff targeys, the differences are significantly positive for all portfolios. That is, current expensed investment not booked to NOA_t projects matched profits in the future holding MPM-ATO constant. As $MPM_t \times ATO_t$ = Matched $Profit_t/NOA_{t-1}$, this holds Matched $Profit_t/NOA_{t-1}$ constant while forecasting future matched profit to NOA_t. And, as the mismatching multiplier is given by mismatched expenses relative to matched profit,

the test reports the multiplier effect. Results are similar for payoffs over one, two, and three years ahead. For T = 1, there is no overlapping of payoffs for successive years.

Panel B of Table 3 carries out the same analysis for future matched profit margins and asset turnovers, the two components of the payoffs. Only summary statistics are reported. For MPM-ATO portfolios, these statistics indicate that both components contribute to the matched profit outcomes in Panel A. Both MPM and ATO are persistent.

Regression Tests

Table 4 reports results from cross-sectional regressions predicting future cumulated matched profit for T = 4 each year with the components of the decomposition analysis. Reported coefficients are mean over years and t-statistics are that mean relative to its standard error estimated from the time series of estimated coefficients (Fama and Macbeth style). The set of regression results follows the sequencing in introducting accounting variables in the portfolio tests.

The results line up with those from the portfolio analysis. MPM and ATO predict future matched profit without other variables in the regression, as does their interaction (in the first regression in the table). As MPM_t x ATO_t = Matched $Profit_t/NOA_{t-1}$, introducing this term effectively asks whether current matched profit relative to NOA_{t-1} predicts future matched profit relative to NOA_t. As in the portfolio analysis, the answer is in the affirmative. Mismatched expenses add explanatory power as do both R&D and quasi-mismatched expense components of mismatched expense. Average R^2 is quite high.

Predicting Variation of Profitability Outcomes

Portfolio Tests

In the expanded DuPont analysis in equation (FSA), mismatched investment is separated from the profit margin and asset turnover not only because it predicts future profitability but (with conservative accounting for risky investment) the risk to profitability also, and incrementally so to matched profit margin and asset turnover. Panels A to D in Table 5 investigate, with risk measured by the dispersion of outcomes, that is, the inter-decile (IDR) and inter-quartile (IQR) range in relation to the predicted profitability. In addition, the table presents statistics regarding the outcomes distribution, with the purpose of assessing the distribution symmetry within the interquantile range (skewness) as well as the dispersion of outcomes in the tails (kurtosis). Given one expects higher variation with higher expected values, the IDR and the IQR measures of dispersion are normalized with the median of the distribution. For each measure, there are three results reported, first the spread across MPM-ATO Level 2 portfolios in Panel A of Table 3, second the spread across MPM/ATO/Mismatching that adds mismatching in Level 3, and finally the dispersion metrics for high minus low mismatching within each MPM-ATO. That is, the results are for the same portfolios in Panel A of Table 3 but with the outcome variable now the variation measure. Variation in payoff outcomes is interpreted as investment risk given the theory that connects the accounting principles underlying the financial statement analysis to priced risk and the corresponding Lintner ratio in Penman and Zhang (2020).

For both payoff variables, all variation measures are differentiated by the portfolio construction. Higher MPM-ATO indicate higher variation of payoffs and, with IDR, IQR, kurtosis, higher risk: Higher expected payoff in Table 3 comes with statistically significant higher risk. That is accentuated with added mismatching in confirmation that expensing investment under conservative accounting conveys risk. Further, the measures are higher for high versus low mismatching within MPM-ATO portfolios. The differences are larger for low MPM

portfolios: Firms with low matched profit but investing in risky expensed investments have higher variation in matched profit payoffs. Firms reporting high MPM have relatively high realized sales and profits that convey the ability of firm to generate realized profits from investments and thus are lower risk from expensed investments. However, low MPM firms are realizing lower profits so expensed investment in these firms is particularly risky. That is the prediction from the realization principle and the principle of conservative accounting for particularly risk investment and the data supports the prediction.

The results for skewness in Panel D of Table 5 indicate higher positive skewness for high MPM and ATO and for high mismatching interacting with high MPM and ATO. The Bowley metric is scaled to fall between 1 (extreme right skewness) and -1 (extreme left skewness) so the results informs that relatively profitable firms realizing sales and revenues and with more expensed investment have payoffs with relatively high right skewness. Within MPM-ATO portfolios the differences in skewness between high and low mismatching are typically not strongly statistically significant. The contrast between the skewness and kurtosis statistics suggests that mismatching leads to risk that is likely to find an expression at the tails of the outcomes distribution. While expensed investments are less likely to yield any future outcome, when this investment is successful outcomes are without amortisation, thus, boosting future reported outcomes to right hand tail of the distribution. The results in Table 5 are similar with the payoff variables calculated for T = 1, 2, and 3.

Panel E of Table 5 reports the inter-decile range (IDR) statistics for the two components of the matched profitability outcomes, the future marched profit margin and asset turnover for which the median portfolio payoff was given in Panel B of Table 3. Table 5 shows that payoffs of high MPM-ATO portfolios exhibit higher dispersion and with high expensed investment. Panel E

corroborates that it is the asset turnover that is at risk. While the IDR of the profit margin payoff is higher for low MPM-ATO portfolios, that for the asset turnover is higher for high MPM-ATO portfolios. This speaks to the issue (earlier) of whether a high asset turnover indicates lower risk because of sales realizations or higher risk because the sales are from previously expensed investments at risk. The results here point to the latter. The differences in IDR between high and low mismatching within MPM-ATO portfolios are significant for both drivers but are only consistently positive for high ATO. Similar results were observed for the other distribution metrics in Panels A-C of the table.

Investors are particularly concerned with extreme downside risk. However, downside risk typically comes with upside potential, so the investor looks at downside outcomes relative to the upside: Do upside outcomes compensate for downside risk? Table 6 reports how the financial analysis variables project upside and downside outcomes for future matched profit. Upside is measured by the upper component of the kurtosis measure in Table 5 and downside by the lower component.

Panel A of Table 6 for the upside reports the differences between high and low MPM-ATO and high and low MPM/ATO/Mismatched Expense. The significance tests inform that relatively high MPM and ATO convey more upside payoff and so with further sorting on mismatched expensed investments. However, the results reporting differences within each MPM-ATO portfolio indicate that the contribution from mismatched expense is in the relatively low MPM-ATO portfolios: When profitability is currently low, projecting lower future payoffs, adding (risky) expensed investment increases the potential for higher payoffs on the upside.

Panel B conducts the same analysis for the downside. Compared with the upside payoff in Panel A, high MPM/ATO/Mismatched firms have lower downside risk, so upside potential

comes with lower downside risk. Within MPM-ATO there is little difference on the degree of mismatching though the differences are negative. But there is a possible bias in the sample affecting these findings: This was a period when investing in U.S. stocks paid off with unexpectedly high earnings payoffs (to expensed intangible assets) on average and a corresponding bull market in stocks. Thus the difference between the upside and downside numbers. Nonsurvivors in the lower MPM portfolios could also be a reason; low MPM with mismatched investment that did not payoff might lead to failure. We tract survivorship by portfolios in Table 11 where lower MPM portfolios have higher frequency of delisting for poor performance, particularly with high investment mismatching.

Regression Tests

The dependent variable for cross-sectional regression tests run each year is the variation in outcomes over the following four years. The results for the IQR are in Table 7, with the IQR measured each year from the distribution of subsequent profitability outcomes for $\frac{Matched\ Profit_{\tau}}{NOA_t}$ over four years, τ = 1 to 4. To give some feeling for the metric, the median IQR from data pooled over years is 0.136 with 0.055 at the 25th percentile and 0.325 at the 75th percentile. With only four years to estimate the IQR, we put less weight on these tests.

The first regression reports that higher MPM x ATO, that is, higher current matched profit-to-NOA, indicates higher variation in future matched profit-to-NOA over the following four years. While high MPM x ATO with high mismatched expense indicates higher payoff in Table 4, that higher payoff comes with higher variation in the payoffs. However, this variable is positively correlated with mismatching, and adding that in the second regression adds explanatory power. The remaining regressions in the table indicate that both R&D and quasi-mismatched expense

contribute to explaining the variation in profitability outcomes, as do interaction terms. Results were similar with the IDR as the variation metric.

Predicting Returns

Portfolio Tests

The return tests investigate whether the financial statement variables predict forward stock returns. The annual return period begins three months after the fiscal year for which the variables are reported. Under asset pricing theory, risk is compensated with higher returns so, if the analysis conveys priced risk, as indicated by Penman and Zhang (2020), and the market prices that risk efficiently, the variables should predict returns to that risk. The tests ask whether that is so. However, the question of market efficiency is open: This "new" analysis might not be understood by the stock market. So we present the return results as a descriptive endeavour with the interpretation left open.

Panel A of Table 8 reports returns for the portfolios in Figure 2 and Table 3 formed on the analysis variables. Under accounting principles, low MPM and ATO convey higher risk but the difference in returns between high-high and low-low MPM and ATO portfolios in Table 8 is only 3.9% on average and not statistically significant. The mean difference in returns between the high-high MPM and ATO with high mismatching and the low-low MPM and ATO with low mismatching is 9.1% and significant at the 95% level for an (appropriate) one-tail test. That indicates expensed investment conveys priced risk. MPM is 0.52 rank correlated with mismatching in Table 1, so the similar returns for high-high and low-low MPM-ATO portfolios could be due to the lower risk with the high-high portfolios being cancelled by the higher risk from the mismatching. Panel B addresses the issue. Within high MPM portfolios, return

differences are positive though only statistically significant in the higher ATO portfolios. But there is little difference in returns for the extent of mismatching for the low MPM portfolos.

Regression Tests

The results with cross-sectional regressions are in Table 9 with the same variables predicting profitability payoffs in Table 7. In Panel A, as in Table 8, only the interaction of the financial statement variables reliably predicts forward returns, and then with low statistical significance. In Panel B, the standard deviation of monthly returns during the forward year is regressed on financial statement variables. Those variables reliably predict the volatility of returns.

Panel C of Table 9 takes a different tack. Here all variables are denominated in price, as are returns, so variables relative to price predict returns relative to price. That price (presumably) incorporates the discount for risk, rendering a more powerful test. It is well recognized that higher E/P ratios, with a price discount in the dominator, yield higher returns. Operating income relative to the price operations, OI/P^{NOA} is the unlevered E/P ratio, and that predicts returns in the first regression. However, mismatched expense adds to the explanation of returns in the second regression as does R&D and quasi-mismatched expense in the third. Book-to-price reliably predicts returns, in Fama and French (1992) for example, but the unlevered book-to-price, NOA/P^{NOA} does not do so here once the information from the financial statements are included. Nor does balance-sheet investment which also has been shown to predict returns. The comparison of the coefficients on the mismatched investment numbers with those on investment booked to the balance sheet, NOA $investment/P^{NOA}$ is particularly informative: While the mean coefficient on investment booked to the balance sheet is close to zero, those on the mismatched investments are positive: The market prices expensed investment as higher risk than investment booked to the balance sheet, as per accounting principles.

Further Tests

Table 10 reports betas for portfolios, further evidence of risk differences with mismatched investment expense. For the 113-111 to the 333-331 portfolios in Figure 2, Panel A reports differences in return betas for high versus low mismatching within the MPM-ATO portfolios. The beta differences are positive and significantly so for most portfolios.[7] Panel B reports earnings betas, the sensitivity of earnings to market-wide earnings, that papers (in the introduction) have estimated as a fundamental indicator of systematic risk. Mismatched investments differentiate these fundamental betas, particularly in high MPM and ATO portfolios. Note that both the return betas and earnings betas are those experienced during the portfolio holding periods, not historical betas.

In most of the tests, the payoff is cumulated profitability payoffs over four years after the analysis variables are observed, T = 4. Those tests are thus subject to survivor bias due to delisting during the four years, though results are similar for T = 1, 2, and 3 with more survivors. The appendix details survivorship in the sample. The direction of the bias depends on reason for a firm disappearing, poor performance or acquisition, the latter typically with a price payoff premium. So Panel A of Table 11 reports the frequency of delisting one year ahead (to avoid overlapping observations) for MPM-ATO partitions, with a differentiation by the reason for the delisting. Delisting for poor performance is higher in low MPM and ATO partitions, reinforcing the prediction that low values for these ratios convey higher risk. The association is consistent across all levels of mismatching but more so for high mismatching. Not so for delisting due to acquisition. There the frequency is higher for high MPM deemed lower risk. The frequencies for

[7] With the equally weighted portfolios here, small firms get higher weight in beta estimation with a value-weighted index, so the analysis was rerun excluding firms in the lowest quintile of NYSE firms by market capitalization. The beta differences are typically larger.

these partitions not only indicate lower poor-performance delisting but also the upside of acquisition.

Panel B of Table 11 reports the two types of delisting for high and low mismatching within the MPM-ATO partitions. The contrast exhibits the risk in expensed investment: Higher expense investment conveys a higher frequency of poor performance but a lower frequency of payoff with acquisition: The effects are concentrated in the lower MPM and ATO partitions.

Conclusion

Traditional financial statement analysis carries out a decomposition of book rate of return to predict future profitability on which the value of firms is in part determined. This paper lays out a financial statement analysis that not only predicts future profitability but also conveys the risk to that profitability. That is important to a valuation that discounts expected payoffs for the risk to payoffs. Empirical tests with both profitability and stock return payoffs associated with the identified financial statement measures supports the analysis.

The analysis largely deals with income-statement and balance-sheet aggregates without the line items that sum to those aggregates. So the analysis can be extended, much like a further decomposition of profit margin and asset turnover adds information in traditional financial statement analysis. Thus the "towards" in the paper's title. Ratios like inventory turnover, PPE turnover, deferred revenue to revenue, accounts receivable turnover, realized and unrealized gains and losses, and impairments are potentially relevant, especially if they are affected by accounting principles that pertain to risk. For example, a low sales-to-PPE ratio due to excess capacity in plants might convey risk as might high inventory (build-up) relative to sales. The composition of SG&A to sort out matched expenses from mismatched investments is important

although disclosure will frustrate the task. Many SG&A items will remain quasi-mismatched if, like advertising, they are incurred to generate both current sales and future sales.

The analysis is incomplete for other reasons. Value is determined not only by expected profitability and the risk to that profitability but also by expected future investment to earn at the projected rate of return and the risk to that investment. This is incorporated in valuation models but also in theory that sees value and risk in investment growth options. Further information can be brought to the task. The analysis forecasts future matched profit but not the future mismatched investments that recursively forecast matched profit and risk. That would complete the forecast of future operating income and risk to operating income so also would be part of a further analysis. However, this "towards" paper has laid out the path to a comprehensive financial statement analysis.

Appendix

Sample Selection

U.S. firms on Compustat files for any of the years, 1975-2017 (2021, for calculating future profitability) after dropping:	194,440
- Observations with financial years lasting more than 370 days or less than 360 days -Financial firms in SIC codes 6000-6999 and utilities in SIC codes 4900-4999 -Observations with negative sales, advertising, R&D, SG&A, MEXP and QMEXP -Observations with missing data to estimate MPM, ATO, MMULT	
DuPont analysis sample	140,700
For prediction of profitability (due to non-survivors):	
Observations available for estimating outcomes at t+1	126,353
Observations available for estimating outcomes at t+2	113,951
Observations available for estimating outcomes at t+3	103,251
Observations available for estimating outcomes at t+4	93,966

Variable Definitions and Calculations and Sample Selection

FA	Financial Assets = Cash and short-term investments (#CHE) + Investments and advances-other (#IVAO).
FO	Financial Obligations = Debt in current liabilities (#DLC) + Long- term debt (#DLTT) + Preferred stock (#PSTK) – Preferred treasury stock (#TSTKP) + Preferred dividends in arrears (#DVPA)
ND	Net Debt = Financial Assets (FO) – Financial Assets (FA).
B	Book Value of Common Equity = Common equity (#CEQ) + Preferred treasury stock (#TSTKP) - Preferred dividends in arrears (#DVPA).
NOA	Net Operating Assets = Net Debt (ND) + Common Equity (B) + Minority interest (#MIB).
Net Income	Net Income = Net income (#NI) – Preferred dividends (#DVP)
NIE	Net Interest Expense = Interest expense (#XINT) + Preferred dividends (#DVP) - Interest income (# IDIT)
OI	Operating Income = Net Income + Net Interest Expense + Income Taxes (#TXT) + Minority interest income (#MII) –

	Extraordinary items & Discontinued operations (#XIDO) – Special Items (#SPI)
FCF	Free Cash Flow to the Firm = Operating Income (OI) − Change in NOA
MEXP	Mismatched Expenses = Advertising expense (#XAD) + R&D expense (#XRD) + (Selling, Administrative and General expense (#XSGA − #XAD − #XRD)/3. If #XSGA is missing, then we set (#XSGA − #XAD − #XRD) to 0.
QMEXP	Quasi-matched Expenses = Advertising expense (#XAD) + (Selling, Administrative and General expense (#XSGA − #XAD − #XRD)/3. If #XSGA is missing, then we set (#XSGA − #XAD − #XRD) to 0.
Other Mismatched Operating Income	All items in Operating Income (OI) that are not from sales, including realized and unrealized gains and losses on securities and asset dispositions, restructuring charges and asset write-downs, other one-time special items, but excluding share of income in subsidiaries under the equity method.
MP	Matched Profit = Operating Income (OI) + Mismatched Expenses (MEXP)
RNOA	Return on Net Operating Assets =Operating Income (OI)/ Lagged Net Operating Assets (NOA)
MPM	Matched Profit Margin = Matched Profit (MP)/Sales (#Sale)
ATO	Asset Turnover = Sales(#Sale)/Lagged Net Operating Assets (NOA)
MMULT	Mismatching Multiplier =1- MEXP/MP
OPM	Operating Profit Margin = OI/Sales
NOA Investment	Investment booked to the balance sheet = Capital expenditures (#CAPX) – Sale of Property (#SPPE) + Other investing activities (#IVACO). It excludes net investment in interest-bearing cash and investments that are included in the investment section of the cash flow statement but pertain to financing activities.
P^{NOA}	Market value plus Net Debt (ND), with market value of equity three months after fiscal year-end. That is calculated as the number of shares outstanding at the end of the fiscal year from Compustat multiplied by the price per share from CRSP at three months after fiscal year-end, adjusted for any intervening stock splits and stock dividends. This excludes any change in the market price from net share issues over the three months.
Forward Return	One-year buy-and-hold return calculated from CRSP monthly returns, starting at the beginning of the fourth month after the current fiscal year-end. For firms that are delisted during the 12 months, the return for the remaining months is calculated by first applying the CRSP delisting return and then reinvesting any remaining proceeds at the risk-free rate. This mitigates concerns with potential survivorship biases. Firms that are delisted for poor performance (delisting codes 500 and 520–584) frequently have missing delisting returns (Shumway 1997). We control for this potential bias by applying delisting returns of −100% in such cases.

References

Andronoudis, D., C. Dargenidou, E. Konstantinini, and P. Pope. 2019. Conservative Accounting and Risk: The Case of Research and Development. Unpublished paper, Bocconi University.

Barker, R., A. Lennard, S. Penman, and A. Teixeira. 2022. Accounting for Intangible Assets: Suggested Solutions. *Accounting and Business Research* 52 (6), 601-630.

Barker, R. and S. Penman. 2020. Moving the Conceptual Framework Forward: Accounting for Uncertainty. *Contemporary Accounting Research* 37 (1), 322-375.

Beaver, W., P. Kettler, and M. Scholes. 1970. The Association between Market Determined and Accounting Determined Risk Measures. *The Accounting Review* 45(4), 654-682.

Casey, R., F. Gao, M. Kirschenheiter, S. Li, and S. Pandit. 2016. Do Compustat Financial Statement Data Articulate? *Journal of Financial Reporting* 1 (1), 37-59.

Chang, W., S. Monahan, A. Ouazad, and F. Vasvari. 2021. The Higher Moments of Future Earnings. *The Accounting Review* 96(1), 91-116.

Ellahie, A. 2021. Earnings Beta. *Review of Accounting Studies* 26 (1), 81-122.

Enache, L. and A. Srivastava. 2018. Should Intangible Investments Be Reported Separately or Comingled with Operating Expenses? New Evidence. *Management Science* 64 (7), 3446-3468.

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., J. Whisenant, and T. Yohn. 2003. Accrued Earnings and Growth: Implications for Future Profitability and Market Mispricing. *The Accounting Review* 78(1), 353-371.

Fama, E. 1977. Risk Adjusted Discount Rates and Capital Budgeting under Uncertainty. *Journal of Financial Economics* 5(1), 3-24.

Fama, E., and K. French. 1992. The Cross-section of Expected Stock Returns. *Journal of Finance* 47(2), 417-465.

Fama, E. and M. Miller. 1972. *The Theory of Finance*. New York: Holt, Rinehart, and Winston.

Johnstone, D. 2016. The Effect of Information on Uncertainty and the Cost of Capital. *Contemporary Accounting Research* 33 (2), 752-774.

Konstantinidi, T. and P. Pope. 2016. Forecasting Risk in Earnings. *Contemporary Accounting Research* 33(2), 487-525.

Kovacs, E. 2004. The Future Benefits in Selling, General and Administrative Expenses. PhD dissertation, Columbia University.

Lambert, R., C. Leuz, and R. Verrecchia. 2007. Accounting Information, Disclosure, and the Cost of Capital. *Journal of Accounting Research* 45 (2), 385-420.

Lev, B. 2001. *Intangibles: Management, Measurement, and Reporting*. Washington, D.C.: Brookings Institution Press.

Lev, B. 2019. Ending the Accounting-for-Intangibles Status Quo. *European Accounting Review* 28 (4), 713-736.

Lev, B. and F. Gu. 2016. *The end of accounting and the path forward for investors and managers*. Hoboken, NJ: Wiley & Sons.

Lev, B. and T. Sougiannis. 1996. The Capitalization, Amortization, and Value Relevance of R&D. *Journal of Accounting and Economics* 21(1), 107-138.

Lev, B., and P. Zarowin. 1999. The Boundaries of Financial Reporting and how to Extend Them. *Journal of Accounting Research* 37 (2), 353-385.

Lintner, J. 1969. The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets: A Reply. *The Review of Economics and Statistics* 51(2), 222-224.

Lintner, J. 1970. The Market Price of Risk, Size of Market and Investor's Risk Aversion. *The Review of Economics and Statistics* 52 (1), 87-99.

Modigliani, F. and M. Miller. 1958. The Cost of Capital, Corporate Finance, and the Theory of Investment. *American Economic Review* 48(3), 261-297.

Nekrasov, A. and P. Shroff. 2009. Fundamentals-based Risk Management in Valuation. *The Accounting Review* 84(6), 1983-2011.

Nissim, D. and S. Penman. 2001. Ratio Analysis and Equity Valuation: From Research to Practice. *Review of Accounting Studies* 6(1), 109-154.

Nissim, D. and S. Penman. 2003. Financial Statement Analysis of Leverage and How it Informs about Profitability and Price-to-Book Ratios. *Review of Accounting Studies* 8 (4), 531-560.

Ohlson, J. 1995. Earnings, Book Values, and Dividends in Equity Valuation. *Contemporary Accounting Research* 11(2), 661-687.

Peasnell, K. 1982. Some Formal Connections Between Economic Values and Yields and Accounting Numbers. *Journal of Business Finance and Accounting* 9, 361-381.

Penman S. 2021. Accounting for Risk. *Foundations and Trends in Accounting* 15(4), 374-507.

Penman, S. and N. Yehuda. 2019. A Matter of Principle: The Identification of Cash-flow News and Discount-rate News in Financial Statements. *Management Science* 65 (12), 5584-5602.

Penman, S. and X. Zhang. 2020. A Theoretical Analysis Connecting Conservative Accounting to the Cost of Capital. *Journal of Accounting and Economics* 69 (1), 1-25.

Penman, S., and X. Zhang. 2021. Connecting Book Rate of Return to Risk and Return: The Information Conveyed by Conservative Accounting. *Review of Accounting Studies* 26 (1), 391-423.

Peters, R., and L. Taylor. 2017. Intangible Capital and the Investment-*q* Relation. *Journal of Financial Economics* 123(2), 251-272.

Rosenberg, B. and W. McKibben. 1973. The Prediction of Systematic and Specific Risk in Common Stocks. *Journal of Financial and Quantitative Analysis* 8(2), 317-333.

Shumway, T., 1997. The Delisting Bias in CRSP data. *The Journal of Finance* 52(1), 327 – 340.

Soliman, M. 2008. The Use of Du Pont Analysis by Market Participants. *The Accounting Review* 83 (3), 823-853.

Srivastava, A. 2014. Why Have Measures of Earnings Quality Changed Over Time? *Journal of Accounting and Economics* 57 (2-3), 196-217.

Wahlen, J. and M. Wieland. 2011. Can Financial Statement Analysis Beat Consensus Analysts' Recommendations? *Review of Accounting Studies* 16 (1), 89-115.

Figure 1a. Median Return on Net Operating Assets (RNOA) and Matched Profit Margin (MPM), 1976-2017

The numbers on the left-hand side axis are Matched Profit Margin (MPM); the numbers on the right-hand axis are RNOA. Average Matched Profit Margin is the series average.

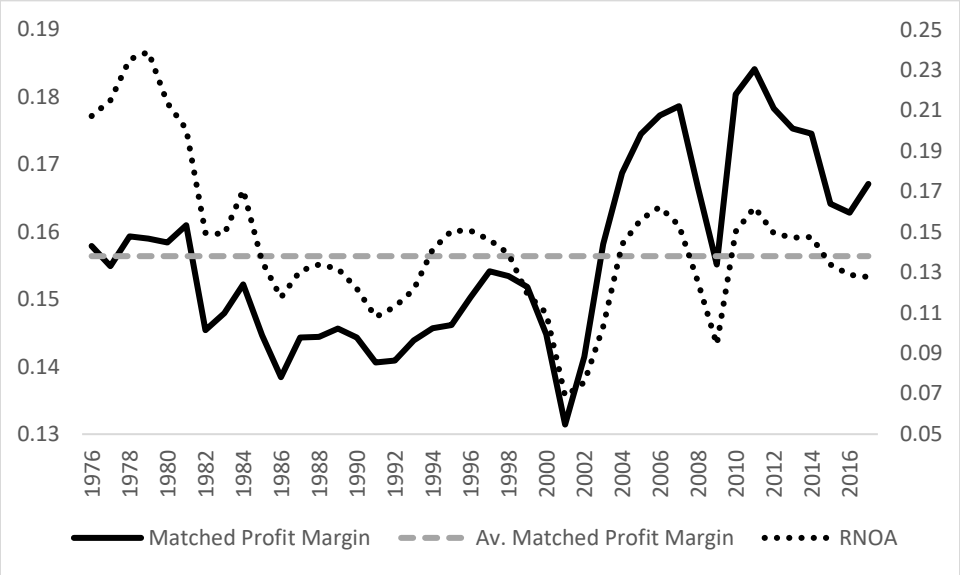

Figure 1b. Median Return on Net Operating Assets (RNOA) and Mismatching Multiplier (MMULT), 1976-2017

The numbers on the left-hand side axis are the Mismatching Multiplier (MMULT); the numbers on the right-hand axis are RNOA. Average Mismatching Multiplier is the series average. Low values of the Mismatching Multiplier mean larger fractions of matched profit are in expensed investments.

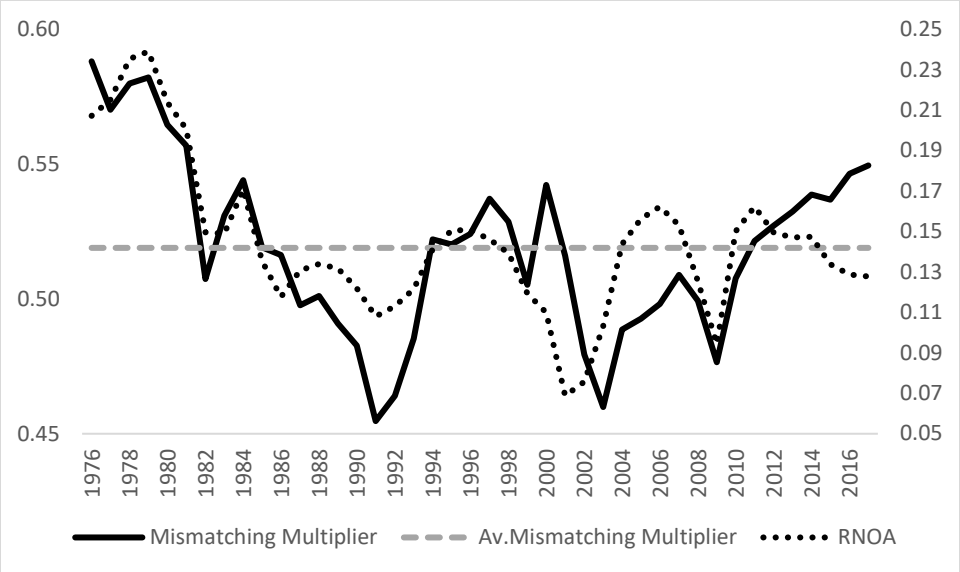

Figure 1c. Median Return on Net Operating Assets (RNOA) and Asset Turnover (ATO), 1976-2017

The numbers on the left-hand side axis are ATO; the numbers on the right-hand axis are RNOA. Average ATO is the series average.

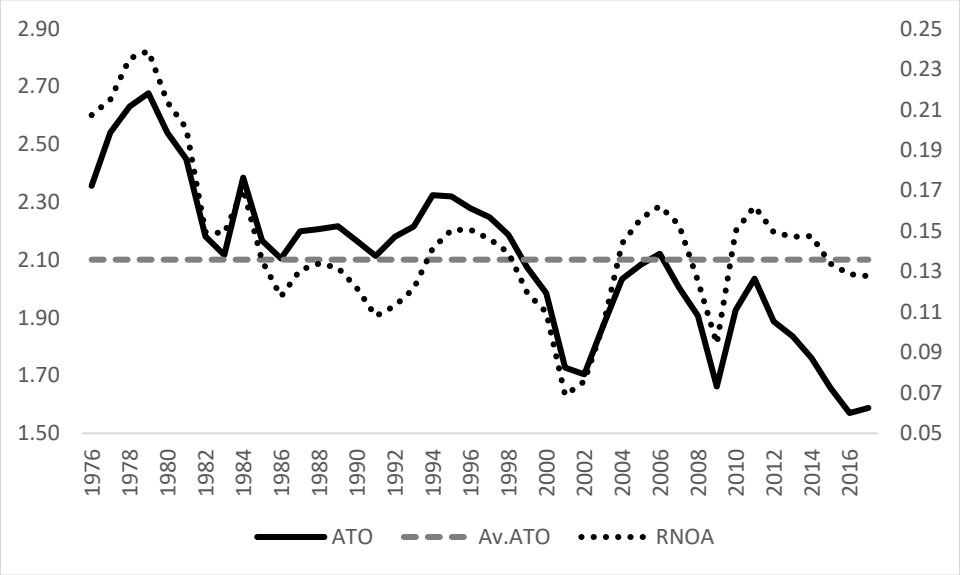

Figure 1d. Median Mismatched Expenses/Sales and Mismatching Multiplier (MMULT), 1976-2017

The numbers on the left-hand side axis are Mismatched Expense (MEXP) to sales; the numbers on the right-hand axis are the Mismatching Multiplier (MMULT). MEXP relative to matched profit decreases the multiplier.

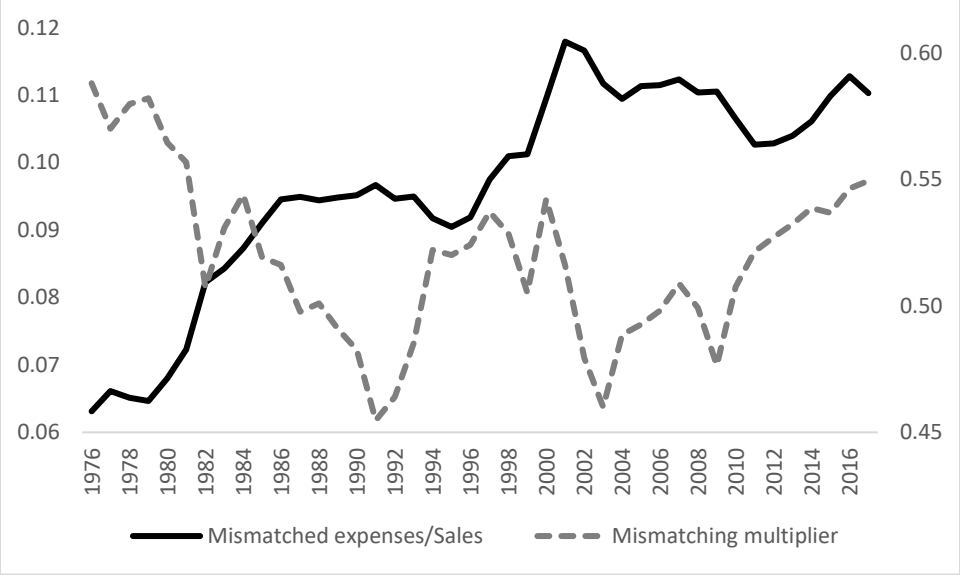

Figure 2. Portfolio Formation for the Empirical Tests

The portfolio formation each year sorts on the three financial statement variables entering the decomposition in equation labelled (FSA) in the text. The Level 1 sort is on matched profit margin (MPM) (not depicted), with the Level 2 sort then on asset turnover (ATO) within each Level 1 MPM portfolio. Level 3 sorts these portfolios on the degree of mismatching measured by the Mismatching Multiplier (MMULT). The final panel in the table is a sort on MMULT within each MPM-ATO portfolio in the Level 2 sort. For each sort, the High (Low) portfolio is the highest (lowest) 30% from a ranking on the measure, with the remaining 40% being Medium.

LEVEL 2: MPM*ATO Portfolios

	Low MPM		High MPM
Low ATO	11	21	31
	12	22	32
High ATO	13	23	33

LEVEL 3: MPM*ATO*MISMATCHING Portfolios

Low Mismatching

	Low MPM		High MPM
Low ATO	111	211	311
	121	221	321
High ATO	131	231	331

Medium Mismatching

	Low MPM		High MPM
Low ATO	112	212	312
	122	222	322
High ATO	132	232	332

High Mismatching

	Low MPM		High MPM
Low ATO	113	213	313
	123	223	323
High ATO	133	233	333

High Mismatching versus Low Mismatching within MPM-ATO Portfolios

	Low MPM		High MPM
Low ATO	113-111	213-211	313-311
	123-121	223-221	323-321
High ATO	133-131	233-231	333-331

Table 1

Summary Statistics for Financial Statement Variables in the Analysis

The statistics are for annual numbers from data pooled over years, 1976-2017. Refer to the Appendix for definition of variables which are before tax. The table excludes observations with negative lagged NOA (the denominator of RNOA). The percentage of firms with negative lagged net operating assets (NOA) ranges from less than 1% of the sample in 1976 to 11% in 2017. The Mismatching Multiplier (MMULT) excludes observations with negative Matched Profit Margin (MPM). Variables are winsorized at 2% and 98% percentiles each year.

Panel A: Distribution of Variables

SD is standard deviation. Q25 and Q75 are the 25th and 75th percentiles.

	Mean	SD	Q25	Median	Q75
RNOA	0.011	0.897	0.008	0.143	0.279
Matched Profit margin (MPM)	0.096	0.434	0.082	0.154	0.245
Asset Turnover (ATO)	3.082	3.092	1.345	2.216	3.568
Mismatching Multiplier (MMULT)	0.261	0.923	0.234	0.474	0.665
Operating Profit Margin (OPM)	-0.110	0.848	0.004	0.063	0.122
Mismatched Expense (MEXP)/Sales	0.190	0.421	0.048	0.091	0.171
Q-matched Expenses (QMEXP)/Sales	0.093	0.091	0.038	0.071	0.115

Panel B: Cross-sectional Correlations Between Variables

Spearman correlations are above the diagonal and Pearson correlations below the diagonal.

	RNOA	MPM	ATO	MMULT	OPM	MEXP/ Sales	QMEXP/ Sales
RNOA		0.44	0.36	0.60	0.74	-0.15	-0.14
MPM	0.22		-0.19	0.17	0.66	0.52	0.39
ATO	0.10	-0.08		-0.15	-0.21	0.01	0.03
MMULT	0.52	0.23	-0.03		0.76	-0.67	-0.61
OPM	0.59	0.24	-0.06	0.57		-0.16	-0.16
MEXP/Sales	-0.48	0.36	0.03	-0.47	-0.75		0.84
QMEXP/Sales	-0.15	0.33	0.04	-0.35	-0.13	0.39	

Table 2

Spearman Correlation Between Matched Profit Margin (MPM) and Asset Turnover (ATO) within Level 2 MPM-ATO Portfolios

The table reports mean cross-sectional Spearman correlations over years, 1976-2017 between MPM and ATO within MPM and ATO portfolios in the Level 2 decomposition in Figure 2. The table excludes observations with negative lagged NOA (the denominator of ATO) and negative Matched Profit Margin (MPM). The notations *,**, and *** indicate statistical significance at 10%, 5%, and 1% confidence levels. Variables are defined in the Appendix.

	Low MPM		High MPM
Low ATO	0.110***	-0.068***	-0.173***
	-0.016*	-0.023***	0.004
High ATO	-0.176***	-0.018*	0.130***

Table 3

Mean Future Matched Profit for Portfolios Formed on Financial Statement Variables

Panel A of the table reports the mean of yearly medians of matched profitability payoffs over the subsequent four years for portfolios formed on financial statement variables in each year, 1976-2017. Portfolios are those in Figure 2, as indicated in the panel headings. The degree of mismatching in Level 3 is measured by the mismatching multiplier (MMULT). Panel B reports differences for the two components of the payoffs, future matched profit margin and assets turnover for the same portfolios. In each portfolio, the High (Low) portfolio is the highest (lowest) 30% from a ranking on the measure, with the remaining 40% being Medium. Variables and their acronyms are defined in the Appendix. The portfolio payoff variable on the left-hand side of Panel A is the sum of future Matched Profit plus free cash flow (FCF) reinvested at the risk-free rate, cumulated over T=4 years after year t for which the financial statement variables are observed, scaled by NOA_t:

$$\frac{\sum_{\tau=1}^{4} Matched\ Profit_{t+\tau} + ((1+r)^{4-\tau}-1)FCF_{t+\tau}}{NOA_t}$$

The payoff variable on the right-hand side of the table drops FCF:

$$\frac{\sum_{\tau=1}^{4} Matched\ Profit_{t+\tau}}{NOA_t}$$

The matched profit margin and asset turnover payoffs in Panel B are calculated as in the panel headings. With NOA in the denominator of the payoff variables, observations with negative NOA_t are excluded from the tests, as are firms with negative MPM_t as MMULT is not defined in that case. The z-statistics are the means of the yearly medians relative to bootstrapped standard errors of the means. The notations *,**, and *** indicate statistical significance at 10%, 5%, and 1% confidence levels for one-tailed tests.

Panel A: Mean Matched Profit Payoffs for Portfolios

$\sum_{\tau=1}^{4}(\ Matched\ Profit_{t+\tau} + Reinvested\ FCF)$ $\sum_{\tau=1}^{4}(Matched\ Profit_{t+\tau})$

LEVEL 2: MPM*ATO Portfolios

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.678	0.955	1.182	Low ATO	0.651	0.928	1.161
	1.147	1.663	2.817		1.124	1.628	2.765
High ATO	2.106	2.987	6.276	High ATO	2.084	2.952	6.230

(High MPM and ATO) – (Low MPM and ATO)

5.598*** $z = 24.48$	5.579*** $z = 23.59$

LEVEL 3: MPM*ATO*MISMATCHING Portfolios

Low Mismatching

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.639	0.776	0.796	Low ATO	0.609	0.752	0.788
	1.041	1.513	2.587		1.015	1.468	2.509
High ATO	1.806	2.765	6.111	High ATO	1.775	2.700	5.925

Medium Mismatching

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.722	1.020	1.249	Low ATO	0.686	0.990	1.225
	1.204	1.712	2.935		1.170	1.669	2.885
High ATO	2.267	3.009	6.349	High ATO	2.246	2.975	6.295

High Mismatching

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.695	1.107	1.612	Low ATO	0.698	1.089	1.606
	1.248	1.808	2.895		1.235	1.793	2.897
High ATO	2.269	3.408	6.834	High ATO	2.310	3.424	6.984

(High MPM/ATO/Mismatching) – (Low MPM/ATO/Mismatching)

6.195*** $z = 3.26$	6.376*** $z = 15.12$

High Mismatching versus Low Mismatching within MPM-ATO Portfolios

$\sum_{\tau=1}^{4}(\ Matched\ Profit_{t+\tau} + Reinvested\ FCF)$ $\sum_{\tau=1}^{4}(Matched\ Profit_{t+\tau})$

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.056**	0.331***	0.816***	Low ATO	0.090***	0.337***	0.818***
	0.207***	0.296***	0.308***		0.219***	0.325***	0.388***
High ATO	0.464***	0.644***	0.723*	High ATO	0.535***	0.724***	1.059**

Panel B: Median Matched Profit Margin and Asset Turnover Components of Payoffs

$\frac{\sum_{\tau=1}^{4} Matched\ Profit_{t+\tau}}{\sum_{\tau=1}^{4} Sales_{t+\tau}}$ $\frac{\sum_{\tau=1}^{4} Sales_{t+\tau}}{NOA_t}$

(High MPM/ATO) – (Low MPM/ATO)

0.216*** z = 33.30	12.423*** z =25.23

(High MPM/ATO/Mismatching) – (Low MPM/ATO/Mismatching)

0.226*** z = 30.44	14.762*** z = 16.88

High Mismatching versus Low Mismatching within MPM-ATO Portfolios

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.016***	0.029***	0.032***	Low ATO	-0.129	1.169***	2.405***
	0.015***	0.028***	0.021**		0.270	0.478*	0.821***
High ATO	0.020***	0.023***	0.008	High ATO	0.094	1.955***	2.995***

Table 4

Results from Cross-sectional Regressions Explaining Future Profitability with Financial Statement Variables

The table report the results of regressions each year, 1976-2017 explaining future profitability, $\sum_{\tau=1}^{4} \frac{Matched\ Profit_{t+\tau}}{NOA_t}$. Variables are defined in the appendix. Reported coefficients are means over years with standard errors for t-statistics estimated from the time series of estimated coefficients. Those t-statistics are in parentheses under the mean coefficient estimates. The notations *,**, and *** indicate statistical significance at 10%, 5%, and 1% confidence levels. R^2 is also the mean over years. Observations with negative NOA_t, negative NOA_{t-1} and negative matched profit margin, MPM_t are excluded from the analysis. Variables are winsorized at 2% and 98% percentiles each year.

MPM	1.820***	0.654**	0.713**	0.654**	0.754***
	(5.71)	(2.28)	(2.57)	(2.35)	(2.79)
ATO	0.071***	0.100***	0.103***	0.104***	0.111***
	(4.90)	(6.89)	(6.72)	(7.89)	(7.38)
MPM*ATO	3.031***	2.787***	2.771***	2.638***	2.311***
	(17.34)	(16.75)	(16.34)	(21.27)	(12.52)
MEXP/Sales		4.532***		3.969***	
		(23.65)		(17.95)	
QMEXP/Sales			5.914***		3.249***
			(10.47)		(11.80)
R&D/Sales			4.189***		4.399***
			(7.25)		(9.33)
MPM*ATO*MEXP/Sales				1.165**	
				(2.41)	
MPM*ATO*QMEXP/Sales					4.334***
					(5.14)
MPM*ATO*R&D/Sales					0.049
					(0.08)
Intercept	0.212***	0.002	-0.094**	0.051	0.100**
	(5.56)	(0.05)	(-2.16)	(1.14)	(2.35)
Observations	83,880	83,880	83,880	83,880	83,880
Average R^2	0.53	0.54	0.55	0.55	0.55

Table 5

Variation of Future Matched Profit within MPM-ATO and Mismatched Investment Portfolios

Panels A-D report mean differences over years, 1976-2017 in measures of dispersion of future matched profitability between high and low mismatched expenses for portfolios in Panel A of Table 3. Panel E reports the Inter-decile range for realizations of the two components of matched profitability, future matched profit margin and asset turnover in Panel B of Table 3. The degree of mismatching is measured by the mismatching multiplier (MMULT). Observations with negative NOA_t and negative matched profit are excluded from the analysis. The notations *,**, and *** indicate statistical significance at 10%, 5%, and 1% confidence levels for one-tail tests.

The inter-decile Range (IDR) = $\frac{Q_{90}-Q_{10}}{Q_{50}}$ and the inter-quartile range (IQR) = $\frac{Q_{75}-Q_{25}}{Q_{50}}$ where Q refers to percentiles of the distribution. Note that both statistics are normalised by a measure of central tendency, that is the median of the observations in each portfolio to enable comparisons. Thus, the dispersion is a percentage of the portfolio median.

Kurtosis is the Moors measure = $\frac{(Q_{87.5}-Q_{62.5})+(Q_{37.5}-Q_{12.5})}{(Q_{75}-Q_{25})}$. The terms (Q37.5–Q12.5) and (Q87.5–Q62.5) are large (small) if relatively little large (small) probability mass is concentrated in the neighbourhood of Q_{25} and Q_{75}, corresponding to large (small) dispersion high(low) dispersion is concentrated in the neighbourhood of Q_{25} and Q_{75} . The denominator is a scaling factor ensuring that the statistic is invariant under linear transformation. The Moors coefficient of kurtosis for the normal distribution is 1.23.

The Bowley skewness metric = $\frac{Q_{75}+Q_{25}-2*Q_{50}}{Q_{75}-Q_{25}}$ which equals 0 for a symmetric distribution.The denominator scales the coefficient so that the maximum is 1 (extreme right skewness) and minimum value is -1 (extreme left skewness).

Panel A: Inter-decile Range (IDR)

$\sum_{\tau=1}^{4}(Matched\ Profit_{t+\tau} + Reinvested\ FCF)$ $\sum_{\tau=1}^{4}(Matched\ Profit_{t+\tau})$

(High MPM/ATO) – (Low MPM/ATO)

1.257*** z = 6.92	1.142*** z = 6.19

(High MPM/ATO/Mismatching) – (Low MPM/ATO/Mismatching)

5.489*** z = 3.26	5.096*** z = 3.13

High Mismatching versus Low Mismatching within MPM-ATO Portfolios

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	2.387***	0.195**	-0.862***	Low ATO	2.119***	0.162*	-0.869***
	1.087***	0.308***	0.175*		1.201***	0.323***	0.145*
High ATO	3.035***	1.232***	3.999***	High ATO	2.968***	1.255***	3.725**

Panel B: Inter-quartile Range (IQR)

$\sum_{\tau=1}^{4}(\ Matched\ Profit_{t+\tau} + Reinvested\ FCF)$ $\sum_{\tau=1}^{4}(Matched\ Profit_{t+\tau})$

(High MPM/ATO) – (Low MPM/ATO)

0.242*** $z = 4.55$	0.188*** $z = 3.54$

(High MPM/ATO/Mismatching) – (Low MPM/ATO/Mismatching)

0.827*** $z = 7.55$	0.743*** $z = 7.35$

High Mismatching versus Low Mismatching within MPM-ATO Portfolios

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.865***	0.072*	-0.506***	Low ATO	0.830***	0.026	-0.537***
	0.353***	0.089***	0.021		0.403***	0.095***	0.021
High ATO	0.476***	0.279***	0.397***	High ATO	0.462***	0.281***	0.382***

Panel C: Moors Kurtosis

$\sum_{\tau=1}^{4}(\ Matched\ Profit_{t+\tau} + Reinvested\ FCF)$ $\sum_{\tau=1}^{4}(Matched\ Profit_{t+\tau})$

(High MPM/ATO) – (Low MPM/ATO)

0.287*** $z = 4.85$	0.312*** $z = 5.92$

(High MPM/ATO/Mismatching) – (Low MPM/ATO/Mismatching)

0.770*** $z = 3.30$	0.792*** $z = 3.39$

High Mismatching versus Low Mismatching within MPM-ATO Portfolios

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.074	0.071	0.042	Low ATO	0.084	0.122**	0.127*
	0.165***	0.106**	0.053		0.197***	0.106**	0.081
High ATO	0.398**	0.353**	0.436**	High ATO	0.426**	0.371**	0.430**

Panel D: Bowley Skewness

$\sum_{\tau=1}^{4}(\ Matched\ Profit_{t+\tau} + Reinvested\ FCF)$ $\sum_{\tau=1}^{4}(Matched\ Profit_{t+\tau})$

(High MPM/ATO) – (Low MPM/ATO)

0.226*** z = 9.12	0.213*** z = 9.26

(High MPM/ATO/Mismatching) – (Low MPM/ATO/Mismatching)

0.288*** z = 7.96	0.283*** z = 7.42

High Mismatching versus Low Mismatching within MPM-ATO Portfolios

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.093**	-0.043	0.010	Low ATO	0.086**	-0.045	0.020
	0.040	0.029	0.023		0.071**	0.034	0.023
High ATO	0.011	0.078**	0.053*	High ATO	-0.005	0.072**	0.045

Panel E: Inter-decile Range (IDR) for Matched Profit Margin and Asset Turnover Payoffs

$\frac{\sum_{\tau=1}^{4} Matched\ Profit_{t+\tau}}{\sum_{\tau=1}^{4} Sales_{t+\tau}}$ $\frac{\sum_{\tau=1}^{4} Sales_{t+\tau}}{NOA_t}$

(High MPM/ATO) – (Low MPM/ATO)

-0.752*** z = -11.72	1.548*** z= 8.27

(High MPM/ATO/Mismatching) – (Low MPM/ATO/Mismatching)

0.085 z = 0.38	4.066*** z= 3.15

High Mismatching versus Low Mismatching within MPM-ATO Portfolios

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	1.494***	-0.172*	-0.692***	Low ATO	0.620***	0.005	-0.280***
	0.644***	0.015	-0.063**		0.445***	0.179***	0.215***
High ATO	0.673***	0.198***	0.401**	High ATO	0.660***	1.129***	2.699**

Table 6

Downside Risk and Upside Potential Indicated by Financial Statement Variables

The table reports mean differences over years, 1976-2021 of the upside (Panel A) and downside (Panel B) matched profitability outcomes for the portfolios in Panel A of Table 3. Upside (potential) is the upper component of the kurtosis measure in Table 5 and downside (risk) is the lower component of the kurtosis. For the normal distribution, the measure is 0.62. Mismatching is measured by the mismatching multiplier (MMULT). The notations *,**, and *** indicate statistical significance at 10%, 5%, and 1% confidence levels for one-tail tests.

Panel A: Upside Potential

$\sum_{\tau=1}^{4}(Matched\ Profit_{t+\tau} + Reinvested\ FCF)$ $\sum_{\tau=1}^{4}(Matched\ Profit_{t+\tau})$

(High MPM/ATO) – (Low MPM/ATO)

0.526*** z = 8.95	0.529*** z = 9.78

(High MPM/ATO/Mismatching) – (Low MPM/ATO/Mismatching)

1.038*** z = 4.57	1.056*** z = 4.63

High Mismatching versus Low Mismatching within MPM-ATO Portfolios

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.104*	0.079*	0.015	Low ATO	0.143**	0.111**	0.100
	0.162***	0.136***	0.068		0.221***	0.144***	0.092*
High ATO	0.364**	0.376**	0.461**	High ATO	0.418**	0.395**	0.464**

Panel B: Downside Risk

$\sum_{\tau=1}^{4}(Matched\ Profit_{t+\tau} + Reinvested\ FCF)$ $\sum_{\tau=1}^{4}(Matched\ Profit_{t+\tau})$

(High MPM/ATO) – (Low MPM/ATO)

-0.240*** z = -12.29	-0.217*** z = -11.27

(High MPM/ATO/Mismatching) – (Low MPM/ATO/Mismatching)

-0.268*** z = -6.44	-0.265*** z = -6.46

High Mismatching versus Low Mismatching within MPM-ATO Portfolios

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	-0.030	-0.008	0.027	Low ATO	-0.059**	0.012	0.028
	0.003	-0.031	-0.016		-0.025	-0.037	-0.012
High ATO	0.035	-0.022	-0.025	High ATO	0.008	-0.025	-0.034

Table 7

Results from Cross-sectional Regressions Explaining the Variation of Future Profitability with Financial Statement Variables

The table reports the results of regressions each year, 1976-2017 explaining the variation of future profitability in the four years ahead. The outcome variable is the IQR of $\frac{Matched\ Profit_{t+\tau}}{NOA_t}$ for τ = 1, 2, 3, and 4. Financial statement explanatory variables are the same as those in Table 4. Reported coefficients are means over years with standard errors for t-statistics estimated from the time series of estimated coefficients. Those t-statistics are in parentheses under the mean coefficient estimates. The notations *,**, and *** indicate statistical significance at 10%, 5%, and 1% confidence levels. R^2 is also the mean over years. Observations with negative NOA_t, negative NOA_{t-1} and negative matched profit margin, MPM_t are excluded from the analysis. Variables are winsorized at 2% and 98% percentiles each year.

MPM	0.096**	-0.201***	-0.196***	-0.182***	-0.200***
	(2.64)	(-4.29)	(-4.51)	(-4.22)	(-4.70)
ATO	0.009***	0.016***	0.015***	0.019***	0.018***
	(4.64)	(6.12)	(5.86)	(6.85)	(6.71)
MPM*ATO	0.318***	0.263***	0.270***	0.156***	0.198***
	(16.95)	(16.11)	(16.83)	(8.95)	(8.30)
MEXP/Sales		1.051***		0.679***	
		(8.32)		(5.56)	
QMEXP/Sales			0.463***		0.515***
			(5.00)		(4.48)
R&D/Sales			1.619***		0.788***
			(9.63)		(5.10)
MPM*ATO*MEXP/Sales				0.576***	
				(8.88)	
MPM*ATO*QMEXP/Sales					0.135
					(0.96)
MPM*ATO*R&D/Sales					1.125***
					(5.73)
Intercept	0.058***	0.010	0.038***	0.050***	0.057***
	(9.14)	(1.18)	(5.42)	(6.43)	(7.25)
Observations	83,880	83,880	83,880	83,880	83,880
Average R^2	0.27	0.31	0.32	0.32	0.33

Table 8

Forward Annual Stock Returns for Portfolios Formed on Financial Statement Variables

Panel A reports mean forward returns over the years, 1976-2017 for Level 1 and Level 2 portfolios in Figure 2 and Panel A of Table 3. Forward returns are annual buy-and-hold returns beginning three months after the fiscal-year end for the year for which the analysis variables are reported. The returns have an accommodation for firms that do not survive the full year, as explained in the appendix. Panel B reports the differences in returns between high and low mismatching within MPM-ATO portfolios. Firms with negative matched profit are omitted. The analysis involves 122,458 firm-year observations. The t-statistics are the yearly means relative to standard errors estimated from the time series of means with a Newey-West correction at three lags. The notations *,**, and *** indicate statistical significance at 10%, 5%, and 1% confidence levels for one-tailed tests.

Panel A: Forward Returns for MPM and ATO Portfolios

LEVEL 2: MPM*ATO Portfolios

	Low MPM		High MPM
Low ATO	0.178	0.178	0.175
	0.171	0.183	0.188
High ATO	0.178	0.186	0.217

(High MPM/ATO) – (Low MPM/ATO)

0.039 $t = 0.86$

LEVEL 3: MPM*ATO*MISMATCHING

Low Mismatching

	Low MPM		High MPM
Low ATO	0.169	0.160	0.147
	0.171	0.150	0.139
High ATO	0.174	0.157	0.175

Medium Mismatching

	Low MPM		High MPM
Low ATO	0.165	0.175	0.174
	0.194	0.182	0.185
High ATO	0.192	0.176	0.216

High Mismatching

	Low MPM		High MPM
Low ATO	0.202	0.201	0.205
	0.139	0.217	0.239
High ATO	0.163	0.227	0.260

(High MPM/ATO/Mismatching) – (Low MPM/ATO/Mismatching)

0.091** $t = 1.71$

Panel B: Forward Returns Differences between High Mismatching and Low Mismatching within MPM-ATO Portfolios

	Low MPM		High MPM
Low ATO	0.032	0.041	0.057
	-0.032	0.066**	0.100***
High ATO	-0.012	0.070*	0.085*

Table 9

Results from Cross-sectional Regressions Predicting Forward Annual Returns with Financial Statement Variables

Panel A reports the results of cross-sectional regressions each year, 1976-2017 of forward returns on the same financial statement variables as those in Tables 4 and 8. In Panel B, the standard deviation of monthly returns over the forward year is regressed on those same variables. Observations with negative NOA_{t-1} and negative matched profit are omitted. In Panel C, forward returns are regressed on financial statement variables denominated by price. Regression coefficients are means over years with standard errors for t-statistics calculated as the mean relative to the estimated standard error calculated from the time series of estimated coefficients using a Newy-West correction at three lags. The t-statics are in parentheses under the mean coefficients. The notations *,**, and *** indicate statistical significance at 10%, 5%, and 1% confidence levels. Variables are winsorized at 2% and 98% percentiles each year.

Panel A: Forward Returns on Financial Statement Variables

MPM	0.022	-0.057	-0.059	-0.054	-0.049
	(0.28)	(-0.73)	(-0.76)	(-0.70)	(-0.67)
ATO	-0.000	0.001	0.001	0.001	0.001
	(-0.17)	(0.44)	(0.47)	(0.67)	(0.67)
MPM*ATO	0.018	0.004	0.004	-0.010	-0.025
	(1.30)	(0.29)	(0.26)	(-0.61)	(-1.34)
MEXP/Sales		0.251*		0.203	
		(1.99)		(1.44)	
QMEXP/Sales			0.154		-0.057
			(1.37)		(-0.46)
R&D/Sales			0.423*		0.660**
			(1.91)		(2.65)
MPM*ATO*MEXP/Sales				0.082*	
				(1.89)	
MPM*ATO*QMEXP/Sales					0.329***
					(3.34)
MPM*ATO*R&D/Sales					-0.320*
					(-1.74)
Intercept	0.170***	0.159***	0.163***	0.164***	0.175***
	(5.39)	(5.18)	(5.81)	(5.05)	(5.68)
Observations, all years	119,089	119,089	119,089	119,089	119,089
Average R^2	0.01	0.02	0.02	0.02	0.02

Panel B: Forward Return Volatility on Financial Statement Variables

MPM	-0.096***	-0.160***	-0.156***	-0.159***	-0.157***
	(-7.75)	(-8.32)	(-8.42)	(-8.23)	(-8.43)
ATO	-0.001***	0.000	0.000	0.000*	0.000**
	(-3.73)	(1.23)	(1.34)	(1.69)	(2.02)
MPM*ATO	0.013***	-0.001	-0.001	-0.002	0.002
	(4.46)	(-0.26)	(-0.28)	(-0.85)	(0.93)
MEXP/Sales		0.248***		0.245***	
		(10.29)		(8.87)	
QMEXP/Sales			0.275***		0.339***
			(10.01)		(10.13)
R&D/Sales			0.257***		0.156***
			(8.47)		(5.15)
MPM*ATO*MEXP/Sales				0.005	
				(0.60)	
MPM*ATO*QMEXP/Sales					-0.084***
					(-4.87)
MPM*ATO*R&D/Sales					0.135***
					(3.53)
Intercept	0.150***	0.136***	0.134***	0.137***	0.131***
	(21.08)	(21.55)	(22.33)	(21.89)	(21.67)
Observations, all years	119,089	119,089	119,089	119,089	119,089
Average R^2	0.02	0.08	0.08	0.08	0.08

Panel C: Forward Returns on Price-denominated Financial Statement Variables

OI/P^{NOA}	0.252***	0.359***	0.399***
	(2.90)	(4.84)	(5.57)
$MEXP/P^{NOA}$		0.204***	
		(4.25)	
$QMEXP/ P^{NOA}$			0.112***
			(2.91)
$R\&D/P^{NOA}$			0.620***
			(4.66)
NOA Investment/P^{NOA}		-0.084*	-0.075*
		(-1.85)	(-1.72)
NOA/P^{NOA}	0.045*	0.017	0.028
	(1.94)	(0.83)	(1.46)
Intercept	0.102***	0.089***	0.078***
	(4.21)	(3.63)	(3.25)
Observations, all years	119,089	119,089	119,089
Average R^2	0.03	0.04	0.04

Table 10

Differences in Return Betas and Fundamental Earnings Betas between High and Low Mismatched Expenses within MPM-ATO Portfolios

Panel A reports differences in return betas and Panel B differences in earnings betas within MPM-ATO portfolios. Return betas are estimated with time series regressions of annual returns over the entire sample period for portfolios reformed each March 31, 1977-2018 on the CRSP value-weighted return index. Earnings betas are also estimated for the same annual periods with the following time-series regression:

$$Portfolio\ \frac{Matched\ Profit_{t+1}}{P_t^{NOA}} = \alpha + \beta Market \frac{Matched\ Profit_{t+1}}{P_t^{NOA}}$$

For both panels, only firms with December 31 fiscal years were included in order to align returns in calendar time. Earnings beta regressions reject the top and bottom 2% of observations. The notations, *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level for one-sided tests. The statistics for these confidence levels are based on Newey-West standard errors using six (three) lags in tests using monthly returns (annual earnings multiples).

Panel A: Return Betas

(High MPM/ATO) – (Low MPM/ATO)

0.128* t = 1.56

(High MPM/ATO/Mismatching) – (Low MPM/ATO/Mismatching)

0.287*** t = 2.89

Return Beta Differences between High Mismatching and Low Mismatching within MPM-ATO Portfolios

	Low MPM		High MPM
Low ATO	0.175**	0.145*	0.131*
	0.157**	0.044	0.182***
High ATO	0.151**	0.222***	0.186**

Panel B: Earnings betas

(High MPM/ATO) – (Low MPM/ATO)

0.749*** t = 2.87

(High MPM/ATO/Mismatching) – (Low MPM/ATO/Mismatching)

1.438*** t = 6.13

Earnings Betas differences between High Mismatching versus Low Mismatching within MPM-ATO Portfolios

	Low MPM		High MPM
Low ATO	-0.105	0.294*	0.320**
	0.108	0.242	0.644***
High ATO	1.631***	1.128***	0.907***

Table 11

Delisting Frequency in Portfolios Formed on Financial Statement Analysis Variables

For the analysis portfolios in Figure 2, the table reports the frequency in percent of delisting due to poor performance and acquisition among missing observations at t+1. Delisting due to poor performance is given by CRSP delisting code 500 or 520-584. Acquisition is given by CRSP delisting codes 300-350. The statistical significance is assessed using tests of proportions. The notations, *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels for a one-tail test.

Panel A: Delisting Percentages for MPM-ATO Portfolios

Delisting Due to Bad Performance **Delisting Due to Acquisitions**

LEVEL 2: MPM*ATO Portfolios

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.482	0.234	0.161	Low ATO	0.456	0.686	0.745
	0.417	0.174	0.123		0.502	0.739	0.820
High ATO	0.385	0.241	0.148	High ATO	0.518	0.658	0.766

(High MPM/ATO) - (Low MPM/ ATO)

-0.334*** z = -16.42	0.310*** z = 14.62

LEVEL 3: MPM*ATO*MISMATCHING Portfolios

Low Mismatching

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.289	0.127	0.130	Low ATO	0.670	0.772	0.782
	0.154	0.111	0.123		0.730	0.770	0.780
High ATO	0.153	0.145	0.184	High ATO	0.718	0.725	0.673

Medium Mismatching

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.456	0.206	0.168	Low ATO	0.467	0.719	0.729
	0.300	0.100	0.091		0.614	0.814	0.869
High ATO	0.224	0.142	0.075	High ATO	0.673	0.743	0.874

High Mismatching

	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.621	0.340	0.178	Low ATO	0.321	0.592	0.735
	0.619	0.278	0.150		0.319	0.656	0.804
High ATO	0.570	0.359	0.199	High ATO	0.350	0.565	0.714

(High MPM/ATO/Mismatching) - (Low MPM/ATO/Mismatching)

-0.090*** z = -2.67	0.044 z =1.19

Panel B: Differences in Delisting Percentages between High and Low Mismatching within MPM-ATO Portfolios

	Delisting Due to Bad Performance				Delisting Due to Acquisitions		
	Low MPM		High MPM		Low MPM		High MPM
Low ATO	0.332***	0.213***	0.048*	Low ATO	-0.349***	-0.179***	-0.047
	0.465***	0.167***	0.027		-0.411***	-0.113***	0.024
High ATO	0.417***	0.214***	0.015	High ATO	-0.367***	-0.159***	0.041