Modeling Managers As EPS Maximizers*

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Abstract

Textbook theory assumes that firm managers maximize the net present value of future cash flows. But when you ask them, the people running large public corporations say that they are maximizing something else entirely: earnings per share (EPS). Perhaps this is a mistake. No matter. We take managers at their word and show that EPS maximization provides a single unified explanation for a wide range of corporate policies involving leverage, share repurchases, cash holdings, and capital budgeting.

Keywords: Earnings Per Share, Corporate Policies, Earnings Yield, Value vs. Growth, Leverage, Equity Issuance, Share Repurchases, Cash Holdings, Capital Budgeting, M&A Payment Method, Accretion, Dilution

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1 Introduction

Textbook corporate-finance theory assumes that firm managers maximize the net present value of future cash flows. If a policy increases this net present value (NPV), they do it. If it does not, they do not.

The trouble is that if managers are NPV maximizers, then many important financing decisions are completely irrelevant in simple models. For example, Modigliani and Miller (1958) shows that there is no optimal choice of leverage in a frictionless information-symmetric world. So to explain why managers might prefer one policy over another, researchers must look for complications that might nudge an NPV-maximizing manager in the desired direction.

This "explanation by complication" approach has not been overwhelmingly successful (Myers, 2001; Frank and Goyal, 2009; DeAngelo, 2022; Graham, 2022). "Extant research has explained only a portion of observed capital structure behavior. [...] Many individual fixes have recently been made...but it is still not clear what it all adds up to. (Graham and Leary, 2011)"

On top of this, the complications in researchers' models rarely show up in managers' own testimonies (Graham, 2022). For example, when modeling leverage, researchers tend to focus on interest tax shields (Modigliani and Miller, 1963), agency costs (Jensen and Meckling, 1976), and signaling (Myers and Majluf, 1984). But managers rarely mention these considerations when asked about how they chose their firm's leverage level.

We propose a different approach to doing corporate-finance theory. Rather than simply assuming that managers are NPV maximizers, we suggest listening to what managers say they are doing. When asked, the managers of large public corporations typically explain that they are trying to increase their firms' earnings per share (EPS).

"Firms view earnings, especially EPS, as the key metric for an external audience, more so than cash flows. (Graham, Harvey, and Rajgopal, 2005)" EPS is what gets talked about on earnings calls (Matsumoto, Pronk, and Roelofsen, 2011). It is what gets forecasted by analysts (O'brien, 1988) and targeted by managers (Houston, Lev, and Tucker, 2010). Managers even get paid based on whether they meet EPS goals (Bettis, Bizjak, Coles, and Kalpathy, 2010).

Maybe this is a bad thing. While EPS maximization is not always an error, there are clearly times when it does lead to suboptimal outcomes. Researchers have been trying to convince managers to abandon EPS for decades (May, 1968; Pringle, 1973; Stern, 1974). Perhaps one day they will succeed. But, right now, the people running large public corporations are EPS maximizers. "Investors demand a simple metric of performance... [and] the market has selected EPS to fulfill this role. (Almeida, 2019)" Regardless of the underlying reason, this is the reality we currently live in.

By studying the problem that real-world managers are actually trying to solve, we are able to give a single unified explanation for a wide range of corporate policies. We show theoretically that EPS maximization can account for (a) how much leverage a firm will use, (b) when they will decide to issue and repurchase shares, (c) which firms will accumulate cash, and (d) how/whether a firm will finance their next project. We then complement this analysis with empirical results that confirm each of our model's predictions.

In the future, when a researcher wants to predict how a manager will actually behave (and not how she ought to behave), the researcher should model her as an EPS maximizer (and not an NPV maximizer). That should be the starting point of the model. This is the central premise of our paper.

1.1 Paper Outline

We begin in section 2 by documenting how managers describe their own objective. The people running large public companies consistently say that they aim to increase EPS for their shareholders. This is a repeated finding across decades of survey research. For example, "despite the efforts of academics to demonstrate that EPS dilution should be irrelevant... [this] was the most cited reason for companies' reluctance to issue equity. (Graham and Harvey, 2002)" We also confirm that EPS maximization is the focus of shareholder communications and regularly appears in regulatory filings.

For better or for worse, large public companies are run by EPS-maximizing managers. We focus on these firms because they represent the bulk of all enterprise value, and they are the ones most studied by researchers. We recognize that other kinds of firms may have different objectives, and that is fine. When modeling those other kinds of firms, researchers should use whatever objective those other kinds of managers are trying to optimize.

Sections 3 and 4 contain our theoretical analysis. In section 3, we model a firm's capital-structure decision. We study a manager who is choosing how much leverage to use, $\ell \overset{\text{def}}{=} \mathit{LoanAmt} \,/\, \mathit{PurchasePrice} \in [0,1)$, when buying a company with expected cash flows of $\mathbb{E}[\mathit{NOI}_1]$ next year. After borrowing $\mathit{LoanAmt}(\ell)$ at interest rate $i(\ell)$, she finances the rest of the purchase by issuing *#Shares* of equity each worth *PricePerShare*. The manager takes the fair interest rate and her share price as given. She then jointly decides how much to borrow and how many shares to issue at these price levels.

We set up our model so that Modigliani and Miller (1958) holds. There are no frictions, information asymmetries, or taxes. Investors correctly price all future payouts. Later, we will analyze real investment, but the size of the pie is fixed to start with. Under these conditions, textbook theory says that there is no best choice of leverage. Nevertheless, we prove that there is a unique leverage ratio that maximizes

$$\mathit{EPS}(\ell) \overset{\text{def}}{=} \underbrace{\big(\mathbb{E}[\mathit{NOI}_1] - i(\ell) \cdot \mathit{LoanAmt}(\ell)\big)}_{\mathbb{E}[\mathit{Earnings}_1(\ell)]} \,/\, \#\mathit{Shares}(\ell) \tag{1}$$

Our model allows us to fully characterize the difference between maximizing NPV and EPS. An EPS-maximizing manager (a) fails to risk adjust her expected earnings and (b) disregards changes in the value of her long-term assets and liabilities. She also (c) ignores the value of her default option. When EPS maximization leads to a bad outcome, some combination of these three factors is at fault.

But it is not always an error to maximize EPS. We purposefully set up the baseline version of our model so that Modigliani and Miller (1958) holds. In this setting, every leverage ratio is equally good from a welfare perspective. EPS maximization is a selection criterion telling you which of these many options a manager will choose.

Imagine suggesting to a manager that she should change her leverage a little bit from ℓ to $(\ell \pm \epsilon)$. We show that an EPS-maximizing manager will decide whether this change is a good idea by comparing her earnings yield, $EY(\ell) \stackrel{\text{def}}{=} \mathbb{E}[\mathit{Earnings}_1(\ell)] \,/\, \mathit{ValueOfEquity}(\ell)$, to the new interest rate she would have to pay, $i(\ell \pm \epsilon)$, if she asked her lender for a slightly larger or smaller loan

$$\begin{aligned} EY(\ell) < i(\ell - \epsilon) \quad &\Rightarrow \quad \text{decrease leverage, equity is cheap} \\ EY(\ell) > i(\ell + \epsilon) \quad &\Rightarrow \quad \text{increase leverage, equity is expensive} \end{aligned} \tag{2}$$

When the manager's earnings yield is higher than the interest rate on a slightly larger loan, debt will look cheap. The manager would like to increase her leverage by ϵ. By contrast, if the interest rate on a slightly smaller loan would still be higher than her current earnings yield, the manager will view debt as expensive and try to borrow less if she can. Because she is constantly comparing it to an interest rate, an EPS-maximizing manager will wind up thinking about her earnings yield as the cost of equity capital.

The EPS-maximization problem itself is smooth and continuous. But the manager cannot borrow at less than the riskfree rate, $i(\ell) \geq r_f$. This practical limitation leads to a bifurcation in outcomes. Our model predicts that there will be two groups of firms that finance themselves in radically different ways.

To see why, consider a manager who currently has no leverage. If this manager's earnings yield is below the riskfree rate even without any leverage, $EY(0) < r_f$, she will see a riskless \$1 loan as expensive and so will find it optimal to have zero leverage. A firm with a low earnings yield has a high price-to-earnings (P/E) ratio, so we refer to this kind of firm as a "growth stock".

By contrast, if a firm's unlevered earnings yield is above the riskfree rate, $EY(0) > r_f$, we call it a "value stock". We show that the EPS-maximizing manager of such a company will take on a substantial amount of debt. Due to convexity, if it makes sense to borrow \$1 at the riskfree rate, it will make even more sense to borrow \$2 on the same terms. Continuing with this same logic, we see that the manager of a value stock will use up all her riskfree borrowing capacity. Thus, since a firm's observed earnings yield using optimal leverage can be no

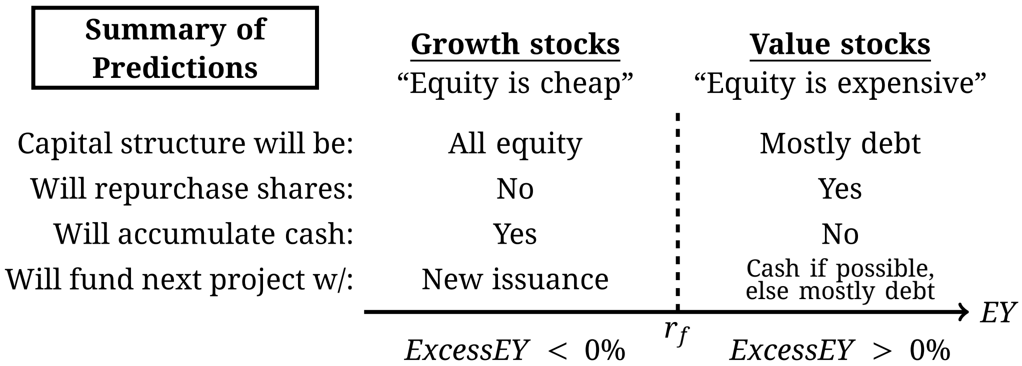


Figure 1. *A growth stock (left) has a negative excess earnings yield, $ExcessEY = EY - r_f < 0\%$, and views equity as the cheapest source of financing. A value stock (right) has a positive excess earnings yield, $ExcessEY > 0\%$, and sees equity as relatively expensive. Our model predicts that there will be a large qualitative difference between the behavior of these two kinds of firms on either side of the $ExcessEY = 0\%$ threshold.*

lower than its unlevered earnings yield, $EY \geq EY(0)$, our model predicts a sharp change in leverage at the threshold $ExcessEY \overset{\text{def}}{=} EY - r_f = 0\%$.

In section 4, we study several more applications showing how the principle of EPS maximization helps explain managerial decision-making. Figure 1 summarizes the key predictions that emerge from this analysis. In every case, EPS-maximizing managers behave very differently when running a growth stock ($ExcessEY < 0\%$) and when running a value stock ($ExcessEY > 0\%$).

The EPS-maximizing manager of a growth stock will view equity as the cheapest source of financing. She will use no leverage, never repurchase shares, steadily accumulate cash, and pay for new projects with new equity issuance. Conversely, the EPS-maximizing manager of a value stock will see equity as relatively expensive. Her capital structure will be mostly debt. If her excess earnings yield ever increases, she will repurchase shares. She will see cash as the cheapest source of financing and so never accumulate much of it. Once she spends her existing cash reserves, the manager of a value stock will finance any new projects (including acquisitions) mostly through borrowing.

In section 5, we empirically verify each of these predictions using annual data from 1976 to 2022. Figure 2 reports our baseline empirical results. Companies

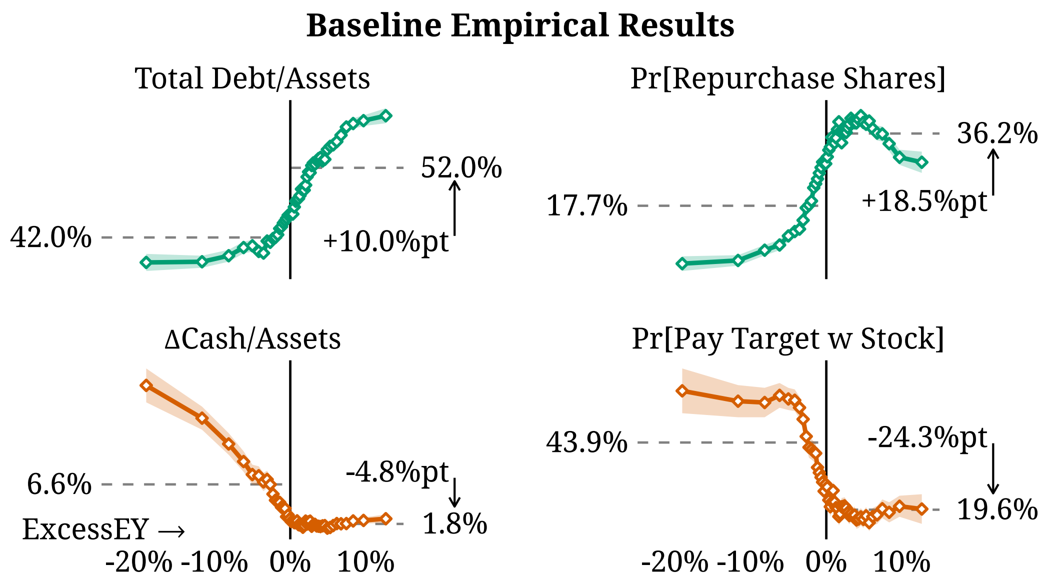


Figure 2. *Each panel is a separate binned scatterplot using firm-year observations from 1976 to 2022. Total Debt/Assets: Total liabilities as a percent of a firm's total assets in a given year. Pr[Repurchase Shares]: Percent of firm-year observations that repurchase* $\geq 1\%$ *of current shares outstanding the following year. ΔCash/Assets: Increase in cash and cash equivalents next year as a percent of total assets in current year. Pr[Pay Target w Stock]: Among all firm-year observations with* ≥ 1 *acquisition, what percent paid target shareholders primarily with its own stock? The x-axis in every panel is excess earnings yield,* $ExcessEY = EY - r_f$*. The left* y*-axis shows the average for growth stocks—i.e., firm-year observations with* $ExcessEY < 0\%$*. The right* y*-axis shows the average for value stocks—i.e., firm-year observations with* $ExcessEY > 0\%$*. The arrows and* $\pm X.X$*%pt values on the right-hand side show the average difference between these two groups and match the coefficient values found in column (1) of Tables 5a, 5b, 5c, and 5d.*

with negative excess earnings yields (growth stocks) have 10%pt lower total debt-to-asset ratios than those with positive excess earnings yields (value stocks). Growth stocks are half as likely to repurchase shares, and these firms accumulate cash at a 4.8%pt faster rate. In M&A deals, when the acquirer is a growth stock, the firm is 24.3%pt more likely to pay target shareholders with its own equity.

The differences reported in Figure 2 are economically large, and our regression analysis shows that they are highly statistically significant. But how can we be sure these differences are the result of EPS maximization?

We rely on several different sources of identification. For one thing, we compliment our baseline results with additional findings. For example, we document that growth stocks are not just less levered on average, they are also twice as likely to have no financial debt whatsoever.

We also look for the threshold effect predicted by our model. As her company's excess earnings yield increases, the manager of a growth firm should not gradually behave more and more like a value-firm manager. There should be a large qualitative change in her behavior as her firm crosses the $\textit{ExcessEY} = 0\%$ threshold. And this phase change clearly shows up in all four panels of Figure 2. Moreover, even though it can take time to completely overhaul a firm's approach to financing its business operations, when a company switches from having $\textit{ExcessEY} < 0\%$ to having $\textit{ExcessEY} > 0\%$ or vice versa, we see large changes in firm behavior in the very next year.

In the past, researchers have labeled the 30% of companies with the lowest book-to-market ratio (B/M) as growth stocks and the 30% with the highest B/M as value stocks. This definition implies that growth stocks always represent 30% of the market. By contrast, our theory says that a "growth stock" is any company with $\textit{ExcessEY} < 0\%$. All remaining companies are "value stocks". Our definition allows the fraction of growth stocks to vary over time. We document that, when the riskfree rate rises, more companies start behaving like growth stocks. When r_f falls, more firms act like value stocks. The dividing line is always located at $\textit{ExcessEY} = 0\%$ regardless of the riskfree rate at the time.

Finally, it is noteworthy that we can organize our predictions on a number line like in Figure 1. While this is an accomplishment unto itself, we can actually do even better. Notice that the top two panels in Figure 2 are mirror images of the bottom two panels. This is not a coincidence. When using *ExcessEY* on the x-axis, our model's predictions must have this step-function shape up to a scalar transformation of the y-axis. We do not find this same symmetry in the data when sorting on other measures of value, such as B/M.

Taken together, all these sources of identification point to one conclusion: managers are doing what they claim to be doing (maximizing EPS), and this is why we observe the patterns that we do in the data.

1.2 Related Work

Tirole (2010) calls Modigliani and Miller (1958)'s capital-structure irrelevancy result "a detonator for the theory of corporate finance, a benchmark whose assumptions needed to be relaxed in order to investigate the determinants of financial structures." But this bomb went off in 1958 while Dwight D. Eisenhower was still in the Oval Office. Researchers have been trying to find the right way to relax those constraints for the past seventy years with little empirical success (Gebhardt, Lee, and Swaminathan, 2001; Lemmon, Roberts, and Zender, 2008; Frank and Goyal, 2009; DeAngelo, 2022).

We focus on EPS maximization because this is what managers say they are doing. The meta-analysis in the following section shows consistent evidence of this fact across decades of academic survey literature. This research methodology connects our paper to work using surveys to identify agents' goals rather than to estimate their beliefs (Chinco, Hartzmark, and Sussman, 2022).

While textbooks like Berk and DeMarzo (2007) talk about NPV maximization as "the golden rule of financial decision-making," the majority of S&P 500 firms have never quoted a discount rate at any point during a quarterly earnings call over the past two decades Gormsen and Huber (2024). Likewise, the majority of sell-side analyst reports do not even bother mentioning the use of a discounted cash-flow model when setting a target price (Décaire and Graham, 2024).

Foundational papers such as Baker and Wurgler (2000, 2002), Baker, Stein, and Wurgler (2003), and Shleifer and Vishny (2003) show that firms adjust their corporate policies to exploit perceived over/undervaluations by the stock market. By analyzing the correct objective function, we are able to add to the behavioral corporate-finance literature that followed from these papers by characterizing when a manager will view her shares as over/undervalued. When $EY(\ell) < i(\ell - \epsilon)$, an EPS-maximizing manager will be pleasantly surprised by how much equity investors are willing to pay for her stock. When $EY(\ell) > i(\ell + \epsilon)$, she will feel that her share price ought to be higher. Unlike previous work, our theory does not require any mispricing for a manager to feel her shares are mispriced. An EPS-maximizing manager will behave like a "cross-market arbitrageur" even in the absence of any arbitrage opportunities (Ma, 2019).

2 In Their Own Words

Our paper stems from a simple observation. When you ask the people in charge of large public corporations how they make financing decisions, they usually do not mention net present values (NPVs) or discounted cash flows (DCFs). Instead, they typically spend most of their time talking about increasing their company's EPS. We now document this important fact.

We are not arguing that EPS is the only thing that managers care about. The real world is more complicated than that. However, when we examine what the managers of large public corporations say about their own decision-making process, it is clear that EPS maximization is a primary concern for the vast majority of them. In the rest of the paper we show that, by modeling what managers say they are trying to do, it is possible to give a unified explanation for a wide range of corporate policies.

2.1 Survey Evidence

As far back as Lintner (1956), academic researchers have been using surveys to probe the motives behind managers' decisions. Collectively, this literature paints a clear picture: when given the opportunity to describe their goals, most managers claim to be maximizing EPS rather than NPV. For large public corporations, EPS is the single most critical performance metric (Graham, Harvey, and Rajgopal, 2005; Dichev, Graham, Harvey, and Rajgopal, 2013).

Table 1 summarizes how financial executives describe their decision-making in 17 different survey-based papers over the past five decades. Different papers focus on different kinds of decisions. Panel (a) includes papers that ask about a manager's broad goals and objectives. Panel (b) looks at papers studying a manager's choice of capital structure. Panel (c) focuses on repurchases and new issuance. Panel (d) includes papers that ask managers about cash holdings. And Panel (e) studies the thought process behind capital budgeting.

There are many more check marks in column (2) than in column (1). Regardless of the decision, when you ask the manager of a large public corporation how they made it, she is more likely to talk about increasing EPS than about maximizing NPV or DCFs. For instance, Brav, Graham, Harvey, and Michaely (2005)

Meta-Analysis Of The Survey Literature

Participants in study…	Are you making decisions based on… NPV/DCF? say "Yes" (1)	EPS? say "Yes" (2)	EPS? not asked (3)
(a) Broad objectives			
Petty et al. (1975)		✓	
Graham et al. (2005)		✓	
Dichev et al. (2013)		✓	
(b) Capital structure			
Pinegar and Wilbricht (1989)		✓	
Graham and Harvey (2001)	✓	✓	
Bancel and Mittoo (2004)	✓	✓	
Brounen et al. (2006)	✓		⊗
(c) Repurchases/issuance			
Baker et al. (1981)		✓	
Tsetsekos et al. (1991)		✓	
Badrinath et al. (2000)		✓	
Graham and Harvey (2001)		✓	
Brav et al. (2005)		✓	
Brounen et al. (2006)		✓	
Caster et al. (2006)		✓	
(d) Cash holdings			
Lins et al. (2010)	✓		⊗
(e) Capital budgeting			
Schall et al. (1978)	✓	✓	
Gitman and Maxwell (1987)	✓	✓	
Graham and Harvey (2001)	✓	✓	
Mukherjee et al. (2004)	✓	✓	
Baker et al. (2011)	✓	✓	

Table 1. *Column (1): Managers reported using either NPV and/or DCF reasoning. Column (2): Managers said they maximized EPS. Column (3): Managers were not given opportunity to talk about EPS maximization. Panel (a): Papers about managers' broad objectives. Panel (b): Papers about how managers chose their capital structure. Panel (c): Papers about share repurchases and new issuance. Panel (d): Papers about cash holdings. Panel (e): Papers about capital budgeting.*

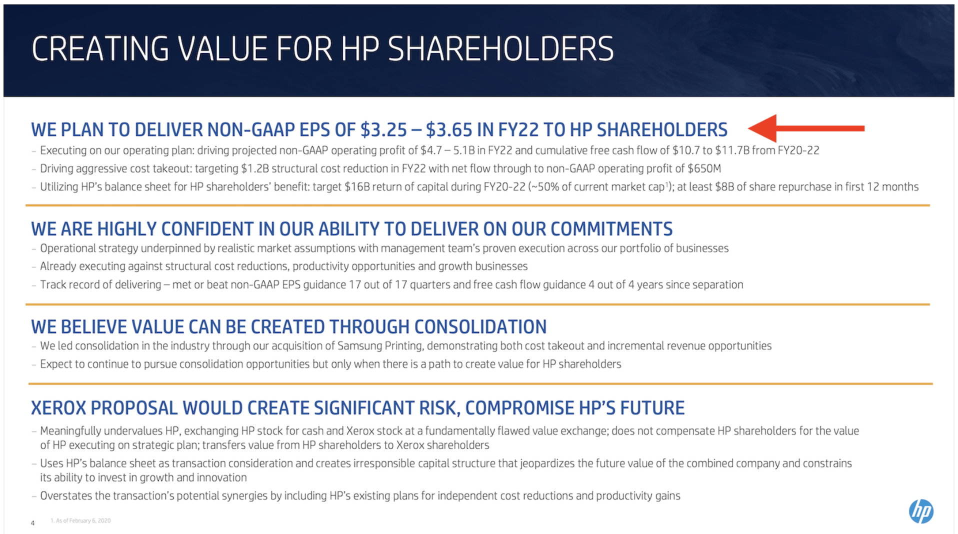


Figure 3. *First slide from a February 2020 presentation made by HP's CEO to the company's shareholders in opposition to Xerox's proposed takeover.* [link]

specifically reports that "managers favor repurchases…to increase earnings per share." One manager surveyed in Graham and Harvey (2001) explains that even without repurchases, "if funds are obtained by issuing debt, the number of shares remains constant and so EPS can increase."

For the most part, when survey respondents talk about maximizing NPV, they also report following the principle of EPS maximization. There are only a couple of surveys that contain no evidence of EPS maximization. And, in these cases, survey respondents were simply not given the opportunity to talk about EPS (column 3).

The fact that many academic researchers have a strong bias against EPS maximization makes managers' survey responses all the more surprising. There is a huge experimenter demand effect working in the opposite direction (Schwarz, 1999). Put yourself in the shoes of a CFO. Your favorite business school professor has just called to interview you about how you make decisions. It would be rude to tell him that all his in-class NPV calculations are irrelevant to your day-to-day decision-making. Yet, in spite of this, survey respondents still report maximizing EPS.

2.2 Shareholder Communications

The managers of large public corporations do not hide the fact that they are EPS maximizers. They explicitly tell their shareholders what they are trying to do. The situation is not like the one modeled in Stein (1989) where managers myopically maximize EPS even though their shareholders would like them to focus on long-term value. The goal of increasing EPS is front-and-center in shareholder communications.

For example, in early 2020, Xerox announced a plan to acquire Hewlett-Packard Co. HP's management team strongly opposed the takeover because Xerox's was trying to acquire HP at a P/E ratio of only 7. Like good EPS-maximizing managers, they were thinking about their earnings yield as a cost of equity capital. And, on that basis, Xerox was making a lowball offer for HP's earnings stream in order to juice its own EPS.

In response, HP's CEO made a presentation to shareholders explaining why they should refuse Xerox's offer. Figure 3 shows the first slide from the CEO's presentation. The title is "Creating Value for HP Shareholders", and the first bullet point is "We plan to deliver non-GAAP EPS of $3.25-$3.65 in FY22 to HP shareholders." While HP's CEO talked a lot about the company's future operating profits, he never once mentioned the net present value of these cash flows.

Given that HP's CEO tried to keep his job by promising to boost his shareholders' EPS via an accretive repurchase, it seems likely that investors also fixate on a company's earnings. CEO compensation is often directly linked to EPS targets (Bens, Nagar, Skinner, and Wong, 2003; De Angelis and Grinstein, 2015; Bennett, Bettis, Gopalan, and Milbourn, 2017; Martin, Seo, Yang, Kim, and Martel, 2022). Shareholders have to approve these compensation packages.

Many real-world investors reason about a company's share price in terms of earnings multiples. We explore the asset-pricing implications of this fact in a companion paper (Ben-David and Chinco, 2024). In this paper, however, investors are fully rational and set each asset's price equal to its expected discounted payoff. Asset markets contain no arbitrage opportunities in our model. Only the manager cares about EPS. Hence, all our predictions must stem from the way she maximizes this quantity, not the way investors price it.

Transcripts Of Quarterly Earnings Calls

Concept (1)	Search Query (2)	% of firms (3)	% of mcap (4)
Earnings	“Earnings” or “Net Income”	95.0%	99.3%
EPS	“Earnings Per Share” or “EPS”	82.0%	79.1%
Dilutive/Accretive	“Diluti(ve|on)” or “Accreti(ve|on)”	59.2%	60.4%
Net Present Value	“Present Value” or “PV”	21.2%	27.2%
Discount Rate	“(Discount|Hurdle) Rate” or “Cost Of Capital” or “WACC” or “OCC”	26.4%	24.1%
NPV or Discount Rate		39.6%	46.3%

Table 2. *Data comes from Capital IQ and starts in 2004. Column (2) reports the query we used to search for the concept in column (1). Column (3) shows the percent of all* 2,817 *firms in our sample that had at least one transcript which satisfied this query. Column (4) shows the average percent of market capitalization in a given year that these firms represent.*

2.3 Earnings-Call Transcripts

We find a similar pattern in other kinds of manager-investor interactions. For example, we analyze the transcripts of quarterly earnings calls using data from Capital IQ. Table 2 describes what managers say to interested market participants during these calls. Capital IQ's transcript data starts in 2004. The point estimates in this table reflect the 2,817 public firms which could be matched to CRSP, were traded on a major exchange, and had a share price above $5.

We start with a sanity check. We are analyzing the transcripts of quarterly earnings calls, so it had better be the case that managers talk about earnings. The first row of Table 2 confirms that this is indeed the case. Column (3) reports that 95.0% of all firms have a conference-call transcript that includes either the word “Earnings” or the phrase “Net Income”. Column (4) shows that these firms represented 99.3% of all market value in a typical year. Managers that do not talk about earnings tend to be running smaller firms whose analysts focus other revenue metrics, such as sales—hence, the 4.3%pt difference.

With this positive control out of the way, we move on to new results. The "EPS" row shows that roughly 4 out of 5 firms specifically discuss "earnings per share" or "EPS" with their shareholders. There are lots of ways to keep track of a firm's earnings. People do not have to think about a firm's earnings as evenly split up across shares any more than they have to think about a calendar as evenly split up into 52 weeks that are 7 days long. These are arbitrary conventions. In principle, people do not have to do either. In practice, they do both.

A dilutive acquisition is an M&A deal that would lower the acquirer's EPS. Conversely, an accretive debt-restructuring plan would boost the firm's EPS, though it may not change the present discounted value of its future cash flows. Investors use these terms when talking about how a specific corporate policy will affect a firm's EPS. And the row labeled "Dilutive/Accretive" reports that 60% of firms have transcripts that contain this language. What's more, it is not just the small firms who talk about EPS dilution and accretion. There is no measurable difference between columns (3) and (4).

We have just seen that the majority of public corporations have specifically told their investors how some corporate policy will affect the firm's EPS during a quarterly earnings call. The final three rows show that the same cannot be said of NPV and discount rates. 3 out of 4 firms have never used the term "Present Value" in any quarterly earnings call since 2004. The same statistic applies to the concept of "Discount Rate". The numbers are not too different in columns (3) and (4), suggesting the results are not driven by smaller firms.

25% of firms talk about present value at some point during an earnings call, and 25% talk about discount rates. It could be that these are the same firms. It could be that roughly 1/4 of all firms discuss detailed NPV calculations with their investors on a regular basis and state the discount rate used. If that were the case, we would expect to see a value close to 25% in the final "PV or Discount Rate" row. Instead, it is roughly 40%. This implies most firms that mention "Present Value" during an earnings call never specify a discount rate.

When managers talk about EPS, they get deep into the weeds. They explain how a specific action will be accretive or dilutive to shareholder value. When managers mention NPV, they use it as a buzzword. They do not bother to bring

Language Used In Regulatory Filings

	#	% that mention… EPS	NPV/DCF
	(1)	(2)	(3)
2001–2022	1,694,415	21.2%	1.8%
2001–2005	358,385	18.9%	1.3%
2006–2010	463,869	20.9%	1.5%
2011–2015	377,502	22.2%	2.0%
2016–2020	349,907	22.8%	2.4%
2021–2022	144,752	21.0%	1.8%

Table 3. *Summary of the language used in 8-K filings for all publicly listed firms over the period from January 1st 2001 through December 31st 2022. Data come from EDGAR. Column (1): Total number of 8-K filings. Column (2): Percent of 8-K filings that included either "Earnings Per" or "EPS". Column (3): Percent of 8-Ks that included at least one of the following strings: "NPV", "(Present|Discounted) Value", "DCF", "Discounted Cash Flows", "Economic Value added".*

up inputs to the model, and their investors do not see any need to press them on their omission. This analysis is consistent with Gormsen and Huber (2024), which finds that most S&P 500 firms have never quoted a discount rate in any conference call over the past twenty years.

2.4 Regulatory Filings

Suppose a public company has a shareholder vote, its CEO leaves, or the firm takes out a large loan. In these sorts of situations, the Securities and Exchange Commission (SEC) requires the company to file a Current Report on Form 8-K within four business days. 8-K filings are meant to help investors their beliefs about previously filed 10-Q and/or 10-K reports.

Earlier research has shown that EPS is the standard metric that companies use when evaluating the economic impact of corporate events in 8-K filings (Amel-Zadeh and Meeks, 2019). We perform our own analysis and confirm this finding. Companies are 12× more likely to talk about EPS than both NPV and discounted cash flows combined.

Table 3 summarizes the content of 1,694,415 filings from 2001 to 2022. Column (1) reports the total number of 8-K filings in EDGAR during the sample period. The first row of column (2) then shows that 21.2% of all filings include either "Earnings Per" or "EPS". We do not require "Share" because in some cases the earnings are reported using slightly different jargon, such as "earnings per partnership unit". Requiring "Share" reduces the value in the first from of column (2) to 18.9%. Column (3) gives the percent of all 8-K filings that include at least one of the following strings: "NPV", "(Present | Discounted) Value", "DCF", "Discounted Cash Flows", "Economic Value added". Economic value added (EVA) is an alternative to EPS promoted by (Stern, Stewart, and Chew, 1995; Stern, Shiely, and Ross, 2002).

A regulatory filing is not the same thing as a discussion with shareholders. For legal reasons, a firm will often file an 8-K in response to a corporate event that would never be important enough to discuss during a quarterly earnings call. For example, a firm will file an 8-K each time it awards stock options to its CEO or changes the terms of a loan agreement. Many 8-K filings are the result of minor changes to the company's ByLaws, which explains why only around 1/5th of all 8-Ks mention the company's EPS. See Appendix C.1 for an example.

When leading a quarterly earnings call, a firm's manager is trying to focus on what she sees as the most important items affecting her shareholders. When deciding whether to file an 8-K, the firm's lawyers are trying to be as thorough as possible to avoid future litigation. The context is different in each case. And the nature of the difference makes it all the more surprising that only 1.8% of all 8-K filings talk about NPVs or discounted cash flows.

True, the fact that a company talks about its EPS in an 8-K does not imply that the firm is maximizing this quantity. But it is noteworthy that 49 out of 50 8-K filings do not talk about NPV in any capacity. To academic researchers, NPV maximization is "the golden rule of financial decision-making. (Berk and DeMarzo, 2007)" To corporate lawyers, the concept does not even warrant the inclusion of some boilerplate legalese. Every mutual-fund advertisement ends with a disclaimer stating that "past performance does not guarantee future results." The absence of similar language here is telling.

3 Capital Structure

How do the managers of large public corporations decide how much to borrow? The textbook approach assumes that they try to maximize the net present value of their future equity payouts. This objective renders leverage irrelevant in simple frictionless models (Modigliani and Miller, 1958). So to explain why a manager prefer one leverage ratio over another, a researcher has to introduce some market friction or information asymmetry.

By contrast, we propose that managers choose their leverage ratio with an eye towards increasing their EPS. We characterize how this objective differs from NPV maximization and show that a unique EPS-maximizing leverage ratio exists even in our frictionless information-symmetric benchmark. We explain why it is natural for an EPS-maximizing manager to think about her earnings yield as the cost of equity capital. And we show how EPS maximization will produce to two groups of firms, growth and value stocks, which finance themselves in radically different ways.

3.1 Economic Framework

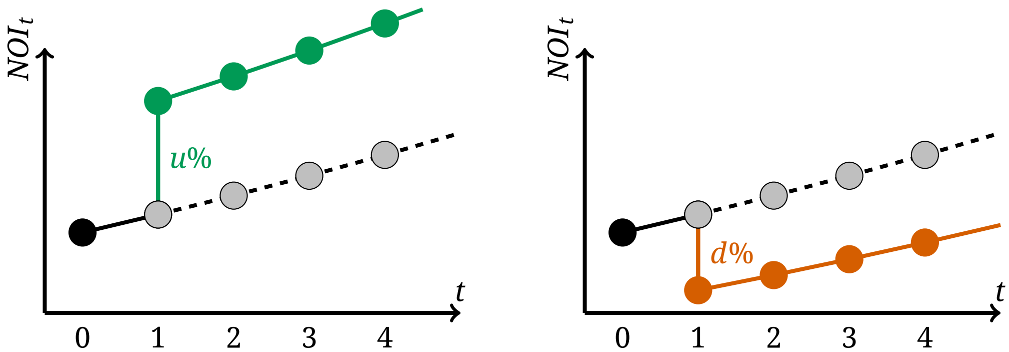
We study a manager who is buying the assets needed to form a company in year $t = 0$. In year $t = 1$, she will collect the cash flows produced by her company and then sell its assets. Our goal is to predict how much leverage she will use when creating the firm at time $t = 0$. We use a simple binomial model with one period of uncertainty as found in Dixit and Pindyck (1994).

Cash Flows. Let NOI_t denote the firm's net operating income in year t. The firm's average NOIs grow at a rate of $g \geq 0\%$ per year in all periods

$$\mathbb{E}[NOI_{t+1}] = (1 + g) \cdot NOI_t \tag{3}$$

However, as shown in Figure 4, there is uncertainty about the conditional expectation of the firm's cash flows in year $t = 1$. Let p_u and $p_d = 1 - p_u$ denote the probabilities of the up and down state in year $t = 1$.

If the up state gets realized in year $t = 1$, the firm's expected cash flows will be $u > 0\%$ higher than the unconditional average. Whereas, if the down state



(a) Up state (b) Down state

Figure 4. *Left panel: Cash flows if up state is realized in year $t = 1$. Right panel: Cash flows if down state is realized.* ***(Black dots)*** *NOI_0 in year $t = 0$ prior to purchase; same in both panels.* ***(Gray dots)*** *Unconditional average cash flows $\mathbb{E}[NOI_t]$ in years $t = 1, 2, 3, 4$; same in both panels.* ***(Green dots)*** *Conditional expectation of NOI_t in years $t = 1, 2, 3, 4$ following a positive shock, $NOI_{\boldsymbol{u}} = (1+\boldsymbol{u}) \cdot \mathbb{E}[NOI_1]$.* ***(Red dots)*** *Conditional expectation of NOI_t in years $t = 1, 2, 3, 4$ following negative shock, $NOI_{\boldsymbol{d}} = (1 - \boldsymbol{d}) \cdot \mathbb{E}[NOI_1]$.*

gets realized in year $t = 1$, the firm's expected cash flows will be $d \in (0\%, 100\%)$ lower than unconditional average

$$\mathbb{E}[NOI_1|s] = \begin{cases} (1+u) \cdot \mathbb{E}[NOI_1] & \text{in the up state, } s = u \\ (1-d) \cdot \mathbb{E}[NOI_1] & \text{in the down state, } s = d \end{cases} \tag{4}$$

We use $NOI_u \overset{\text{def}}{=} \mathbb{E}[NOI_1|s = u] = (1+u) \cdot \mathbb{E}[NOI_1]$ and $NOI_d \overset{\text{def}}{=} \mathbb{E}[NOI_1|s = d] = (1-d) \cdot \mathbb{E}[NOI_1]$ as shorthand for the conditional expectations of NOI_1 in each state of the world next year at time $t = 1$.

If the up state is realized in year $t = 1$, then the firm's expected cash flows in year $t = 2$ will be $\mathbb{E}[NOI_{2|u}] = (1+g) \cdot NOI_u$. By contrast, had the down state been realized, then the firm's cash flows in year $t = 2$ would have been $\mathbb{E}[NOI_{2|d}] = (1+g) \cdot NOI_d$. Hence, we have

$$\frac{\mathbb{E}[NOI_{t|u}]}{\mathbb{E}[NOI_{t|d}]} = \frac{1+u}{1-d} > 1 \qquad \text{for all } t \geq 2 \tag{5}$$

The firm's cash flows grow at a constant annual rate of g even in year $t = 1$. Thus, the unconditional expectation of the firm's cash flows in year $t = 1$ must satisfy $\mathbb{E}[NOI_1] = p_u \cdot NOI_u + p_d \cdot NOI_d$.

Firm Value. Given the setup so far, the firm's assets in year t are worth

$$ValueOfAssets_t = \frac{\mathbb{E}_t[NOI_{t+1}]}{r - g} \tag{6}$$

where $r > g$ denotes the discount rate on the firm's cash flows. Because year $t = 1$ cash flows are unknown at time $t = 0$, the future value of the firm's assets will also be a random variable, $ValueOfAssets_1 \in \{ValueOfAssets_u, ValueOfAssets_d\}$.

The manager in our model buys assets to create her firm at time $t = 0$. She pays $PurchasePrice \overset{\text{def}}{=} ValueOfAssets_0$ for these assets. The previous owners get to keep, NOI_0, which represents the cash flows produced by the firm's assets in year $t = 0$. In year $t = 1$, the manager collects NOI_1 and then sells the firm's assets for $SalePrice_1 \overset{\text{def}}{=} ValueOfAssets_1$. The total value that the manager gets from owning the firm in year $t = 1$ is given by $ValueOfFirm_1 \overset{\text{def}}{=} NOI_1 + ValueOfAssets_1$. We use $ValueOfFirm_u$ and $ValueOfFirm_d$ to denote the two possible realizations.

Correct Prices. Investors correctly price all future payouts in our model. We use q_u to denote the price in year $t = 0$ of an asset pays out \$1 in year $t = 1$ iff the up state is realized. Similarly, we use q_d to denote the analogous down-state price. Let $r_f > 0\%$ denote the prevailing riskfree rate. While $p_u + p_d = 1$, the price of a \$1 riskfree bond is given by $q_u + q_d = \frac{\$1}{1+r_f} < \$1$.

Our binomial setup allows us to solve for these state prices in closed form

$$q_u = \frac{PurchasePrice - \left(\frac{ValueOfFirm_d}{1+r_f}\right)}{ValueOfFirm_u - ValueOfFirm_d} \quad q_d = \frac{\left(\frac{ValueOfFirm_u}{1+r_f}\right) - PurchasePrice}{ValueOfFirm_u - ValueOfFirm_d} \tag{7}$$

We use $\tilde{\mathbb{E}}[X_1] \overset{\text{def}}{=} q_u \cdot X_u + q_d \cdot X_d$ to denote the risk-neutral expectation of an arbitrary random variable, $X_1 \in \{X_u, X_d\}$. By contrast, $\mathbb{E}[X_1] \overset{\text{def}}{=} p_u \cdot X_u + p_d \cdot X_d$ represents its expectation under the physical measure. In our paper, the manager maximizes EPS even though investors correctly price all assets.

3.2 Leverage Decision

We are studying a manager who must decide how much to borrow when purchasing the assets needed to create a firm. We now outline the implications of her leverage decision. Given how much she borrows, what interest rate will she have to pay? How many shares will she have to issue?

Debt Financing. In exchange for getting *LoanAmt* at time $t = 0$, the manager promises to pay the lender principal plus interest, $(1 + i) \cdot \mathit{LoanAmt}$, at time $t = 1$ where $i \geq r_f$ is the fair interest rate on the loan. Let $\ell \in [0, 1)$ denote the manager's leverage as a fraction of the total purchase price

$$\mathit{LoanAmt}(\ell) \overset{\text{def}}{=} \ell \cdot \mathit{PurchasePrice} \tag{8}$$

The present value of the manager's promised debt payments in year $t = 1$ is

$$\begin{aligned} \mathit{ValueOfDebt} = q_u &\cdot \{(1 + i) \cdot \mathit{LoanAmt}\} \\ &+ q_d \cdot \min\{(1 + i) \cdot \mathit{LoanAmt}, \mathit{ValueOfFirm}_d\} \end{aligned} \tag{9}$$

If the up state gets realized in year $t = 1$, the manager will make her promised debt payment, $(1+i) \cdot \mathit{LoanAmt}$. However, if the down state gets realized in year $t = 1$, the manager will choose to default and receive \$0 whenever her promised debt payment exceeds the value of her firm, $(1 + i) \cdot \mathit{LoanAmt} > \mathit{ValueOfFirm}_d$.

Suppose the manager took out a measly \$1 loan in year $t = 0$. In this hypothetical scenario, the manager's firm would be guaranteed to be worth more than her promised debt payments in the down state given how small the loan is, $\mathit{ValueOfFirm}_d > (1 + i) \cdot \$1$. The lender would anticipate this and be willing to lend at the riskfree rate. The same logic holds any leverage ratio up to

$$\ell_{\max r_f} \overset{\text{def}}{=} \frac{1}{1 + r_f} \cdot \left(\frac{\mathit{ValueOfFirm}_d}{\mathit{PurchasePrice}} \right) \tag{10}$$

The manager will be able to borrow at $i(\ell) = r_f$ for any $\ell \in [0, \ell_{\max r_f}]$.

If the manager takes out a large enough loan, her promised debt payments may exceed her firm's value in the down state, $\mathit{ValueOfFirm}_d < (1+i) \cdot \mathit{LoanAmt}$.

In this situation, a \$0 payout would be preferable to paying $(1+i) \cdot \mathit{LoanAmt} - \mathit{ValueOfFirm}_d$ out of pocket. The lender recognizes that if the manager uses enough leverage $\ell > \ell_{\max r_f}$, she will default in the down state. And, as a result, the lender quotes her an interest rate above the riskfree rate when $\ell > \ell_{\max r_f}$

$$i(\ell) = \frac{(\$1 - q_u) \cdot \mathit{LoanAmt}(\ell) - q_d \cdot \mathit{ValueOfFirm}_d}{q_u \cdot \mathit{LoanAmt}(\ell)} > r_f \tag{11}$$

We use $\mathit{DefaultSavings}_1 \in \{\mathit{DefaultSavings}_u, \mathit{DefaultSavings}_d\}$ to denote how much money the manager can save by defaulting at time $t = 1$. Since the manager never defaults in the up state, we have $\mathit{DefaultSavings}_u = \$0$. Whereas, the default savings in the down state will depend on the size of the loan

$$\mathit{DefaultSavings}_d \overset{\text{def}}{=} \max\{(1+i) \cdot \mathit{LoanAmt} - \mathit{ValueOfFirm}_d, \$0\} \tag{12}$$

Equity Financing. After borrowing *LoanAmt*, the manager finances the rest of the purchase price of her assets by issuing *#Shares*

$$\begin{aligned} \mathit{EquityFunding} &\overset{\text{def}}{=} \mathit{PurchasePrice} - \mathit{LoanAmt} \\ &= \#\mathit{Shares} \cdot \mathit{PricePerShare} \end{aligned} \tag{13}$$

We use *EquityFunding* to denote the total amount of capital raised by the manager via public equity markets at time $t = 0$.

At time $t = 1$ shareholders get any remaining firm value left over after paying off the debt. The present value of these future equity payouts is given by

$$\begin{aligned} \mathit{ValueOfEquity} = q_u \cdot \{&\mathit{ValueOfFirm}_u - (1+i) \cdot \mathit{LoanAmt}\} \\ &+ q_d \cdot \max\{\mathit{ValueOfFirm}_d - (1+i) \cdot \mathit{LoanAmt}, \$0\} \end{aligned} \tag{14}$$

The owner of each equity share is entitled to $1/\#\mathit{Shares}$ of this time $t = 1$ payout. Just like the lender, shareholders price their portion of the payout correctly.

Choice Variable. The manager in our model takes as given the interest rate, $i(\ell)$, and her share price in equity markets, *PricePerShare*. Then, with this information in hand, she decides how much to borrow, $\mathit{LoanAmt}(\ell)$, and how many shares to issue, *#Shares*, at these prices. Her total amount of debt and equity financing must be enough to cover the purchase price of the firm, $\mathit{LoanAmt} + \mathit{PricePerShare} \cdot \#\mathit{Shares} \geq \mathit{PurchasePrice}$.

Notice that there is really only one choice variable here. *LoanAmt* and *#Shares* are two sides of the same coin. The manager cannot separately choose how much to borrow and how many shares to issue.

This observation stems from twos facts. First, investors price all assets correctly. They are willing to pay $\mathit{PricePerShare} = \mathit{ValueOfEquity} \,/\, \#\mathit{Shares}$ for each share issued at time $t = 0$. Second, the manager cannot increase her EPS by changing the size of each share. Following a reverse split, a company is required to retroactively update previously reported EPS values to reflect its new share count. Hence, once the market has set *PricePerShare*, the manager takes this price as given. Without loss of generality, we will normalize things so that $\mathit{PricePerShare} = \$1$. See Appendix C.2 for more details.

3.3 NPV Maximization

In this subsection, we look at one way that the manager could make decisions: NPV maximization. Textbook theory assumes that she will choose the leverage ratio that maximizes the present discounted value of future equity payouts net of costs

$$\mathit{NPV} \overset{\text{def}}{=} \mathit{ValueOfEquity} - \mathit{EquityFunding} \tag{15}$$

Unfortunately, Modigliani and Miller (1958) tells us that there can be no NPV-maximizing choice of leverage in our idealized benchmark model since it lacks frictions, information asymmetries, and taxes.

Proposition 3.3 (Modigliani and Miller, 1958)**.** *Assume that (a) the cash-flow distribution is fixed, (b) prices are correct, and (c) there are no frictions, information asymmetries, or taxes. In this idealized benchmark, the present value of future equity payouts is equal to the upfront cost of purchasing these claims no matter the leverage level*

$$\mathit{ValueOfEquity}(\ell) = \mathit{EquityFunding}(\ell) \qquad \text{for every } \ell \in [0, 1) \tag{16}$$

Under the textbook NPV-based approach, the manager's leverage decision is ill-posed. Any choice of leverage is just as good as any other. If the manager borrows more, then her equity holders will not have to pay as much at time $t = 0$ for their stake in the firm. But borrowing more will also cause the lender to adjust the terms of the manager's loan, meaning that there will be less firm value left over for equity holders at time $t = 1$. Modigliani and Miller (1958) tells us that these two forces exactly offset one another in an idealized model where there are no frictions, information asymmetries, or taxes.

To make this problem well-posed, you need to introduce two missing ingredients. The first ingredient should cause managers to deviate from the idealized benchmark. The second ingredient is there to ensure that the resulting deviation is not infinitely large. For example, trade-off theory (Taggart, 1977) argues that NPV-maximizing managers lever up to exploit an interest tax shield but do not use infinite leverage due to bankruptcy costs. It is a similar workflow to using the limits-to-arbitrage paradigm in behavioral finance (Shleifer and Vishny, 1997). Both paradigms require introducing pairs of ad hoc features.

3.4 EPS Maximization

Now let's look at a different approach to the manager's leverage decision: EPS maximization. This is what the managers of large public corporations say that they are doing.

How NPV Differs From EPS. Suppose that the manager chooses the leverage ratio that results in the highest EPS. How is this objective different? To answer this question, it will be helpful to look at

$$NPVratio \overset{\text{def}}{=} \frac{ValueOfEquity}{EquityFunding} \tag{17}$$

rather than $NPV = ValueOfEquity - EquityFunding$. Both measures have exactly the same economic content since $NPV > 0$ corresponds to $NPVratio > 1$ and vice versa. However, it will be convenient to compare EPS with $NPVratio$ since both have the same denominator when normalizing $PricePerShare = \$1$.

Proposition 3.4a (How NPV Differs From EPS)**.** *Any difference between a company's NPV and EPS must be driven a difference between the present value of all future equity payouts and the expected value of the firm's earnings next year*

$$\begin{aligned} NPVratio - EPS &\propto ValueOfEquity - \mathbb{E}[Earnings_1] && (18a) \\ &= (\tilde{\mathbb{E}} - \mathbb{E})[NOI_1 - i \cdot LoanAmt] \\ &\quad + \tilde{\mathbb{E}}[ValueOfAssets_1 - LoanAmt] && (18b) \\ &\quad + \tilde{\mathbb{E}}[DefaultSavings_1] \end{aligned}$$

Since all Modigliani and Miller (1958) assumptions hold in our model, any choice of leverage is just as good as every other. EPS maximization is merely a selection criterion in this setting. Even outside of a stylized Modigliani and Miller (1958) world, EPS- and NPV-maximizing choices can coincide.

However, there are situations where maximizing EPS and maximizing NPV do lead to different outcomes. Proposition 3.4a shows how to interpret precisely these situations. Any observed difference must stem from some combination of the following three factors:

(a) EPS-maximizing managers do not risk adjust their firms' cash flows in year $t = 1$. This is the first term in Equation (18b), $(\tilde{\mathbb{E}} - \mathbb{E})[NOI_1 - i \cdot LoanAmt]$.

(b) EPS-maximizing managers do not account for long-term changes in firm value. This is the second term in Equation (18b), $\tilde{\mathbb{E}}[ValueOfAssets_1 - LoanAmt]$, and it explains why people associate EPS maximization with short-term thinking (Dimon and Buffett, 2018; Almeida, 2019; Terry, 2023).

(c) EPS-maximizing managers do not consider the value of their default option. This is the third term in Equation (18b), $\tilde{\mathbb{E}}[DefaultSavings_1]$. Even if the manager knows she will default in the down state, GAAP accounting standards say that her expected earnings should reflect her promised debt payment. Hence, a \$1 increase in interest payments, $i \cdot LoanAmt$, will always decrease expected earnings by \$1. Interest payments are treated as a known expense rather than a random variable.

How Managers Think. Imagine that the manager was initially planning on using some leverage ratio $\ell_0 \in [0, 1)$. Then she asked herself: "Would my EPS go up if I changed my initial plan a little bit, $\ell_0 \to \ell_\epsilon = (\ell_0 + \epsilon)$?" To be concrete, suppose that she considers a tiny $\epsilon > 0$ increase in leverage.

On one hand, bumping up her leverage would lower her expected earnings next year by increasing her promised debt payment. The manager would have to pay interest on a loan that was $\epsilon \cdot \mathit{PurchasePrice}$ larger. And if her debt was already risky, $\ell_0 > \ell_{\max r_f}$, then adding more leverage would increase her interest rate a little bit. Let $i(\ell_\epsilon) = i(\ell_0) \cdot [1 + \delta(\ell_0)]$ denote the manager's interest rate on the slightly larger loan. We write the elasticity of interest with respect to leverage as $\delta(\ell) \overset{\text{def}}{=} \ell \cdot [i'(\ell)/i(\ell)]$ with $\delta(0) = 0$.

On the other hand, using more debt would allow the manager to issue fewer shares since $\mathit{PricePerShare} \cdot \#\mathit{Shares} = (1 - \ell) \cdot \mathit{PurchasePrice}$. An ϵ increase in the manager's leverage would reduce her share count by $(\epsilon \cdot \mathit{PurchasePrice})/\mathit{PricePerShare}$. Under the normalization that $\mathit{PricePerShare} =$ \$1, this trade off leads an EPS-maximizing manager to reason as follows.

Proposition 3.4b (How Managers Think). *Suppose an EPS-maximizing manager changes her leverage by a tiny amount, $\ell_0 \to \ell_\epsilon = (\ell_0 + \epsilon)$, and adjusts her equity issuance to compensate. This small change will alter her firm's EPS by an amount*

$$\tfrac{\mathrm{d}}{\mathrm{d}\epsilon}\big[EPS(\ell_0 + \epsilon)\big]_{\epsilon=0} = \frac{1}{1-\ell_0} \cdot \{\, EY(\ell_0) - i(\ell_\epsilon) \,\} \tag{19}$$

$EY(\ell_0) = \mathbb{E}[Earnings_1(\ell_0)]\ /\ ValueOfEquity(\ell_0)$ is the manager's initial earnings yield. $i(\ell_\epsilon) = i(\ell_0) \cdot [1 + \delta(\ell_0)]$ is the interest rate she gets quoted when she calls up her lender and asks for a slightly larger/smaller loan, and $\delta(\ell) = \ell \cdot [i'(\ell)/i(\ell)]$ is the elasticity of her interest rate with respect to leverage.

If the manager's original earnings yield is higher than her new interest rate, $EY(\ell_0) > i(\ell_\epsilon)$, then the manager will view equity as expensive compared to debt, $\tfrac{\mathrm{d}}{\mathrm{d}\epsilon}\big[EPS(\ell_0 + \epsilon)\big]_{\epsilon=0} > 0$. She will think it is a good idea to increase her leverage. By contrast, if the manager's original earnings yield is lower than her adjusted interest rate, $EY(\ell_0) < i(\ell_\epsilon)$, then she will view equity as the cheaper option, $\frac{\mathrm{d}}{\mathrm{d}\epsilon}\big[EPS(\ell_0 + \epsilon)\big]_{\epsilon=0} < 0$. Given the option, she would try to increase her EPS by borrowing even less.

Proposition 3.4b explains why managers often talk about their earnings yield as a cost of capital (Graham and Harvey, 2001). EPS-maximizing managers are constantly thinking to themselves: "A high earnings yield implies that equity financing is more costly. A high earnings yield implies that equity financing is more costly. [...] A high earnings yield implies that equity financing is more costly." Recite this mantra enough times, and you too would start thinking of your earnings yield as a cost of capital.

To be clear: we are not arguing that managers should be conflating these two ideas. A stock's dividend yield is not the same thing as its expected return. Likewise, a company's earnings yield is not the same thing as its return on equity. Proposition 3.4b simply explains why it would be natural for an EPS-maximizing manager to think this way.

Unique EPS-Maximizing Leverage. Next we show that there is a unique EPS-maximizing leverage ratio even in our frictionless information-symmetric model where all Modigliani and Miller (1958) assumptions hold. When the manager's earnings yield is high, she levers up a bit. When her earnings yield is low, she tries to reduce her leverage. Given any initial leverage ratio, $\ell_0 \in [0, 1)$, this process will lead her to the single EPS-maximizing leverage ratio, $\ell_\star$.

Proposition 3.4c (Unique EPS-Maximizing Leverage)**.** *Either $EPS(\ell)$ is maximized at $\ell = 0$, or there is a unique interior choice of $\ell \in (0, 1)$ that satisfies*

$$\frac{\mathrm{d}}{\mathrm{d}\epsilon}\big[EPS(\ell + \epsilon)\big]_{\epsilon=0} = 0 \tag{20}$$

Either way, given any initial starting point $\ell_0 \in [0, 1)$, the logic outlined in Proposition 3.4b produces a single EPS-maximizing leverage ratio, $\ell_\star$.

Recall that EPS maximization is not a mistake in our benchmark model. If Modigliani and Miller (1958) holds, then every choice of leverage is just as good as any other. EPS maximization in our benchmark model is best thought of as a selection criterion rather than a behavioral tick.

Also recall that all risky payouts in our model are priced correctly. Thus, while it can sometimes lead managers to make bad choices, the EPS-maximization paradigm requires neither managers nor markets to be irrational. We think it is likely that investors also care about EPS. However, in this paper, we show that many otherwise puzzling phenomena can be explained using a model where only the manager cares about EPS.

Value vs. Growth. In a world where managers are EPS maximizers, there will be two types of firms that finance themselves in completely different ways. The EPS-maximization problem itself is smooth and continuous. The sharp qualitative change is not baked into the model. Instead, it emerges as a consequence of the fact that the manager cannot borrow at less than the riskfree rate, $i(\ell) \geq r_f$. This practical limitation leads to a bifurcation in her decision-making.

To see why, imagine that our manager is initially planning on buying her firm's assets using no debt, $\ell_0 = 0$. Earnings are the same as expected cash flows in the absence of debt. So, in this setting, Gordon-growth logic would apply and the manager's unlevered earnings yield would be $EY(0) = r - g$ since

$$\frac{1}{EY(0)} = \frac{ValueOfEquity(0)}{\mathbb{E}[Earnings_1(0)]} = \frac{PurchasePrice}{\mathbb{E}[NOI_1]} = \frac{1}{r - g} \tag{21}$$

$r - g$ is often called the cash flow capitalization rate (a.k.a., the "cap rate").

Lemma 3.4 (Borrowing The First \$1)**.** *Suppose a manager initially planned on using zero leverage $\ell_0 = 0$. If she instead borrowed* \$1 *at the riskfree rate, thereby increasing her leverage by a tiny amount ϵ, then her firm's EPS would change by*

$$\tfrac{\mathrm{d}}{\mathrm{d}\epsilon}\big[EPS(0+\epsilon)\big]_{\epsilon=0} = \underbrace{EY(0)}_{\text{cap rate}} - r_f \tag{22}$$

Would the manager think it is a good idea to increase her leverage a tiny bit by borrowing a single \$1 at the riskfree rate? Lemma 3.4 tells us that the answer depends on how her unlevered earnings yield (i.e., her cap rate) compares to the riskfree rate.

First, suppose that the manager's unlevered earnings yield is below the riskfree rate

$$EY(0) = r - g < r_f = i(\epsilon) \tag{23}$$

In this case, Equation (22) tells us that she would like to reduce her leverage. But $\ell_0 = 0$ is as low as she can go. So she does the next best thing and follows through on her initial all-equity plan, $\ell_\star = \ell_0 = 0$.

Now, suppose the exact same manager is creating a different kind of company with a higher cap rate, $EY(0) = r - g > r_f = i(\epsilon)$. In this new scenario, the manager would no longer stick to her initial equity-only plan, $\ell_0 = 0$. Equation (22) indicates that the manager could increase her EPS by borrowing just a little, $\ell_\star > \ell_0 = 0$. She will view the first \$1 of debt borrowed as less expensive than the last share of equity she was initially planning on issuing.

Proposition 3.4d (Value vs. Growth)**.** *There will be a large qualitative change in the optimal leverage of an EPS-maximizing manager at the threshold, $EY(0) = r_f$, where the manager's unlevered earnings yield is exactly equal to the riskfree rate*

$$\ell_\star \begin{cases} = 0 & \text{if } EY(0) < r_f \quad \text{(growth stocks)} \\ \geq \ell_{\max r_f} & \text{if } EY(0) > r_f \quad \text{(value stocks)} \end{cases} \tag{24}$$

At the moment, researchers currently define value and growth firms by sorting stocks on some measure of fundamental value to price. The names at the top of the list are value stocks. The ones at the bottom get the "growth" label. "In academia, the predominant way to measure value is to use the book value of a firm's equity relative to its market value, referred to as the book-to-market ratio (B/M). However, we know of no theoretical justification for it as the true measure of value, versus other reasonable competitors. (Asness, Frazzini, Israel, and Moskowitz, 2015)"

The principle of EPS maximization suggests using one of these reasonable competitors—namely, earnings yield. But, instead of doing a cross-sectional sort, the theory defines a "growth stock" as any company whose unlevered earnings yield is below the riskfree rate, $EY(0) < r_f$. Growth stocks have high price-to-earnings ratios (P/E). Shareholders have to pay a lot for each \$1 of earnings. By contrast, a “value stock” is any company where $EY(0) > r_f$. These companies have low P/E ratios, making it cheap to buy each $1 of their earnings.

Proposition 3.4d shows that these two kinds of firms will not just have different P/E ratios. They will also finance themselves in starkly different ways. Our model predicts that growth firms will use no debt; whereas, value firms will never borrow just a little. The discontinuous jump in leverage at $EY(0) = r_f$ is a consequence of the fact that earnings yield initially increases with leverage, $EY(\epsilon) > EY(0)$, while the cost of debt remains the same, $i(\ell) \cdot [1 + \delta(\ell)] = r_f$ for all $\ell \in [0, \ell_{\max r_f}]$. So if it makes sense to borrow one dollar, $EY(0) > r_f = i(0) \cdot [1 + \delta(0)]$, then it makes even more sense for her to borrow two, $EY(\epsilon) > EY(0) > r_f = i(\epsilon) \cdot [1 + \delta(\epsilon)]$. And the next dollar of debt will look even more attractive, $EY(2 \cdot \epsilon) > EY(\epsilon) > EY(0) > r_f = i(2 \cdot \epsilon) \cdot [1 + \delta(2 \cdot \epsilon)]$. For value firms, this positive feedback loop will continue at least until the manager has exhausted all her riskfree borrowing capacity, $\ell_\star \geq \ell_{\max r_f}$.

Mapping To Observables. Proposition 3.4b says that an EPS-maximizing manager will home in on her optimal leverage ratio by comparing her current earnings yield to the interest rate on a slightly altered loan, $EY(\ell_0) \lesseqgtr i(\ell_\epsilon)$. She always follows the same line of reasoning. However, we learn from Proposition 3.4d that this reasoning will lead to very different outcomes depending on whether her firm’s unlevered earnings yield (a.k.a., her “cap rate”) is above or below the riskfree rate, $EY(0) = r - g \lesseqgtr r_f$.

In an ideal world, researchers would be able to observe both sides of both comparisons. Unfortunately, standard data sources only allow us to compute one side of each one. We can use analyst forecasts to compute a company’s earnings yield given the manager’s optimal choice of leverage, $EY(\ell_\star)$. But most sell-side analysts do not submit separate forecasts for each firm’s cap rate, $EY(0) = r - g$. Conversely, data on the prevailing riskfree rate r_f is readily available. But, when a manager calls up their lender to get a quote on a slightly bigger or smaller loan, we do not get to hear how their lender responds, $i(\ell_\epsilon)$.

To be clear: It is reasonable to expect managers to have access to all this information. Researchers do not have data on one side of each comparison. So, in our empirical analysis, we will split the difference and construct a new variable out of the two halves that we can observe. We call this variable "excess earnings yield" and define it as follows

$$ExcessEY \overset{\text{def}}{=} EY(\ell_\star) - r_f \tag{25}$$

While it would be great to have access to better data, we are not merely going to treat *ExcessEY* as a noisy proxy for $EY(0) - r_f$ and hope for the best. Our model predicts when and how the thing we can observe, *ExcessEY*, will differ from the thing we cannot observe, $EY(0) - r_f$.

Proposition 3.4e (Mapping To Observables)**.** *A firm's excess cap rate will have the same sign as its observed excess earnings yield*

$$EY(0) = r - g \begin{cases} < r_f & \Rightarrow \quad EY(\ell_\star) = EY(0) \\ > r_f & \Rightarrow \quad EY(\ell_\star) \geq EY(0) \end{cases} \tag{26}$$

A growth stock's observed excess earnings yield will be unlevered, $ExcessEY = EY(0) - r_f < 0\%$*; whereas, the observed excess earnings yield of a value stock will be strictly larger than its unlevered counterpart,* $ExcessEY > EY(0) - r_f > 0\%$*.*

We would like to be able to directly observe a manager's views about her company's cap rate as well as the quotes she has received on alternative lending arrangements. Unfortunately, we cannot. Nevertheless, Proposition 3.4e says that we can still use the data we can observe to classify growth and value stocks. If a firm is a growth stock, then it will have $ExcessEY < 0\%$ and vice versa.

The main drawback of using *ExcessEY* is that it will smooth out the sharp change in financing decisions at the growth-vs-value threshold. Whenever our theory predicts a discontinuous jump at $EY(0) = r_f$, we should see a steady increase/decrease starting at $ExcessEY = 0\%$ in our empirical analysis.

Think about a growth stock whose cap rate is just barely below the riskfree rate, $EY(0) - r_f = -\epsilon$. Suppose that this firm's cap rate rises a little bit, pushing it over the threshold and turning it into a value stock. Our theory predicts that an EPS-maximizing manager will immediately lever up, which will cause her observed earnings yield to rise, $EY(\ell_\star) \geq EY(0)$. Thus, when using her observed

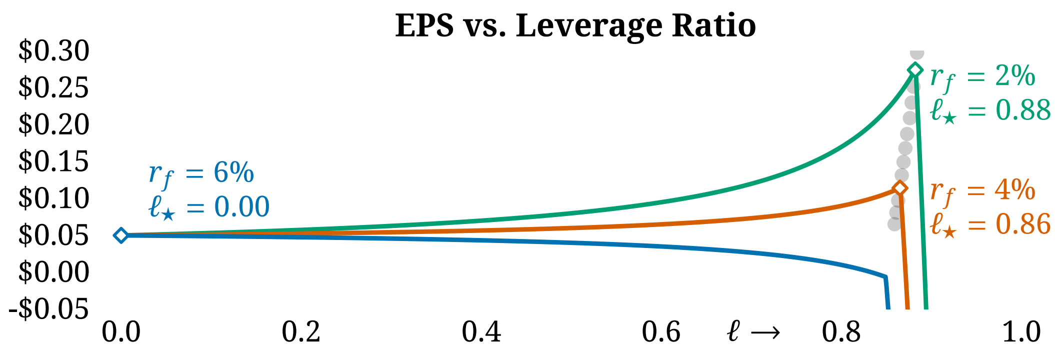


Figure 5. *x-axis: Candidate leverage ratio, $\ell \in [0, 1)$. y-axis: Earnings per share, $EPS(\ell)$. Each line reports results for a different riskfree rate, $r_f \in \{2\%, 4\%, 6\%\}$. All other parameters are the same for all three lines: $\mathbb{E}[NOI_1] = \$5.00$, $u = 27\%$, $d = 18\%$, $r = 10\%$, $g = 5\%$, and $p_u = 40\%$. White diamonds show the EPS-maximizing leverage for a particular r_f. Gray dots show EPS-maximizing leverages associated with other riskfree rates less than 5% at 25bps increments.*

excess earnings yield as the measuring stick, she will seem farther away from the growth-vs-value threshold than she actually is.

3.5 Numerical Simulations

We conclude this section with a pair of numerical simulations that illustrate how EPS-maximizing managers choose their leverage. This is not a calibration exercise. The parameter values were not chosen to match real-world moments. Our aim is to illustrate the underlying economic intuition.

Figure 5 reports $EPS(\ell)$ over the full range of leverage ratios $\ell \in [0, 1)$. There are three lines. Each one is associated with a different riskfree rate, $r_f \in \{2\%, 4\%, 6\%\}$. Everything else is the same for all three lines: $\mathbb{E}[NOI_1] = \$5.00$, $u = 27\%$, $d = 18\%$, $r = 10\%$, $g = 5\%$, and $p_u = 40\%$.

When $\boldsymbol{r_f = 6\%}$, the firm is a growth stock, $r - g = 10\% - 5\% = 5\% < \boldsymbol{6\% = r_f}$. In this scenario, the highest point on the blue line is indicated by the diamond all the way on the left-hand side of the figure. The manager maximizes her EPS by using no leverage whatsoever, $\boldsymbol{\ell_\star = 0.00}$.

By contrast, when $\boldsymbol{r_f = 2\%}$ and when $\boldsymbol{r_f = 4\%}$, the firm is a value stock. In both cases, the firm's cap rate, $r - g = 5\%$, is larger than the riskfree rate. So the manager maximizes her EPS by borrowing a substantial amount, $\boldsymbol{\ell_\star = 0.88}$

Observed Change In Leverage

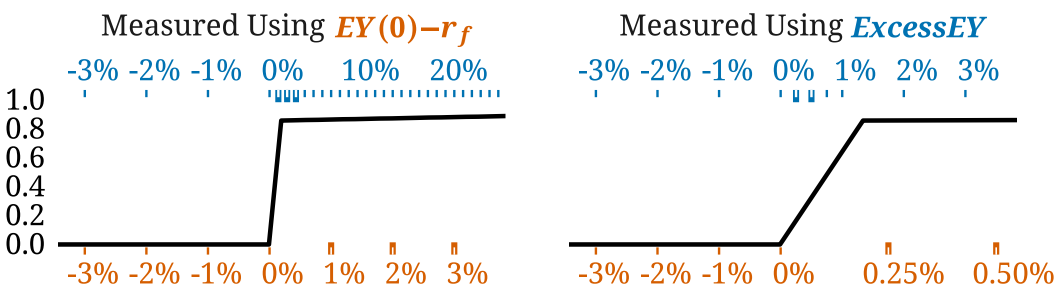


Figure 6. *The thick black lines show the same firm's EPS-maximizing leverage, $\ell_\star$, as it transitions from being a growth stock to a value stock. Simulation parameters are $\mathbb{E}[NOI_1] = \$5.00$, $u = 27\%$, $d = 18\%$, $r = 10\%$, $g = 5\%$, and $p_u = 40\%$. Top x-axis shows the firm's observed excess earnings yield, $\boldsymbol{ExcessEY = EY(\ell_\star) - r_f}$. The bottom x-axis shows the firm's excess cap rate, $\boldsymbol{EY(0) - r_f}$.* (Left Panel) *How the change in EPS-maximizing leverage looks when using a firm's excess cap rate, $\boldsymbol{EY(0) - r_f}$, to measure distance from the value-vs-growth threshold. Tick marks on the bottom x-axis remain equally spaced, but the top x-axis gets compressed for value stocks.* (Right Panel) *How the exact same data look when using $\boldsymbol{ExcessEY = EY(\ell_\star) - r_f}$. Now, the tick marks on the top x-axis remain equally spaced while the bottom x-axis gets stretched out for value stocks.*

and $\boldsymbol{\ell_\star = 0.86}$. Even when $(r - g) - \boldsymbol{r_f} = 5\% - \boldsymbol{4\%} = 1\%$, the EPS-maximizing leverage ratio is already $\boldsymbol{\ell_\star = 86\%}$ of the purchase price.

Figure 6 shows how the sharp change in leverage at $EY(0) = r_f$ will appear in a world where researchers can only observe $\boldsymbol{ExcessEY}$. The thick black line in both panels shows the EPS-maximizing choice of leverage changes as the firm transitions from a growth stock to a value stock. All parameter values are the same as in Figure 5. The top x-axis in each panel measures $\boldsymbol{ExcessEY}$; whereas, the bottom x-axis measures $\boldsymbol{EY(0) - r_f}$.

A company with a negative excess cap rate, $\boldsymbol{EY(0) - r_f < 0\%}$, is a growth stock and will have zero leverage. If this company's excess cap rate rises enough to become positive, $\boldsymbol{EY(0) - r_f > 0\%}$, it will become a value stock. The EPS-maximizing manager of this firm will want to lever up, which in turn will increase her earnings yield, $EY(\ell_\star) > EY(0)$. As a result, a +1% change in the excess cap rate of a value firm will be associated with a much larger change in the firm's excess earnings yield.

4 Three Applications

This section analyzes three more applications of the principle of EPS maximization. First, suppose that market conditions change immediately after our manager purchases the assets needed to create her company. How will she adjust her capital structure in response? This analysis leads to predictions about share repurchases. Second, now suppose that right after the manager creates her company, she becomes aware of a new project. When will she choose to undertake this new project? How will she finance it? This analysis leads to predictions about cash accumulation and M&A method of payment. Third, we show that, because EPS is not risk adjusted, there can be positive-NPV projects which dilute a company's EPS and vice versa. This analysis gives future empirical researchers the necessary tools for studying EPS accretion/dilution concerns.

4.1 Ex Post Restructuring

Here is the scenario. Consider the manager from the previous section. Suppose she has just finished buying assets and creating her firm in year $t = 0$. And, immediately after the ink dries on the paperwork, market conditions change. Let ℓ_0 denote her optimal leverage given market conditions when she initially started the company, and let $\ell_\epsilon = (\ell_0 + \epsilon)$ denote her ideal leverage ratio under current market conditions. This reformulation of our original problem sheds light on why managers repurchase shares.

Proposition 4.1 (Share Repurchases). *Following the change in market conditions, an EPS-maximizing manager will undertake a debt-financed share-repurchase plan that increases her leverage $\ell_0 \to \ell_\epsilon = (\ell_0 + \epsilon)$ whenever*

$$EY(\ell_0) > i(\ell_\epsilon) \tag{27}$$

$EY(\ell_0) = \mathbb{E}[Earnings_1(\ell_0)] \,/\, ValueOfEquity(\ell_0)$ is the earnings yield for the firm's existing shareholders. $i(\ell_\epsilon)$ is the firm's interest rate after repurchasing shares.

If the manager increases her leverage by ϵ, she will be able to repurchase $(\epsilon \cdot PurchasePrice)/PricePerShare$ shares. But she will also have to pay interest on a larger loan next year. And if the firm's debt was already risky, $\ell_0 > \ell_{\max r_f}$, the manager will also pay a slightly higher interest rate on the larger loan, $i(\ell_\epsilon) = i(\ell_0) \cdot [1 + \delta(\ell_0)] > i(\ell_0)$. These two effects work in opposite directions. Fewer shares outstanding $\Rightarrow$ higher EPS. Higher interest expense $\Rightarrow$ lower EPS. Share repurchases occur when the first effect dominates.

We want to emphasize that this logic is the same as the logic in Proposition 3.4b. The only difference is that now we are talking about repurchasing existing shares rather than how many to issue in the first place. Nothing has to be added to the benchmark setup to account for this phenomenon.

Academics and policymakers have debated long and hard about how to explain share repurchases (Gutierrez and Philippon, 2017; Kahle and Stulz, 2021). But there is not much to explain once you recognize that the managers of large public corporations are EPS maximizers. When you ask them why they do not issue more shares, they often express concerns about diluting their EPS (e.g., Graham and Harvey, 2001). Repurchasing shares is the flip side of the same coin. Managers repurchase shares whenever it boosts their EPS.

It is common to hear managers talk about buying back shares because these shares are undervalued. For example, in a recent Bloomberg News article, an analyst wrote that "the stock buyback by Heineken sends a 'strong message that the board views the shares as undervalued.' (O'Boyle, Gopinath, and Sarah, 1988)" Statements like these have a similar flavor to the market-timing story for equity issuance in Baker and Wurgler (2000, 2002). Our two mechanisms are not mutually exclusive, and in our eyes both are likely at work in real-world asset markets.

That being said, EPS maximization does not require the company's stock to actually be mispriced. There are no arbitrage opportunities in our model. Even if her company's shares are priced correctly, an EPS-maximizing manager will still want to buy some of them back if her earnings yield is too high relative to prevailing interest rates as described in Proposition 4.1. If investors are also underpricing the manager's shares, then the two effects will reinforce one another. But our mechanism does not require the mispricing, and only value-stock managers would respond to such a mispricing in our model.

4.2 Capital Budgeting

We just analyzed how an EPS-maximizing manager would respond to a change in market conditions. Now, we are going to hold market conditions constant and give her the opportunity to undertake a new project, such as starting a new product line or acquiring a supplier. When will the manager undertake the project? And, when she does, how will she finance the cost?

Project Terms. When the manager purchased her company at time $t = 0$, she did so using the EPS-maximizing leverage ratio at the time, $\ell_\star$. Now, immediately after she completed this purchase, she suddenly realizes that there is a new project her firm could undertake.

This project costs ϵ% of the purchase price of the manager's own company. If the manager decides to finance this project using debt, then she will need to increase her leverage by ϵ. Alternatively, if she relied entirely on equity financing, she would have to issue $\epsilon \cdot \mathit{PurchasePrice}/\mathit{PricePerShare}$ new shares. Either way, the cost needs to be paid immediately in year $t = 0$.

By contrast, the project's benefit is realized in future periods. If the manager decides to undertake the project, then it will boost her expected NOIs by $(b \cdot \epsilon)$% from year $t = 1$ onward where $b \in (0, \infty)$. Note that a $b > 1$ is not the same thing as a positive NPV acquisition. The project's b determines its effect on the firm's expected NOIs. It does not include any sort of risk adjustment.

If Equity Is The Only Option. First, imagine that the manager can only finance the project by issuing new equity. Under the same normalization that $\mathit{PricePerShare} = \$1$ as before, she would have to issue $\epsilon \cdot \mathit{PurchasePrice}/\$1$ new shares to cover the cost. So, if the manager were to undertake the project, her new EPS would be

$$\frac{(1 + b \cdot \epsilon) \cdot \mathbb{E}[\mathit{NOI}_1] - i(\ell_\star) \cdot \mathit{LoanAmt}(\ell_\star)}{\mathit{ValueOfEquity}(\ell_\star) + \epsilon \cdot \mathit{PurchasePrice}} \tag{28}$$

Her expected earnings would be higher, which would be good. But these earnings would be spread across a larger number of shares, which would be bad. Which effect dominates?

Lemma 4.2a (If Equity Is The Only Option)**.** *Suppose a project's cost is small relative to the size of the manager's firm, $\epsilon \to 0$. When the manager only has access to equity financing, she will undertake the project if its boost is sufficiently large*

$$b > \underline{b}_{Equity} \overset{\text{def}}{=} \frac{EY(\ell_\star)}{r - g} \tag{29}$$

$EY(\ell_\star)$ is the original firm's earnings yield prior to starting the project.

The manager thinks about her original company's earnings yield, $EY(\ell_\star)$, as her cost of equity capital. Equation (29) says that, as an EPS-maximizing manager, she will only issue equity to start a new project if it would boost her expected NOIs by a multiple of her cost of equity capital.

If Debt Is The Only Option. Next, consider a scenario where the manager only has access to debt markets. If she decides to borrow money to pay for the project, she would have to increase her leverage by ϵ. In that case, her new EPS would be

$$\frac{(1 + b \cdot \epsilon) \cdot \mathbb{E}[NOI_1] - i(\ell_\star + \epsilon) \cdot LoanAmt(\ell_\star + \epsilon)}{\#Shares(\ell_\star)} \tag{30}$$

Once again, her EPS may be higher or lower depending on how much the project boosts her expected NOIs when compared to its cost.

Lemma 4.2b (If Debt Is The Only Option)**.** *Suppose a project's cost is small relative to the size of the manager's firm, $\epsilon \to 0$. When the manager only has access to debt financing, she will undertake the project if its boost is sufficiently large*

$$b > \underline{b}_{Debt} \overset{\text{def}}{=} \frac{i(\ell_\star + \epsilon)}{r - g} \tag{31}$$

$i(\ell_\star + \epsilon)$ is the manager's new interest rate after borrowing to pay for the project.

When the manager calls up her lender to ask for a slightly larger loan in order to fund the project, $i(\ell_\star + \epsilon)$ is the rate he quotes her. This is the manager's cost of debt capital. Equation (31) says that the manager will undertake the new project if it boosts her expected NOIs in all future periods by more than she will have to pay in interest in these future periods.

If Cash Is Available. In practice, the manager might also have access to a third financing option, which we have yet to discuss—namely, cash. Firms hold more cash than ever before. Bates, Kahle, and Stulz (2009) documents that "the average cash-to-assets ratio for US industrial firms more than [doubled] from 1980 to 2006." And this upward trend has continued in the decade since (Faulkender, Hankins, and Petersen, 2019). Instead of using cash reserves, managers regularly choose to pay for new projects by issuing equity.

Why might managers do this? If there is cash burning a hole in their corporate pockets, why would they choose not to use it? How could this not be the cheapest payment option?

To answer these questions, let's assume that the manager has enough cash to pay for the project, $Cash \geq \epsilon \cdot PurchasePrice$. This cash was not involved in her purchase of the firm. Think about it as a windfall coming right after the ink dries on the first deal. At that very moment, she discovers a briefcase full of cash and spots a costly new project at the same time.

The firm will earn the riskfree rate on any cash holdings. So, in the presence of cash, our formula for the firm's EPS in Equation (1) can be rewritten as follows

$$EPS \overset{\text{def}}{=} \frac{\mathbb{E}[NOI_1] + r_f \cdot Cash - i \cdot LoanAmt}{\#Shares} \tag{32}$$

So, if the manager pays for the new project with cash, her new EPS would be

$$\frac{(1 + b \cdot \epsilon) \cdot \mathbb{E}[NOI_1] + r_f \cdot (Cash - \epsilon \cdot PurchasePrice) - i \cdot LoanAmt}{\#Shares} \tag{33}$$

The logic behind when it would be worthwhile to undertake the project would then be the same as when thinking about equity or debt.

Lemma 4.2c (If Cash Is Available). *Suppose a project's cost is small relative to the size of the manager's firm, $\epsilon \to 0$. If a manager can only finance the project out of cash reserves, she will undertake the project if its boost is sufficiently large*

$$b > \underline{b}_{Cash} \overset{\text{def}}{=} \frac{r_f}{r - g} \tag{34}$$

Capital Budgeting. We now put these results together to see what an EPS-maximizing manager would do when given all three options. The end result of our analysis is a general capital-budgeting rule. Once again, we find that EPS-maximizing managers make very different decisions depending on whether they are running a growth or value firm.

Proposition 4.2 (Capital Budgeting)**.** *Suppose a project's cost is small relative to the size of the manager's firm, $\epsilon \to 0$. If the manager's company is a growth stock, $EY < r_f$, she will undertake the project if $b > 1$ and finance the cost by issuing new shares even if she has cash. If her company is a value stock, $EY > r_f$, she will undertake the project if*

$$b > \begin{cases} \frac{r_f}{r-g} & \text{if she has cash} \\ \frac{EY(\ell_\star)}{r-g} = \frac{i(\ell_\star+\epsilon)}{r-g} & \text{if she does not} \end{cases} \tag{35}$$

where $\frac{i(\ell_\star+\epsilon)]}{r-g} = \frac{EY(\ell_\star)}{r-g} \geq \frac{r_f}{r-g} > 1$. She will finance any such project using cash if possible. If not, she will use a highly levered mix of debt and equity financing.

Proposition 4.2 says that growth and value stocks require projects to meet different hurdles in order to get funded. And, conditional on meeting this hurdle, each kind of company will finance the cost in a different way.

The EPS-maximizing manager of a growth firm will have just purchased her firm's assets using $\ell_\star = 0$. Hence, we see from Lemma 4.2a that she would be willing to fund any project with boost above $\underline{b}_{Equity} = \frac{EY(0)}{r-g} = 1$ by issuing shares. In other words, she is willing to pay ϵ% of her firm's purchase price so long as the project will boost her expected NOIs by at least ϵ%. And, whenever such a project comes along, she will always see new issuance as the cheapest financing option since $EY(0) = r - g < r_f = i(\epsilon)$.

By contrast, if we put the same EPS-maximizing manager in charge of a value firm, then she would be working from a different starting point, $EY(0) = r - g > r_f$. She will have just purchased her firm's assets using a substantial amount of leverage, $\ell_\star \geq \ell_{\max r_f}$. In fact, from Proposition 3.4d that she would have used up all her riskfree borrowing capacity when creating her company. As a result, if the manager were to borrow more to finance the additional project, then she would now face an interest rate above the riskfree rate $i(\ell_{\max r_f} + \epsilon) > r_f$.

From this, we can infer that if the manager does not have any cash reserves, then she will require a higher minimum boost from her projects, $\underline{b}_{Equity} = \frac{EY(\ell_{\max r_f})}{r-g} = \frac{i(\ell_{\max r_f}+\epsilon)}{r-g} = \underline{b}_{Debt} > 1$. However, if the manager of a value stock has cash on hand, then everything changes. She will see this cash as the cheapest source of financing and be willing to fund any project with a boost greater than $\underline{b}_{Cash} = \frac{r_f}{r-g} < 1$. Without cash, the EPS-maximizing manager of a value stock is more stingy than she would be when running a growth stock. With cash, she suddenly becomes extravagant, freely dispensing money to low-boost projects until her reserves run dry.

At this point, it is worth highlighting a pair of connections to older strands of the corporate-finance literature. First, there is the pecking-order theory of capital structure. "According to Myers (1984), due to adverse selection, firms prefer internal to external finance. When outside funds are necessary, firms prefer debt to equity because of lower information costs associated with debt issues. Equity is rarely issued. (Frank and Goyal, 2003)" We generate a similar pattern for value stocks without any adverse selection. Managers are simply maximizing EPS. Our approach also explains why many firms (growth stocks) do not behave in a way that is consistent with pecking-order theory.

Second, Fazzari, Hubbard, and Petersen (1988) kicked off a debate in the 1990s by arguing that more financially constrained firms have higher investment-cash flow sensitivities. Our model says that the managers of value stocks will have high investment-cash flow sensitivities because they are maximizing EPS, even if they are not financially constrained. By contrast, the EPS-maximizing manager of a growth stock will have a low investment-cash flow sensitivity even if she is constrained. Given high interest rates at the time, this distinction between value and growth stocks helps makes sense of the conflict between Fazzari, Hubbard, and Petersen (1988)'s original findings and Kaplan and Zingales (1997)'s subsequent analysis.

Cash Accumulation. The corollary below summarizes this logic in the form of a testable prediction we can bring to the data in the following section.

Corollary 4.2a (Cash Accumulation)**.** *The cash holdings of growth stocks should increase rapidly since an EPS-maximizing manager of a growth firm, $EY(0) < r_f$, will never use this money to finance new projects.*

Suppose a value stock, $EY(0) > r_f$, initially has some cash holdings. An EPS-maximizing manager will quickly deplete these reserves, and her cash holdings should hover around zero in the steady state.

Textbook theory assumes that managers are NPV maximizers. In that framework, if you want to explain why a manager does not pay for a costly new project using cash on hand, then you must introduce some market imperfection such as a precautionary-savings motive or tax differential. By contrast, the simplest possible model of EPS maximization naturally explains why some firms hoard cash and others do not.

For growth firms, the cost of equity capital is lower than the riskfree rate, $EY(0) = r - g < r_f$. So they will finance any new project by issuing equity even when cash is present. Whereas, the EPS-maximizing manager of a value stock will always see cash as the cheapest financing option, $r_f < EY(\ell_{\max r_f}) = i(\ell_{\max r_f} + \epsilon)$. Only after cash is gone will she turn to equity and debt markets. And, with cash in hand, she may even fund projects with $b < 1$.

We note that, if investors also had a preference for dividend-paying stocks, then it would be cheaper for growth stocks to cater to that preference (Baker and Wurgler, 2004). But, since the current paper already generates a wide range of results, we leave that analysis for a future paper.

M&A Method Of Payment. Our analysis of the manager's capital-budgeting decision could be applied to any costly new project. However, when we apply it to the particular case of M&A deals, we get a clear testable prediction. Growth stocks have extremely low earnings yields, $EY(0) < r_f$, which means that equity investors are willing to pay a lot for each \$1 of the firm's earnings. Thus, when a growth stock acquires another firm, the manager should see new issuance as the cheapest way to pay target shareholders.

Corollary 4.2b (M&A Method Of Payment)**.** *If the acquirer is a growth stock, $EY(0) < r_f$, then target shareholders should be paid with shares of the acquirer's equity. If the acquirer is a value stock, $EY(0) > r_f$, target shareholders will mainly be compensated with cash, either from existing reserves or via borrowing.*

While Corollary 4.2b only deals with how target shareholders get paid, we note that Proposition 4.2 also has implications for the kinds of mergers that will take place. A value stock which has just received a large influx of cash will be most willing to perform an acquisition. This kind of firm has the lowest boost requirement. A growth stock has a minimum required boost that is slightly higher, and a value stock without cash has the highest boost threshold.

However, in our empirical analysis, we focus exclusively on the method of payment chosen by the acquiring firm. We cannot directly observe the boost in NOIs that this manager expects the completed M&A deal to produce. Researchers could quite reasonably disagree on how best to estimate this quantity. By comparison, there can be no disagreement about how target shareholders were compensated. Did they receive cash or shares of the acquirer's own stock? We can observe the answer to this question in our data.

4.3 Accretion And Dilution

Last but not least, market commentators sometimes complain about profitable acquisitions not taking place because they would dilute the acquirer's EPS (Andrade, 1999). Proposition 4.3 shows how to incorporate this logic into our model. The key observation is that EPS-maximizing managers do not risk adjust a project's future benefits. They only care about expected boost in their NOIs. As a result, if a project provides insurance against unlikely future events, it is possible for it to reduce EPS (physical measure) while simultaneously increasing NPV (risk-neutral measure).

To formalize this reasoning, we need to introduce one small tweak to the model. Suppose a project boosts the manager's expected future NOIs by b_u in the up state and b_d in the down state next year. If the manager's expected NOIs still go up by b on average, the associate up- and down-state boost profile (b_u, b_d)

must satisfy

$$b = b_u \cdot \{ \, p_u \cdot (1 + u) \, \} + b_d \cdot \{ \, p_d \cdot (1 - d) \, \} \tag{36}$$

Note that there is an entire continuum of boost profiles, (b_u, b_d), associated with each average boost level, $b \in (0, \infty)$. Proposition 4.3 shows that this range of possibilities is large enough to allow for positive-NPV M&A deals which have $b < 1$ on average. It will also contain negative-NPV M&A deals where $b > 1$.

Proposition 4.3 (Accretion And Dilution)**.** *There are average boost levels $b > 1$ for which it is possible to construct negative-NPV boost profiles, (b_u, b_d). There are average boost levels $b < 1$ associated with positive-NPV boost profiles, (b_u, b_d).*

Think about a biotech company whose future profits hinge on the success of a new technology. The company's board expects this critical new technology to pan out, but it also realizes that success is not guaranteed. So they are pushing the firm's manager to acquire a smaller competitor who is developing a competing approach. Because the competitor's approach is less likely to bear fruit, the manager of this growth stock will not pursue the proposed M&A deal. It will lower his expected earnings in most states of the world, $b < 1$. However, it is worth doing precisely because it offers insurance against the unlikely event that the company's own technology falls flat, $b_d \gg 1 > b_u$ but $p_d \ll 1/2$.

5 Empirical Evidence

When asked, the people running large public corporations say that they are trying to increase their EPS. They claim to be EPS maximizers not NPV maximizers. In this section, we show that the observed data supports this claim in exactly the ways that our theoretical model predicts. We first describe our data and provide baseline regression results showing that managers seem to make very different decisions on either side of the model-implied *ExcessEY* = 0% threshold. Then, after documenting that growth and value stocks finance themselves in markedly different ways, we explore four sources of identification which all suggest that the differences are the result of EPS maximization.

5.1 Data Description

Our final dataset contains 74,117 firm-year observations over the period from 1976 to 2022. All variables have been winsorized at the 1st and 99th percentiles within each year.

We start by creating an annual dataset of firm characteristics. We take annual Compustat data and merge on additional variables from WRDS' Ratios Suite using WRDS' own linking algorithm. We also merge on daily price data from CRSP. To be included in our data, a public company must be traded on the one of the three major US exchanges (NYSE, Nasdaq, or AmEx) and have a share price over $5. Following the existing literature, we remove firms in the financial and utility industries (SIC codes 4900-4999 and 6000-6999).

Since we use the PERMNO of a company's primary issuance as a unique identifier for that firm, we will talk about "firms" and "PERMNOs" interchangeably. We report summary statistics at the firm-year level in Table 4. In our regression results, we will double-cluster our standard errors by firm and year.

To calculate each firm's earnings yield and EPS, we rely on data from the IBES unadjusted summary file. For a firm to be included in our analysis for year t, an analyst must have made a next-twelve-month EPS forecast (end of year $t+1$) at some point during the period from 11 months to 13 months prior to the end of the next fiscal year (year $t+1$). Again, we rely on WRDS' own link table to merge the IBES variables onto our dataset of firm characteristics.

We also retrieve data from several other sources. We use the SDC's New Issues dataset to identify firms that will issue new debt and/or equity in the upcoming year. We use the SDC's M&A dataset to identify acquirers and the subset of acquiring firms that chose to pay target shareholders with stock. Finally, we download each firm's simulated pre-interest marginal tax rate from John Graham's website (https://people.duke.edu/~jgraham/taxform.html).

Appendix B contains a detailed recipe showing how to construct each variable used in our analysis. However, a brief example is enough to convey the main ideas. IBM's 2005 fiscal year ended in December 2005. Our model predicts that IBM's excess earnings yield (ExcessEY) on this date should be correlated with its current capital structure (end of FY2005) and its corporate policies over

Summary Statistics

	#	Avg	Sd	Min	Max
	(1)	(2)	(3)	(4)	(5)
ExcessEY	74,117	0.8%	5.4%	−43.3%	25.5%
ExcessEY > 0%	74,117	62.3%			
Total Debt/Assets	74,113	48.3%	22.3%	4.2%	145.2%
Financial Leverage > 0%	74,117	89.4%			
Will Repurchase Shares	66,074	29.3%			
Will Issue Debt	74,117	9.1%			
Will Issue Equity	74,117	7.7%			
ΔCash/Assets	66,074	3.5%	18.5%	−40.5%	323.4%
Will Pay Target w Stock	9,339	29.0%			
$\log_2$(Market Cap)	74,117	29.4	2.6	23.4	38.5
Profitability	74,117	12.1%	13.9%	−89.2%	46.0%
Book To Market (B/M)	72,893	57.7%	43.1%	1.0%	323.2%
Tangibility	74,117	27.3%	22.1%	0.0%	90.5%
Marginal Tax Rate	44,810	32.9%	10.2%	0.0%	46.1%

Table 4. *Sample: Firm-year observations from 1976 to 2022. ExcessEY: Next-twelve-month earnings yield minus the 10-year Treasury rate. Total Debt/Assets: Average total liabilities as a percent of total assets. Financial Leverage >0%: Percent of firm-year observations that have any long-term financial debt. Will Repurchase Shares: Percent of observations where the firm repurchases* ≥ 1% *of its current market cap over the next year. Will Issue Debt: Percent of firm-year observations where the firm issues new debt during the next year. Will Issue Equity: Percent of firm-year observations where the firm issues new equity during the next year.* Δ*Cash/Assets: Average change in cash and cash equivalents over the next year as a percent of firms' total assets in the current year. Will Pay Target w Stock: Of the firm-year observations that made an acquisition during the following year, what percent delivered more than half of all value to target shareholders via their own stock?* $\log_2$*(Market Cap): Average of the base-2 log of total market capitalization. Profitability: Average operating income before depreciation as a percent of total assets. Book To Market: Book value of equity as a percent of market capitalization. Tangibility: Net PP&E spending as a percent of total assets. Marginal Tax Rate: Pre-interest marginal tax rate as calculated in Graham (1996).*

the next twelve months (FY2006). We calculate IBM's earnings yield by dividing analysts' consensus next-twelve-month EPS forecast for IBM in December 2005 by the company's price in December 2005. To get to IBM's excess earnings yield, we subtract off the annual 10-year Treasury rate in December 2005. We measure variables related to IBM's capital structure (e.g., Total Debt/Assets) as of the end of FY2005 in December 2005. Whereas, we measure changes in corporate policies (e.g., Will Repurchase Shares, ΔCash/Assets, and Will Pay Target w Stock) using data from FY2006 (January to December 2006).

5.2 Baseline Results

We now present regression results to support the four baseline empirical results shown in Figure 2. From the figure, we already know that there are large qualitative differences in the financing decisions made by growth and value stocks. Our goal in this first part of our empirical analysis is to quantify the size of the gap and show that it cannot be explained by any obvious confounds. Then, once this is out of the way, we will spend the remainder of the paper identifying EPS maximization as the cause of these differences.

Capital Structure. Proposition 3.4d predicts that there should be a large difference between the amount of leverage used by growth and value stocks. Growth firms should finance themselves using mostly equity. The EPS-maximizing manager of a value stock will, at the very least, use up all her riskfree borrowing capacity. We assess how big this difference is in Table 5a by running regressions of the form below

$$\text{Total Debt/Assets}_{n,t} = \hat{\alpha} + \hat{\beta} \cdot \text{Is Value Stock}_{n,t} + \cdots + \hat{\varepsilon}_{n,t} \tag{37}$$

Total Debt/Assets$_{n,t}$ is the nth firm's total liabilities as a percent of its total asset value in year t, and Is Value Stock$_{n,t} = 1_{\{\text{ExcessEY}_{n,t} > 0\%\}}$ indicates whether the firm had a positive excess earnings yield.

Column (1) reveals that the typical value stock has 10.00%pt higher leverage than the typical growth stock. In column (2), we add year fixed effects to Equation (37), and the effect size hardly changes. Since all firms face the same riskfree rate each year, the identical point estimates in columns (1) and (2) tell us that our results are not driven by changing interest-rate regimes.

By contrast, the effect size does drop to $\hat{\beta}$ = 3.41%pt in column (3) when we include firm fixed effects. Growth stocks tend to remain growth stocks. Most value stocks in year t will also have positive excess earnings yields in year $(t+1)$. This makes things more challenging from an identification perspective. We need to make sure that we are not simply comparing apples to oranges, and later we will confirm that growth suddenly start behaving like value stocks right after their excess earnings yield turns positive and vice versa.

The drop from $\hat{\beta}$ = 10.00%pt to 3.41%pt is not a knock on our theory. It is exactly what our model says should happen in a world where firms do not constantly flip back and forth between growth and value. So what would be a serious problem for our theory? If the 10.00%pt effect in column (1) could be attributed to some known difference between our growth and value stocks.

In columns (5) and (6), we show that this is not the case. These columns control for a firm's size, its profitability, its book-to-market ratio, the tangibility of the firm's assets, and the firm's marginal tax rate. Many of these variables have statistically significant coefficient. But their effect sizes are economically tiny, and controlling for these variables does not affect the magnitude of $\hat{\beta}$. We control for marginal tax rates in a separate column because this variable meaningfully reduces our sample size.

Share Repurchases. Proposition 4.1 predicts that value stocks should be much more likely to engage in debt-financed share repurchases that growth stocks. Why? The EPS-maximizing manager of a value stock will keep levering up until her earnings yield is exactly equal to the interest rate she would get charged on a slightly larger loan, $EY(\ell_\star) = i(\ell_\star + \epsilon)$. If market conditions change and her earnings yield rises a bit more for reasons that are out of her control, she will suddenly view her shares as undervalued relative to her cost of debt, making a buy back seem like an attractive proposition. By contrast, the manager of a growth stock starts out with an unlevered earnings yield which is below the riskfree rate, $EY(0) < r_f$, so a small ex post increase in her earnings yield will not change the fact that equity is still her cheapest financing option.

Dep Variable:	Total Debt/Assets				
	(1)	(2)	(3)	(4)	(5)
Is Value Stock ExcessEY > 0%	10.00*** (0.78)	10.02*** (0.69)	3.41*** (0.43)	11.37*** (0.54)	9.88*** (0.56)
$\log_2$(Mkt Cap)				1.76*** (0.14)	1.93*** (0.15)
Profitability				−0.17*** (0.03)	−0.48*** (0.04)
Book to Market				−0.01 (0.01)	−0.01 (0.01)
Tangibility				0.19*** (0.01)	0.18*** (0.01)
Marg Tax Rate					0.26*** (0.05)
Year FE	*N*	*Y*	*N*	*Y*	*Y*
Firm FE	*N*	*N*	*Y*	*N*	*N*
# Obs	74,113	74,113	72,823	72,889	44,306
Adj. R^2	4.7%	6.8%	67.6%	15.2%	16.8%

Table 5a. *Each column reports results for a separate regression. We omit estimates for the intercept and any fixed effects. Total Debt/Assets: Total liabilities as a percent of a firm's total assets in current year. Is Value Stock: One if firm-year observation has a positive excess earnings yield. Numbers in parentheses are standard errors double-clustered by firm-year.* *, **, *and* *** *denote statistical significance at the* 10%, 5%, *and* 1% *levels.*

We quantitatively assess how much more likely value stocks are to repurchase shares in Table 5b using regressions of the form

$$\text{Will Repurchase Shares}_{n,t} = \hat{\alpha} + \hat{\beta} \cdot \text{Is Value Stock}_{n,t} + \cdots + \hat{\varepsilon}_{n,t} \qquad (38)$$

Will Repurchase Shares$_{n,t}$ is an indicator variable that is 100 if the nth firm repurchases $\geq$ 1% of its current market cap in year t over the next twelve months in year $(t+1)$. We use a 0/100 indicator rather than a 0/1 indicator so that $\hat{\beta}$ can be interpreted as a percentage point change.

Column (1) shows that, among all stocks in year t, the ones with positive excess earnings yield are $\hat{\beta} = 18.51$%pt more likely to repurchase shares over the next twelve months. Column (2) shows that the result is not attenuated by

Dep Variable:	Will Repurchase Shares				
	(1)	(2)	(3)	(4)	(5)
Is Value Stock ExcessEY > 0%	18.51*** (1.90)	16.80*** (1.81)	16.21*** (1.26)	12.36*** (1.21)	10.54*** (1.34)
$\log_2$(Mkt Cap)				3.74*** (0.31)	3.69*** (0.32)
Profitability				0.52*** (0.03)	0.56*** (0.05)
Book to Market				0.02** (0.01)	0.01 (0.01)
Tangibility				−0.18*** (0.02)	−0.18*** (0.03)
Marg Tax Rate					0.15*** (0.05)
Year FE	*N*	*Y*	*N*	*Y*	*Y*
Firm FE	*N*	*N*	*Y*	*N*	*N*
# Obs	66,074	66,074	65,142	65,099	40,623
Adj. R^2	3.9%	7.7%	22.0%	13.8%	14.5%

Table 5b. *Each column reports results for a separate regression. We omit estimates for the intercept and any fixed effects. Will Repurchase Shares: 100 if firm repurchases ≥ 1% of its current market cap over the next year. Is Value Stock: 1 if firm-year observation has a positive excess earnings yield. Numbers in parentheses are standard errors double-clustered by firm-year.* ⋆, ⋆⋆, *and* ⋆⋆⋆ *denote statistical significance at* 10%, 5%, *and* 1% *levels.*

including year fixed effects. Moreover, since repurchases are a change in the firm's capital structure over the next year rather than a steady-state outcome, we see little drop in $\hat{\beta}$ when including firm fixed effects in column (3).

In column (4), we include year fixed effects as well as controls for firm size, profitability, book to market, and asset tangibility. Adding these variables to the right-hand side of our regression reduce $\hat{\beta}$ by about 1/3, from 18.51%pt to 12.36%pt. While slightly smaller, this is still an economically large effect. The sample average is 29.35%. Adding each firm's marginal tax rate as a control in column (5) does not change this fact.

Cash Accumulation. Corollary 4.2a predicts that growth stocks should accumulate cash at a much faster rate than value stocks. The EPS-maximizing manager of a growth stock should always view equity as the cheapest source of financing. Any cash that gets added to her balance sheet should stay there as long as her firm has a negative excess earnings yield.

By contrast, if a value stock happens to have cash reserves, its EPS-maximizing manager will prefer using this cash to finance any new projects. Cash will also lower her standards for what constitutes a project worth investing in. Without cash, the EPS-maximizing manager of a growth firm will require a boost of $b > \frac{i(\ell_\star + \epsilon)}{r-g} > 1$. With cash, she only requires a project to have $b > \frac{r_f}{r-g}$. Since she is running a value firm, $EY(0) = r - g > r_f$, this lowered boost hurdle is actually less than one. Both these effects work in the same direction, causing the EPS-maximizing manager of a value stock to rapidly use up any cash.

We quantitatively assess the difference in each kind of company's cash-accumulation rate in Table 5c using regressions of the form

$$\Delta\text{Cash/Assets}_{n,t} = \hat{\alpha} + \hat{\beta} \cdot \text{Is Value Stock}_{n,t} + \cdots + \hat{\varepsilon}_{n,t} \tag{39}$$

$\Delta\text{Cash/Assets}_{n,t}$ is the change in nth stock's cash and cash equivalents over the next twelve months as a percent of its total assets in year t.

Column (1) shows that, among all stocks in year t, the ones with positive excess earnings yield reduce their cash reserves by $\hat{\beta} = 4.81\%$ of their total assets each year. Column (2) shows that the effect is not driven by year-specific considerations. In column (3), we see that about half of the effect can be soaked up by firm fixed effects. Again, this is exactly what one would expect if growth- and value-stock labels were persistent.

In columns (4) and (5), we include year fixed effects as well as controls for firm size, profitability, book to market, asset tangibility, and marginal tax rates. Adding these variables to the right-hand side of our regressions reduces the estimate of $\hat{\beta}$ slightly, but the 1.80%pt difference remains highly significant. It is also economically large. The sample average is just 3.54% per year.

M&A Method Of Payment. Corollary 4.2b predicts that, when acquiring another firm, a growth stock should be much more likely to pay the target shareholders with its own shares. The EPS-maximizing manager of a growth

Dep Variable:	ΔCash/Assets				
	(1)	(2)	(3)	(4)	(5)
Is Value Stock ExcessEY > 0%	$-4.81^{\star\star\star}$ (0.96)	$-5.39^{\star\star\star}$ (0.92)	$-1.55^{\star\star\star}$ (0.43)	$-1.80^{\star\star\star}$ (0.30)	$-1.15^{\star\star\star}$ (0.22)
$\log_2$(Mkt Cap)				$1.76^{\star\star\star}$ (0.06)	$0.42^{\star\star\star}$ (0.05)
Profitability				$-0.07^{\star\star\star}$ (0.02)	$-0.05^{\star}$ (0.03)
Book to Market				$-0.06^{\star\star\star}$ (0.01)	$-0.04^{\star\star\star}$ (0.01)
Tangibility				-0.01 (0.01)	$-0.02^{\star\star}$ (0.01)
Marg Tax Rate					$-0.19^{\star\star\star}$ (0.04)
Year FE	*N*	*Y*	*N*	*Y*	*Y*
Firm FE	*N*	*N*	*Y*	*N*	*N*
# Obs	66,074	66,074	65,142	65,099	40,623
Adj. R^2	1.6%	3.6%	9.1%	7.2%	5.4%

Table 5c. *Each column reports results for a separate regression. We omit estimates for the intercept and any fixed effects. ΔCash/Assets: Change in cash and cash equivalents over next year as a percent of total assets in current year. Is Value Stock: 1 if firm-year observation has a positive excess earnings yield. Numbers in parentheses are standard errors double-clustered by firm-year.* *, **, *and* *** *denote statistical significance at* 10%, 5%, *and* 1% *levels.*

stock will see equity as the cheapest source of financing. She can get a lot of money from equity markets for giving up $1 of earnings. By contrast, the EPS-maximizing manager of a value stock will see equity as expensive. As a result, she will prefer to pay target shareholders with cash if possible. If she does not have any cash on hand, she will borrow the money and deliver cash.

We quantitatively assess the difference in each kind of company's cash-accumulation rate in Table 5d using regressions of the form

$$\text{Will Pay Target w Stock}_{n,t} = \hat{\alpha} + \hat{\beta} \cdot \text{Is Value Stock}_{n,t} + \cdots + \hat{\varepsilon}_{n,t} \qquad (40)$$

This table uses data on a restricted sample. It only includes firm-year observations in which the firm made at least one acquisition in year $(t+1)$. We then define Will Pay Target w $\text{Stock}_{n,t}$ as a 0/100 indicator for acquirers that used their own equity to deliver more than half of all payments to target shareholders. We again use a 0/100 indicator rather than a 0/1 indicator so that $\hat{\beta}$ can be interpreted as a percentage point change.

Column (1) shows that, among all acquirers in year t, the ones with a positive excess earnings yield were $\hat{\beta} = 24.29$%pt less likely to pay target shareholders with their own stock. Columns (2) and (3) show that the effect is not primarily driven by year- or firm-specific considerations. 1,526 firms only make one acquisition during our sample. When we include firm fixed effects in column (3), these firm-year observations get dropped.

In columns (4) and (5), we add controls for firm size, profitability, book to market, asset tangibility, and marginal tax rates. These additional right-hand-side variables cut down our estimate to around 14%pt. But the result remains highly significant and economically large. 43.85% of the acquirers in our sample make most of their payments with equity, making a 14%pt change equivalent to roughly 1/3 of the average.

5.3 Supporting Results

Having seen that growth and value stocks finance themselves in different ways, we now focus our attention on identifying EPS maximization as the root cause of these differences. We rely on four main sources of identification. To start with, we compliment our baseline results with several supporting results that point in the same direction.

Strebulaev and Yang (2013) found that roughly 14% of all US stocks have zero financial leverage. This is a puzzle when assuming that managers are aiming to maximize NPV. However, it makes perfect sense when viewed through the lens of our EPS-maximization framework. Our model predicts that growth stocks should be unlevered. And column (1) in Table 6 show that growth stocks are 7.22%pt more likely to have zero financial leverage. We can explain roughly half of the effect with no fine-tuning required.

The distinction between financial leverage and total leverage is important. As pointed out in Welch (2011b), firms can lever up without issuing corporate

Dep Variable:	Will Pay Target w Stock				
	(1)	(2)	(3)	(4)	(5)
Is Value Stock ExcessEY > 0%	$-24.29^{\star\star\star}$ (2.11)	$-17.76^{\star\star\star}$ (1.75)	$-17.78^{\star\star\star}$ (1.74)	$-13.79^{\star\star\star}$ (1.49)	$-14.15^{\star\star\star}$ (1.65)
$\log_2$(Mkt Cap)				$-0.60^{\star\star}$ (0.29)	$-0.74^{\star\star}$ (0.32)
Profitability				$-0.39^{\star\star\star}$ (0.06)	$-0.17^{\star\star\star}$ (0.06)
Book to Market				$-0.06^{\star\star}$ (0.02)	$-0.10^{\star\star\star}$ (0.02)
Tangibility				-0.02 (0.04)	-0.04 (0.03)
Marg Tax Rate					$-0.32^{\star\star\star}$ (0.08)
Year FE	*N*	*Y*	*N*	*Y*	*Y*
Firm FE	*N*	*N*	*Y*	*N*	*N*
# Obs	9,339	9,339	7,812	9,247	5,691
Adj. R^2	10.3%	18.6%	26.8%	20.1%	19.1%

Table 5d. *Each column reports results for a separate regression. We omit estimates for the intercept and any fixed effects. Will Pay Target w Stock: 100 if firm uses its own equity to deliver more than half of all payments to target shareholders next year. Is Value Stock: 1 if firm-year observation has a positive excess earnings yield. Numbers in parentheses are standard errors double-clustered by firm-year.* *, **, *and* *** *denote significance at* 10%, 5%, *and* 1% *levels.*

bonds. Roughly half of total liabilities are long-term "financial" debt. So, in columns (3)-(6) of Table 6, we show that value stocks are more likely to issue debt and less likely to issue new equity, exactly as predicted by the principle of EPS maximization.

5.4 Evidence Of A Threshold

We now explore a second way of identifying EPS maximization as the culprit responsible for our baseline empirical results. Our theoretical model predicts that an EPS-maximizing manager will abruptly change her financing decisions when her firm switches from having being a growth stock ($\mathit{ExcessEY} < 0\%$) to being a value stock ($\mathit{ExcessEY} > 0\%$) or vice versa. Obviously, in the real world, it would take time to completely change how a large company finances

Dep Variable:	Financial Debt > 0%		Will Issue Debt		Will Issue Equity	
	(1)	(2)	(3)	(4)	(5)	(6)
Is Value Stock ExcessEY > 0%	7.22*** (1.04)	8.82*** (0.90)	5.08*** (0.70)	5.21*** (0.41)	−7.41*** (1.05)	−3.16*** (0.55)
$\log_2$(Mkt Cap)		1.88*** (0.19)		3.96*** (0.23)		−0.55*** (0.08)
Profitability		−0.15*** (0.03)		−0.10*** (0.01)		−0.40*** (0.05)
Book To Market		0.05*** (0.01)		0.02** (0.01)		−0.08*** (0.01)
Tangibility		0.22** (0.02)		0.11*** (0.01)		0.06*** (0.01)
Year FE	*N*	*Y*	*N*	*Y*	*N*	*Y*
# Obs	74,117	72,893	74,117	72,893	74,117	72,893
Adj. R^2	1.3%	10.2%	0.7%	12.1%	1.8%	7.3%

Table 6. *Each column reports results for a separate regression. We omit estimates for the intercept and any fixed effects. Financial Leverage >0%: 100 if firm-year observation has long-term debt. Will Issue Debt: 100 in year t if firm will issue new debt in year* $(t+1)$. *Will Issue Equity: 100 in year t if firm will issue new equity in year* $(t+1)$. *Is Value Stock: 1 if firm-year observation has a positive excess earnings yield. Numbers in parentheses are standard errors double-clustered by firm-year.* *, **, *and* *** *denote significance at the* 10%, 5%, *and* 1% *levels.*

itself. But, in Table 7, we show that there are meaningful changes in financing behavior the very next year after a firm crosses the *ExcessEY* = 0% threshold.

Each column in Table 7 shows a separate regression of the following form. The $\text{Outcome}_{n,t}$ variable on the left-hand side is a placeholder for one of the four dependent variables we have examined thus far: Total Debt/Assets, Will Repurchase Shares, ΔCash/Assets, or Will Pay Target w Stock. On the right-hand side, we now include a pair of interaction terms

$$\begin{aligned}\text{Outcome}_{n,t} = \hat{\alpha} + \hat{\gamma} \cdot \{&\text{Was Value}_{n,t-1} \rightarrow \text{Is Growth}_{n,t}\} \\ &+ \hat{\delta} \cdot \{\text{Was Growth}_{n,t-1} \rightarrow \text{Is Value}_{n,t}\} \\ &+ \hat{\beta} \cdot \text{Was Value Stock}_{n,t-1} \\ &+ \cdots + \hat{\varepsilon}_{n,t}\end{aligned} \tag{41}$$

Was Value $\text{Stock}_{n,t-1} = 1_{\{\text{ExcessEY}_{n,t-1}>0\%\}}$ is an indicator that flags firms with a positive excess earnings yield in the previous year. The coefficient on this variable in each column is similar to the value reported in column (1) of Tables 5a, 5b, 5c, and 5d. We have simply lagged this variable by one year.

What we really care about in Table 7 is the coefficients on the interaction terms. $\{\text{Was Value}_{n,t-1} \rightarrow \text{Is Growth}_{n,t}\}$ flags newly minted growth stocks. These firms have a negative excess earnings yield in the current year but a positive value in the previous year. The coefficients in the first row tell us that, in the very first year after exiting the fraternity of value stocks, a newly minted growth stock is already halfway to looking like a standard growth stock. In the second row, we see that the opposite is true for growth stocks in the previous year that are now value stocks in the current year, $\{\text{Was Growth}_{n,t-1} \rightarrow \text{Is Value}_{n,t}\}$.

These one-year changes sizes are massive. Moreover, they cannot be explained by changes in market capitalization, profitability, book to market, or asset tangibility. Every column in Table 7 also includes year fixed effects, so the observed changes in firm behavior at the $\mathit{ExcessEY} = 0\%$ threshold cannot be explained by market-wide fluctuations or swings in interest rates.

In summary, it is easy to think of reasons why stocks on the value end of the spectrum might have higher leverage and repurchase shares at a higher rate. We can all think of reasons why stocks that typically get classified as "growth" might accumulate cash more quickly and pay for acquisitions with equity. But we know of no other theory that says there should be a large qualitative change in behavior right at the $\mathit{ExcessEY} = 0\%$ threshold. And we find strong evidence of this threshold effect in the data.

5.5 Time-Series Variation

We exploit time-series variation for identification purposes in two ways. First, we use it to highlight that we are using a different definition of "growth" and "value". In the past, researchers have labeled the 30% of companies with the lowest book-to-market ratios (B/M) as "growth stocks" and those with the highest 30% as "value stocks". This definition implies that growth stocks always represent 30% of the market. By contrast, our theory says that a "growth stock"

Dependent Variable:	$\frac{\text{Total Debt}}{\text{Assets}}$ (1)	Will Reprch Shares (2)	$\frac{\Delta\text{Cash}}{\text{Assets}}$ (3)	Will Pay Tgt w Stock (4)
Was Value → Is Growth	$-6.29^{\star\star\star}$	$-11.50^{\star\star\star}$	$1.40^{\star\star\star}$	$9.94^{\star\star\star}$
$\text{ExcessEY}_{t-1} > 0\%$ $\text{ExcessEY}_t < 0\%$	(0.66)	(1.72)	(0.26)	(1.84)
Was Growth → Is Value	$4.25^{\star\star\star}$	$9.90^{\star\star\star}$	$-3.10^{\star\star\star}$	$-13.69^{\star\star\star}$
$\text{ExcessEY}_{t-1} < 0\%$ $\text{ExcessEY}_t > 0\%$	(0.59)	(1.42)	(0.62)	(2.13)
Was Value Stock	$11.77^{\star\star\star}$	$18.33^{\star\star\star}$	$-5.21^{\star\star\star}$	$-20.26^{\star\star\star}$
$\text{ExcessEY}_{t-1} > 0\%$	(0.68)	(1.97)	(0.88)	(1.62)
$\Delta \log_2$(Mkt Cap)	$-1.38^{\star\star\star}$	$-2.61^{\star\star\star}$	$2.85^{\star\star\star}$	1.98
	(0.34)	(0.62)	(0.57)	(1.44)
ΔProfitability	0.02	$0.24^{\star\star}$	0.01	−0.00
	(0.02)	(0.03)	(0.03)	(0.06)
ΔBook To Market	$-0.04^{\star\star\star}$	0.01	$-0.03^{\star\star}$	−0.02
	(0.01)	(0.01)	(0.01)	(0.02)
ΔTangibility	$-0.09^{\star\star\star}$	$-0.22^{\star\star\star}$	$0.20^{\star\star\star}$	$0.27^{\star\star\star}$
	(0.03)	(0.04)	(0.03)	(0.09)
Year FE	*Y*	*Y*	*Y*	*Y*
# Obs	64,747	58,240	58,240	8,251
Adj. R^2	8.3%	7.8%	5.2%	18.6%

Table 7. *Each column reports results for a separate regression. We omit estimates for the intercept and any fixed effects. Total Debt/Assets: Total liabilities as a percent of a firm's total assets in current year. Will Repurchase Shares: 100 if firm repurchases* ≥ 1% *of its current market cap over the next year. ΔCash/Assets: Change in cash and cash equivalents over next year as a percent of total assets in current year. Will Pay Target w Stock: 100 if firm uses its own equity to deliver more than half of all payments to target shareholders next year. Was Value → Is Growth: 1 if firm transitioned from being a value stock last year to being a growth stock this year. Was Growth → Is Value: 1 if firm is a value stock in the current year but was a growth stock in the previous year. Was Value Stock: 1 if firm had a positive excess earnings yield last year. ΔControl Variable: Realization in the current year minus the realization in the previous year. Numbers in parentheses are standard errors double-clustered by firm-year.* *, **, *and* *** *denote statistical significance at* 10%, 5%, *and* 1% *levels.*

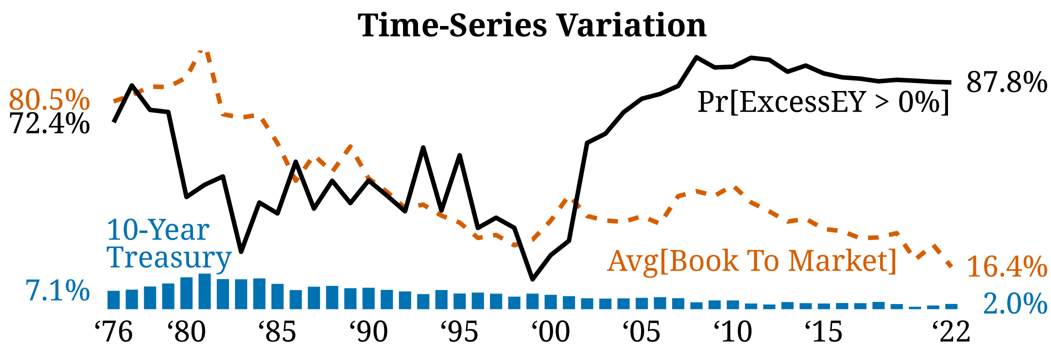


Figure 7. *10-Year Treasury: Average annual return on 10-year Treasuries for all fiscal-year end dates in a given calendar year. Pr[ExcessEY > 0%]: Percent of firms each year that have a positive excess earnings yield. Avg[Book To Market]: Value-weighted average book-to-market ratio for firms in a given year. Percentages on the left are initial values in 1976. Those on the right are 2022 values.*

is any company with $ExcessEY < 0\%$. All remaining companies are "value stocks". Our definition allows the percent of growth stocks to vary over time.

The solid black line in Figure 7 shows the percent of all firms in our sample which have a positive excess earnings yield each year, Pr[ExcessEY > 0%]. The dashed red line shows the value-weighted book-to-market ratio of firms each year, Avg[Book To Market]. These two lines are very different from one another. In particular, book-to-market ratios have been falling since 2010. By this measure, the market should have looked very "growthy" in recent years. But, our approach says that 9 out of 10 companies were value stocks during this time. Earnings yields were falling, but riskfree rates were falling even faster, which kept $ExcessEY > 0\%$ for most firms.

Second, we also use time-series variation to demonstrate that firms consistently change their behavior at the $ExcessEY = 0\%$ threshold regardless of the riskfree rate at the time. Take a look at Figure 8. Each panel reports results for a separate outcome panel. A single dot represents the average value for firms in a particular 1% excess earnings yield bin (y-axis) in a particular year (x-axis). Red dots are high average values; blue dots are low average values; and, the white line separates growth stocks (below) from value stocks (above). Think about all the ways that markets have changed since 1976. In spite of all these

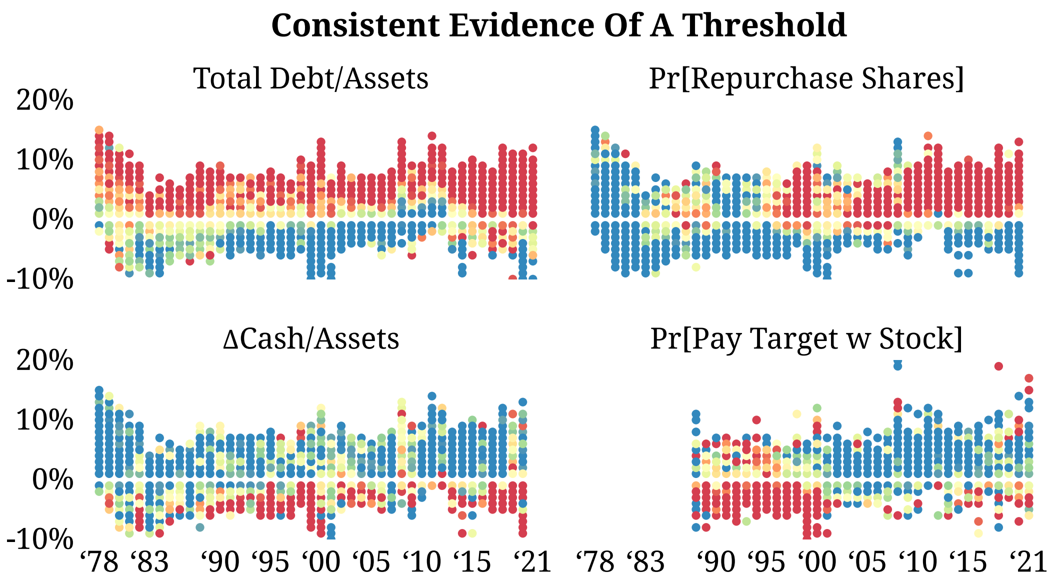


Figure 8. *The dots represent averages across firms in a* 1% *ExcessEY bin (y-axis) during a given year (x-axis). Bins with high average values are colored red. Those with low average values are colored blue. The white horizontal line in the middle of each panel separates growth stocks (below; ExcessEY < 0%) from value stocks (above; ExcessEY > 0%). Each panel shows ExcessEY bin-year averages for a different outcome variable.*

changes, we find consistent evidence that managers change their financing decisions at the $\mathit{ExcessEY} = 0\%$ threshold during this entire sample period.

The only place where the data does not line up with our theory is in the top right panel during the late 1970s and early 80s. However, prior to 1983, stock repurchases were considered illegal stock manipulation. We should not expect any firms to engage in this activity. Thus, the vertical strips of solid blue prior to 1983 in the upper-right panel are an example of a positive control—i.e., a null result in a special circumstance where we should find nothing.

While this paper is mainly aimed at corporate-finance researchers, we note that this stylized fact likely has important implications for asset-pricing researchers. There is a large and active literature studying why value and growth firms often appear to be priced differently. Our analysis neatly explains the findings in Lettau, Ludvigson, and Manoel (2018), which show that growth funds have disappeared in recent years.

5.6 Unified Explanation

Our last identification strategy is, as far as we know, new to this paper. In the past, researchers have tried to explain firm decisions by adding ad hoc features to an NPV-maximizing framework. And, as a result, the corporate-finance literature is currently populated by a collection of largely unrelated models. For example, trade-off theory (Taggart, 1977) argues that NPV-maximizing managers lever up to exploit an interest tax shield but do not use infinite leverage due to bankruptcy costs. Such a model has little to say about whether an acquirer will pay target shareholders with cash or equity.

We are able to provide structure to the literature by showing that many important financial decisions stem from a single problem: EPS maximization. As a result, we can organize all our predictions on a single number line as shown in Figure 1. This is a serious step forward.

But we can actually do even better. Notice that the top two panels in Figure 2 are mirror images of the bottom two panels. This is not a coincidence. When using *ExcessEY* on the x-axis, our model's predictions must have this step-function shape up to a scalar transformation of the y-axis.

We illustrate this point in the left panel of Figure 9. The solid and dashed green lines correspond to the curves for Total Debt/Assets and Pr[Repurchase Shares] exactly as shown in Figure 2. The min and max values for each curve have merely been set to zero and one, respectively. By contrast, the solid and dashed red lines are transformed versions of the curves for ΔCash/Assets and Pr[Pay Target w Stock] in Figure 2. In addition to rescaling the y-axis for these best-fit lines, we have also inverted the y-axis relative to the original chart.

Our theory says that, after this transformation, all four lines should sit right on top of one another. And, to a good approximation, that is exactly what we see in the data. The right panel of Figure 9 shows what happens if we apply the same transformations to binned scatterplots when using book to market on the x-axis. Rather than seeing similar curves, the result is a mess of overlapping lines. Taken together, all these sources of identification point to one conclusion: managers are doing what they claim to be doing (maximizing EPS), and this is why we observe the patterns that we do in the data.

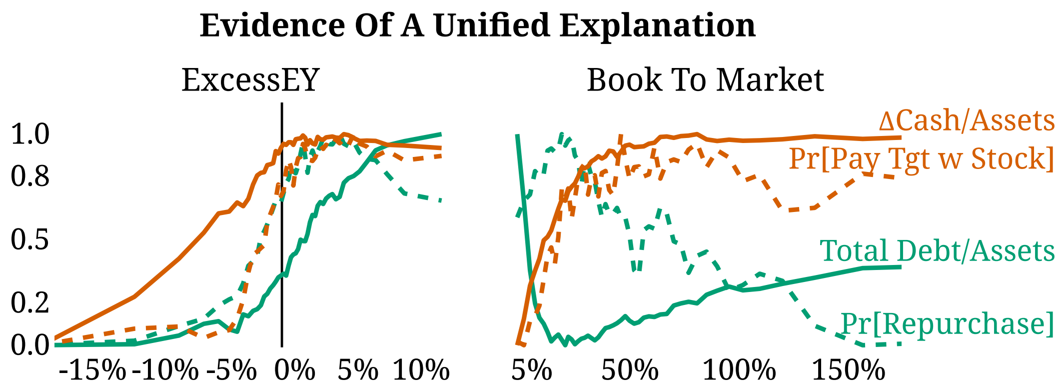


Figure 9. (Left Panel) *This panel shows rescaled versions of the best-fit curves shown in Figure 2. The x-axis denotes excess earnings yield. The solid and dashed green lines are the curves for Total Debt/Assets and Pr[Repurchase Shares] exactly as shown in the original figure. All that has changed for these two curves is the units on the y-axis. The min and max values for each curve have been set to zero and one, respectively. The solid and dashed red lines show the curves for ΔCash/Assets and Pr[Pay Target w Stock]. In addition to rescaling the y-axis for these best-fit lines, we have also inverted the y-axis relative to the original chart.* (Right Panel) *This panel shows the results of an analogous exercise, only this time with Book To Market rather than ExcessEY on the x-axis.*

6 Conclusion

Academic researchers have spent decades trying to convince the people running large public corporations to stop making decisions based on EPS. In his MBA corporate-finance textbook, Welch (2011a) calls "EPS a meaningless measure". Almeida (2019) argues that "it [is] time to get rid of EPS." And Stewart Stern has even created an entire consulting company aimed at popularizing an alternative to EPS called "economic value added (EVA)" (Stern, Stewart, and Chew, 1995; Stern, Shiely, and Ross, 2002).

We are not arguing that managers should be EPS maximizers. There are clearly situations where it leads to bad outcomes (May, 1968; Pringle, 1973; Stern, 1974). In principle, EPS-maximizing managers could be leaving a lot of money on the table. From a normative perspective, it would be great if some silver-tongued scholar finally did talk managers into becoming NPV maximizers. But things are different from a positive perspective.

If you are trying to explain the decisions that real-world managers actually make, then you should not be modeling managers as NPV maximizers. For better or for worse, that is simply not the problem they are solving. The people in charge of large public companies are EPS maximizers.

How do we know? Easy. It is what managers tell us they are doing. Surveys of financial executives regularly find that "firms view earnings, especially EPS, as the key metric for an external audience, more so than cash flows. (Graham, Harvey, and Rajgopal, 2005)" Moreover, if you really think that most managers are not trying to maximize EPS, then why are academic researchers spending so much time trying to convince them to stop?

This paper shows that, regardless of whether it is a good idea, the principle of EPS maximization gives a single unified explanation for a wide range of corporate decisions. Going forward, when researchers want to explain the choices that a manager will actually make, they should model her as an EPS maximizer. That should be the starting point. A model where the manager is an NPV maximizer will only be good at explaining the choices that academic researchers would like her to make.

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A Proofs And Derivations

Proof. **(Equation 7)** *The no-arbitrage state prices, q_u and q_d, come from solving the following system of equations*

$$\$1/(1+r_f) = q_u \cdot 1 + q_d \cdot 1 \tag{42a}$$

$$PurchasePrice = q_u \cdot ValueOfFirm_u + q_d \cdot ValueOfFirm_d \tag{42b}$$

□

Proof. **(Proposition 3.3)** *The fair interest rate $i(\ell)$ equates the present value of the manager's debt payments in year $t = 1$ to the initial loan amount*

$$ValueOfDebt(\ell) = LoanAmt(\ell) \qquad \text{for all } \ell \in [0, 1) \tag{43}$$

The manager finances the remainder of the purchase price of her company's assets, PurchasePrice−LoanAmt(ℓ), by issuing #Shares each worth PricePerShare. These equity holders get all remaining firm value in year $t = 1$ after paying off the debt. Hence we have

$$\mathit{ValueOfEquity}(\ell) = \mathit{EquityFunding}(\ell) \tag{44}$$

□

Proof. **(Proposition 3.4a)** *Under the normalization that PricePerShare = \$1, we have EquityFunding = #Shares · \$1 and thus*

$$\begin{aligned} \mathit{NPVratio} - \mathit{EPS} &= \frac{\mathit{ValueOfEquity}}{\mathit{EquityFunding}} - \frac{\mathbb{E}[\mathit{Earnings}_1]}{\mathit{EquityFunding}/\$1} && \text{(45a)} \\ &\propto \mathit{ValueOfEquity} - \mathbb{E}[\mathit{Earnings}_1] && \text{(45b)} \end{aligned}$$

Equation (14) gives ValueOfEquity as a state-price weighted average. We can write out $\mathbb{E}[\mathit{Earnings}_1]$ *as a probability weighted average*

$$\begin{aligned} \mathbb{E}[\mathit{Earnings}_1] = p_u \cdot (\mathit{NOI}_u - i \cdot \mathit{LoanAmt}) \\ + \; p_d \cdot (\mathit{NOI}_d - i \cdot \mathit{LoanAmt}) \end{aligned} \tag{46}$$

If the firm's debt is riskless, then there are two terms separating ValueOfEquity and $\mathbb{E}[\mathit{Earnings}_1]$

$$\begin{aligned} &\mathit{ValueOfEquity} - \mathbb{E}[\mathit{Earnings}_1] \\ &\quad = (q_u - p_u) \cdot (\mathit{NOI}_u - r_f \cdot \mathit{LoanAmt}) \\ &\qquad + (q_d - p_d) \cdot (\mathit{NOI}_d - r_f \cdot \mathit{LoanAmt}) && \text{(47a)} \\ &\qquad\quad + q_u \cdot (\mathit{ValueOfAssets}_u - \mathit{LoanAmt}) \\ &\qquad\qquad + q_d \cdot (\mathit{ValueOfAssets}_d - \mathit{LoanAmt}) \\ &\quad = (\tilde{\mathbb{E}} - \mathbb{E})[\mathit{NOI}_1 - r_f \cdot \mathit{LoanAmt}] \\ &\qquad + \tilde{\mathbb{E}}[\mathit{ValueOfAssets}_1 - \mathit{LoanAmt}] && \text{(47b)} \end{aligned}$$

However, if the firm's debt is risky, then $i > r_f$ *and there is an extra term to consider*

$$\begin{aligned} &\mathit{ValueOfEquity} - \mathbb{E}[\mathit{Earnings}_1] \\ &\quad = (\tilde{\mathbb{E}} - \mathbb{E})[\mathit{NOI}_1 - i \cdot \mathit{LoanAmt}] \\ &\qquad + \tilde{\mathbb{E}}[\mathit{ValueOfAssets}_1 - \mathit{LoanAmt}] && \text{(48a)} \\ &\qquad\quad - q_d \cdot [(\mathit{NOI}_d + \mathit{ValueOfAssets}_d) - (1 + i) \cdot \mathit{LoanAmt}] \end{aligned}$$

To complete the proof, observe that this extra term is the present value of the manager's savings from being able to default in the down state

$$\begin{aligned}&\tilde{\mathbb{E}}[\mathit{DefaultSavings}_1]\\&\qquad = q_d \cdot \max\{(1+i)\cdot \mathit{LoanAmt} - (\mathit{NOI}_d + \mathit{ValueOfAssets}_d), \$0\}\end{aligned} \tag{49}$$

□

Proof. **(Proposition 3.4b)** *The manager is initially planning on buying the assets to create her company using leverage level, $\ell_0 \in [0,1)$. Then, she considers how her EPS would change if she made a small change to this initial leverage $\ell_0 \longrightarrow \ell_\epsilon = (\ell_0 + \epsilon)$ and used the money to issue $\epsilon \cdot \mathit{PurchasePrice}$ fewer shares.*

This infinitesimal change would give her the new EPS value below

$$\mathit{EPS}(\ell_0+\epsilon) = \frac{\mathbb{E}[\mathit{NOI}_1] - i(\ell_0+\epsilon)\cdot \mathit{LoanAmt}(\ell_0+\epsilon)}{\#\mathit{Shares}(\ell_0) - \epsilon \cdot \mathit{PurchasePrice}} \tag{50a}$$

$$= \frac{\mathbb{E}[\mathit{NOI}_1] - i(\ell_0+\epsilon)\cdot [(\ell_0+\epsilon)\cdot \mathit{PurchasePrice}]}{\mathit{ValueOfEquity}(\ell_0) - \epsilon \cdot \mathit{PurchasePrice}} \tag{50b}$$

The EPS-maximizing leverage will zero out $\frac{\mathrm{d}}{\mathrm{d}\epsilon}\big[\mathit{EPS}(\ell_0+\epsilon)\big]_{\epsilon=0}$, which equals

$$\begin{aligned}= {}&\frac{-[i'(\ell_0)\cdot \ell_0 + i(\ell_0)]\cdot \mathit{PurchasePrice}\cdot \mathit{ValueOfEquity}(\ell_0)}{\mathit{ValueOfEquity}(\ell_0)^2}\\&\qquad + \frac{\mathbb{E}[\mathit{Earnings}_1(\ell_0)]\cdot \mathit{PurchasePrice}}{\mathit{ValueOfEquity}(\ell_0)^2}\end{aligned} \tag{51a}$$

$$\begin{aligned}= {}&\frac{1}{1-\ell_0}\cdot\left(\frac{\mathbb{E}[\mathit{Earnings}_1(\ell_0)]\cdot \mathit{ValueOfEquity}(\ell_0)}{\mathit{ValueOfEquity}(\ell_0)^2}\right.\\&\qquad \left. - \frac{i(\ell_0)\cdot[1+\delta(\ell_0)]\cdot \mathit{ValueOfEquity}(\ell_0)^2}{\mathit{ValueOfEquity}(\ell_0)^2}\right)\end{aligned} \tag{51b}$$

$$= \frac{1}{1-\ell_0}\cdot\left(\frac{\mathbb{E}[\mathit{Earnings}_1(\ell_0)]}{\mathit{ValueOfEquity}(\ell_0)} - i(\ell_0)\cdot[1+\delta(\ell_0)]\right) \tag{51c}$$

$$= \frac{1}{1-\ell_0}\cdot\big(\mathit{EY}(\ell_0) - i(\ell_0)\cdot[1+\delta(\ell_0)]\big) \tag{51d}$$

where $\delta(\ell) = \ell \cdot [i'(\ell)/i(\ell)]$ is the elasticity of interest rates to leverage. □

Proof. **(Proposition 3.4c)**

(Case #1) *Suppose the manager is buying assets for a company that will have*

$EY(0) = r - g < r_f$. In this case, the first-order condition in Equation (19) is negative

$$\tfrac{\mathrm{d}}{\mathrm{d}\epsilon}\big[EPS(\ell+\epsilon)\big]_{\epsilon=0} < 0 \qquad \textit{for all } \ell \in (0,1) \tag{52}$$

meaning that EPS peaks at $\ell_\star = 0$.

(Case #2) *Suppose the manager is buying assets for a company that will have, $EY(0) = r - g > r_f$. Now, the first-order condition in Equation (19) will change sign exactly once, being positive when leverage is low and negative when it is high*

$$\tfrac{\mathrm{d}}{\mathrm{d}\epsilon}\big[EPS(\ell+\epsilon)\big]_{\epsilon=0} \begin{cases} > 0 & \textit{if } \ell < \frac{1}{1+r_f}\cdot\left(\frac{ValueOfFirm_d}{PurchasePrice}\right) \\ < 0 & \textit{if } \ell > \frac{1}{1+r_f}\cdot\left(\frac{ValueOfFirm_d}{PurchasePrice}\right) \end{cases} \tag{53}$$

Hence, there will be a single interior $\ell_\star \in (0,1)$ that maximizes EPS. □

Proof. **(Lemma 3.4)** *This result follows from two observations.*

(Observation #1) *That $EY(0) = r - g$. Equation (1) tells us that unlevered earnings are the same as expected NOIs*

$$\begin{aligned} \mathbb{E}[Earnings_1(0)] &= \mathbb{E}[NOI_1] - i(0)\cdot LoanAmt(0) & \text{(54a)} \\ &= \mathbb{E}[NOI_1] - r_f \cdot \$0 & \text{(54b)} \end{aligned}$$

So Gordon-growth logic implies that

$$\begin{aligned} EY(0) &= \frac{\mathbb{E}[Earnings_1(0)]}{ValueOfEquity(0)} & \text{(55a)} \\ &= \frac{\mathbb{E}[NOI_1]}{PurchasePrice} = r - g & \text{(55b)} \end{aligned}$$

(Observation #2) *That $i(0)\cdot[1+\delta(0)] = r_f$. Equation (10) implies that, if $ValueOfFirm_d > \$1\cdot(1+r_f)$, the first \$1 borrowed will be riskless.* □

Proof. **(Proposition 3.4d)**

(Case #1) *Suppose the manager is buying assets to create a growth stock that will have $EY(0) = r - g < r_f$. In this case, the proof of Lemma 3.4 indicates says EPS is maximized at $\ell_\star = 0$.*

(Case #2) *Now suppose the manager is buying assets to create a value stock that will have $EY(0) = r - g > r_f$. In this case, the proof of Lemma 3.4 says EPS is maximized at $\ell_\star = \frac{1}{1+r_f}\cdot(\frac{ValueOfFirm_d}{PurchasePrice})$.*

(Existence Of Gap) *If ValueOfFirm*$_d$ *> \$0, then the manager's riskfree borrowing capacity will be strictly positive. Hence, there will be a non-zero gap between the EPS-maximizing leverage of Case #1 and that of Case #2.* □

Proof. **(Proposition 3.4e)**

(Case #1) *Suppose the manager is buying assets to create a growth stock that will have* $EY(0) = r - g < r_f$. *In this case, Proposition 3.4d tells us that the manager will use* $\ell_\star = 0$. *Hence, there will be no difference between the excess earnings yield and the excess cap rate of a growth stock*

$$\text{growth firm, } \ell_\star = 0 \quad \Rightarrow \quad \underbrace{EY(\ell_\star) - r_f}_{\substack{\text{excess}\\ \text{earnings yield}}} = EY(0) - r_f = \underbrace{(r-g) - r_f}_{\substack{\text{excess}\\ \text{cap rate}}} < 0 \tag{56}$$

(Case #2) *Now suppose the manager is buying assets to create a value stock that will have* $EY(0) = r - g > r_f$. *In this case, Proposition 3.4d tells us that the manager will use a substantial amount of leverage even if her firm's cap rate is just barely above the riskfree rate,* $\ell_\star \geq \ell_{\max r_f}$. *Even if this is all she borrows, Proposition 3.4b would still imply that has a first-order condition* $EY(\ell_{\max r_f}) = i(\ell_{\max r_f} + \epsilon) > r_f$.

Thus, the earnings yield of a value stock will reflect both the company's higher cap rate AND an increase due to the manager's decision to lever up, which implies that the firm's excess earnings yield will be strictly larger than its excess cap rate

$$\text{value firm, } \ell_\star > 0 \quad \Rightarrow \quad \underbrace{EY(\ell_\star) - r_f}_{\substack{\text{excess}\\ \text{earnings yield}}} > EY(0) - r_f = \underbrace{(r-g) - r_f}_{\substack{\text{excess}\\ \text{cap rate}}} > 0 \tag{57}$$

□

Proof. **(Proposition 4.1)** *Suppose a manager's initial plan is to buy the assets needed to create her firm using* $\ell_0 \in [0, 1)$. *Proposition 3.4b says that she will scrap her initial plan in favor of a slightly higher leverage level whenever*

$$\tfrac{\mathrm{d}}{\mathrm{d}\epsilon}\big[EPS(\ell_0 + \epsilon)\big]_{\epsilon=0} = \frac{1}{1-\ell_0} \cdot \Big(EY(\ell_0) - i(\ell_0) \cdot [1 + \delta(\ell_0)] \Big) > 0 \tag{58}$$

When this derivative is positive, the manager can increase her EPS by borrowing $\epsilon \cdot$ *PurchasePrice and issuing* $(\epsilon \cdot \textit{PurchasePrice})/\textit{PricePerShare}$ *fewer shares.*

We can apply the same argument if the manager actually purchased the assets yesterday using leverage $\ell_0 \in [0, 1)$ *and has just woken up this morning to learn that market conditions have changed.* □

Proof. **(Lemma 4.2a)** *In the limit as $\epsilon \to 0$, the difference between the manager's new EPS in Equation (28) and her original EPS is*

$$\frac{\mathrm{d}}{\mathrm{d}\epsilon}[EPS_\epsilon]_{\epsilon=0} = \frac{(b \cdot \mathbb{E}[NOI_1]) \cdot ValueOfEquity}{ValueOfEquity^2} - \frac{\mathbb{E}[Earnings_1] \cdot PurchasePrice}{ValueOfEquity^2} \tag{59a}$$

$$= b \cdot \left(\frac{\mathbb{E}[NOI_1]}{ValueOfEquity}\right) - \frac{1}{1-\ell_0} \cdot \left(\frac{\mathbb{E}[Earnings_1]}{ValueOfEquity}\right) \tag{59b}$$

$$= \frac{b}{1-\ell_0} \cdot \left(\frac{\mathbb{E}[NOI_1]}{PurchasePrice}\right) - \frac{1}{1-\ell_0} \cdot \left(\frac{\mathbb{E}[Earnings_1]}{ValueOfEquity}\right) \tag{59c}$$

If the manager can only use equity, she will undertake a costly project whenever $\frac{\mathrm{d}}{\mathrm{d}\epsilon}[EPS_\epsilon]_{\epsilon=0} > 0$. Setting this condition equal to zero and solving for b gives

$$\underline{b}_{Equity} = \frac{1}{r-g} \cdot \left(\frac{\mathbb{E}[Earnings_1]}{ValueOfEquity}\right) \tag{60a}$$

$$= \frac{EY}{r-g} \tag{60b}$$

The manager is willing to finance the project by issuing equity if $b > \underline{b}_{Equity}$. □

Proof. **(Lemma 4.2b)** *In the limit as $\epsilon \to 0$, the difference between the manager's new EPS in Equation (30) and her original EPS is*

$$\frac{\mathrm{d}}{\mathrm{d}\epsilon}[EPS_\epsilon(\ell_\star)]_{\epsilon=0} = \frac{b \cdot \mathbb{E}[NOI_1] - i(\ell_\star) \cdot [1+\delta(\ell_\star)] \cdot PurchasePrice}{\#Shares(\ell_\star)} \tag{61}$$

where $\ell_\star$ is her EPS-maximizing leverage when she initially created her firm.

If the manager can only use debt, she will only undertake a costly new project if $\frac{\mathrm{d}}{\mathrm{d}\epsilon}[EPS_\epsilon]_{\epsilon=0} > 0$. Setting this condition equal to zero and solving for b gives

$$\underline{b}_{Debt} = i(\ell_\star) \cdot [1+\delta(\ell_\star)] \cdot \left(\frac{PurchasePrice}{\mathbb{E}[NOI_1]}\right) \tag{62a}$$

$$= \frac{i(\ell_\star) \cdot [1+\delta(\ell_\star)]}{r-g} \tag{62b}$$

The manager is willing to finance the project with debt if $b > \underline{b}_{Debt}$. □

Proof. **(Lemma 4.2c)** *In the limit as $\epsilon \to 0$, the difference between the manager's new EPS in Equation (33) and her original EPS is*

$$\frac{\mathrm{d}}{\mathrm{d}\epsilon}[EPS_\epsilon]_{\epsilon=0} = \frac{b \cdot \mathbb{E}[NOI_1] - r_f \cdot PurchasePrice}{\#Shares} \tag{63}$$

If the manager can only pay cash, she will invest if $\frac{\mathrm{d}}{\mathrm{d}\epsilon}[EPS_\epsilon]_{\epsilon=0} > 0$. Setting this condition equal to zero and solving for b gives

$$\underline{b}_{Cash} = r_f \cdot \frac{PurchasePrice}{\mathbb{E}[NOI_1]} = \frac{r_f}{r-g} \tag{64}$$

□

Proof. **(Proposition 4.2)**

(Case #1) *First consider a growth stock that has $EY(0) = r - g < r_f$. In the absence of any cash holdings, Lemmas 4.2a and 4.2b tell us that an EPS-maximizing manager would see equity markets as the cheapest source of financing*

$$\underline{b}_{Equity} = \frac{EY(0)}{r-g} \tag{65a}$$

$$= \frac{r-g}{r-g} = 1 < \frac{r_f}{r-g} \tag{65b}$$

$$= \frac{i(0) \cdot [1 + \delta(0)]}{r-g} = \underline{b}_{Debt} \tag{65c}$$

What if the company has cash reserves? In that scenario, Lemma 4.2c tells us that the cost of debt financing is the same as the cost of cash for a growth stock

$$\underline{b}_{Cash} = \frac{r_f}{r-g} = \frac{i(0) \cdot [1 + \delta(0)]}{r-g} = \underline{b}_{Debt} \tag{66}$$

Hence, for a growth stock, equity financing remains the cheapest financing option.

(Case #2) *Now consider a value stock that has $EY(0) = r - g > r_f$. In this case, the EPS-maximizing leverage prior to investing will be $\ell_\star \geq \ell_{\max r_f}$. So Lemma 4.2c now tells us that the cost of cash will be cheaper than either debt or equity*

$$\underline{b}_{Cash} = \frac{r_f}{r-g} < \underbrace{\frac{EY(\ell_\star)}{r-g}}_{\underline{b}_{Equity}} = \underbrace{\frac{i(\ell_\star) \cdot [1 + \delta(\ell_\star)]}{r-g}}_{\underline{b}_{Debt}} \tag{67}$$

Hence, the manager of a value firm will pay cash whenever possible. □

Proof. **(Corollary 4.2a)**

(Case #1) *The EPS-maximizing manager of a growth stock, $EY(0) = r - g < r_f$, will always see equity as the cheapest source of financing. Any cash that gets added to her balance sheet with stay there.*

(Case #2) *Now consider the EPS-maximizing manager of a value stock, $EY(0) = r - g > r_f$. In the absence of cash, the manager will use a substantial amount of leverage to finance any new projects. Moreover, any new project will have to satisfy a minimum boost threshold greater than one, $\underline{b}_{Debt}(w/o\ cash) = \frac{i(\ell_\star)}{r-g} > 1$. By contrast, if the same manager had access to cash, she would view this money as the cheapest source of finance, using it before issuing either debt or equity. What's more, when she has cash reserves, the manager's boost hurdle rate drops as well, $\underline{b}_{Debt}(w\ cash) = \frac{r_f}{r-g} < 1$. Both these effects work in the same direction, causing the EPS-maximizing manager of a value stock to quickly burn through any cash she has access to.* □

Proof. **(Corollary 4.2b)**

(Case #1) *Suppose the acquirer is a growth stock with $EY(0) = r - g < r_f$. In this case, the manager's EPS-maximizing leverage prior to making the acquisition would be $\ell_\star = 0$. We know from the proof of Lemma 3.4 that*

$$EY(0) = r - g < r_f \tag{68a}$$

$$i(0) \cdot [1 + \delta(0)] = r_f \tag{68b}$$

So, for a growth firm, we can conclude that

$$\underline{b}_{Equity} = \frac{EY(0)}{r-g} = \frac{r-g}{r-g} = 1 < \frac{r_f}{r-g} = \frac{i(0) \cdot [1 + \delta(0)]}{r-g} = \underline{b}_{Debt} \tag{69}$$

We can infer that whenever $b \geq \underline{b}_{Equity}$ a growth firm will pay for the acquisition by issuing new shares to the target company's shareholders.

(Case #2) *Now suppose the acquirer is a value stock with $EY(0) = r - g > r_f$. In this case, the manager's EPS-maximizing leverage prior to making the acquisition would be $\ell_\star \geq \ell_{\max r_f}$. Proposition 3.4b tells us that*

$$EY(\ell_\star) = i(\ell_\star) \cdot [1 + \delta(\ell_\star)] \tag{70}$$

So, for a value stock, we can conclude that

$$\underline{b}_{Equity} = \frac{EY(\ell_\star)}{r-g} = \frac{i(\ell_\star) \cdot [1 + \delta(\ell_\star)]}{r-g} = \underline{b}_{Debt} \tag{71}$$

Thus, we can infer that whenever $b \geq \underline{b}_{Equity} = \underline{b}_{Debt}$, a value firm likely to pay for an acquisition using a debt-heavy mix of borrowing and new issuance. □

Proof. **(Proposition 4.3)** *The restriction linking an M&A deal's average boost level, $b \in (0, \infty)$, to the collection of viable up- and down-state boost profiles, (b_u, b_d), follows from noting that $NOI_u = (1+u) \cdot \mathbb{E}[NOI_1]$ and $NOI_d = (1-d) \cdot \mathbb{E}[NOI_1]$*

$$b \cdot \mathbb{E}[NOI_1] = b_u \cdot (p_u \cdot NOI_u) + b_d \cdot (p_d \cdot NOI_d) \tag{72a}$$

$$b \cdot \mathbb{E}[NOI_1] = b_u \cdot \{p_u \cdot (1+u) \cdot \mathbb{E}[NOI_1]\} + b_d \cdot \{p_d \cdot (1-d) \cdot \mathbb{E}[NOI_1]\} \tag{72b}$$

$$b = b_u \cdot \{p_u \cdot (1+u)\} + b_d \cdot \{p_d \cdot (1-d)\} \tag{72c}$$

So, if we fix the average boost associated with an acquisition, then we get

$$b_u = \left(\frac{1}{p_u} \cdot \frac{1}{1+u}\right) \cdot b - \left(\frac{p_d}{p_u} \cdot \frac{1-d}{1+u}\right) \cdot b_d \tag{73}$$

We now turn to the net present value of an acquisition. The acquisition costs

$$Cost/\epsilon = PurchasePrice \tag{74}$$

in year $t = 0$. The present value of the benefit is

$$Benefit/\epsilon = q_u \cdot \left\{b_u \cdot ValueOfFirm_u\right\} + q_d \cdot \left\{b_d \cdot ValueOfFirm_d\right\} \tag{75a}$$

$$= PurchasePrice - q_u \cdot \left\{(1-b_u) \cdot ValueOfFirm_u\right\} - q_d \cdot \left\{(1-b_d) \cdot ValueOfFirm_d\right\} \tag{75b}$$

Thus, an acquisition will have a positive net present value whenever

$$(Benefit - Cost)/\epsilon = q_u \cdot \left\{(b_u - 1) \cdot ValueOfFirm_u\right\} + q_d \cdot \left\{(b_d - 1) \cdot ValueOfFirm_d\right\} > 0 \tag{76}$$

Note that $(p_u, p_d) \neq (q_u, q_d)$ in our model since $r_f > 0$. So there will always be a wedge between state prices and physical probabilities. Hence, there will exist a non-zero range of average boost values less than unity, $b < 1$, for which $(Benefit - Cost)/\epsilon > 0$. There will also exist a non-zero range of average boost values greater than unity, $b > 1$, for which $(Benefit - Cost)/\epsilon < 0$. □

B Data Construction

We construct our sample based on Compustat data (annual frequency) and data from the WRDS Ratios Suite, matched via their linking algorithm. "PERMNO" is the main identifier for firms. We include firms that are traded on the one of the major US exchanges (NYSE, Nasdaq, AmEx) and have a share price over $5 in CRSP. Following the existing corporate-finance literature, we exclude firms in the financial and utility industries (SIC codes 4900-4999 and 6000-6999). To be included in our analysis for the current year $t = 1$, a firm must have a next-twelve-month EPS forecasts in the I/B/E/S monthly unadjusted summary file between 11 and 13 months before the $t = 1$ fiscal year end (we opt for the earliest estimate available).

We supplement the main dataset with information retrieved from several other datasets. We use the SDC's New Issues dataset for data on debt and equity issuances, and we use their M&A dataset for data on acquisitions. We downloaded data on simulated pre-interest marginal tax rate data from John Graham's website (Duke University; https://people.duke.edu/~jgraham/taxform.html). Overall, our dataset contains 74,117 firm-year observations, between 1976 and 2022. All variables have been winsorized at the 1st and 99th percentiles, within calendar year. Below we describe how we constructed each variable:

- Excess earnings yield (ExcessEY): The median one-year EPS forecast taken from the I/B/E/S unadjusted EPS summary file, divided by the share price on the same date as in I/B/E/S, minus the annual 10-year Treaury rate (St Louis Fed's FRED, series DGS10).
- Is Value Stock: A (0/1) indicator variable that is one for firm-year observations where ExcessEY > 0% and zero otherwise.
- Was Value $\longrightarrow$ Is Growth: A (0/1) indicator variable that is one if a firm transitioned from being a value stock in the previous year ($\text{ExcessEY}_{n,t-1} > 0\%$) to being a growth stock in the current year ($\text{ExcessEY}_{n,t} < 0\%$).
- Was Growth $\longrightarrow$ Is Value: A (0/1) indicator variable that is one if a firm transitioned from being a growth stock in the previous year ($\text{ExcessEY}_{n,t-1} < 0\%$) to being a value stock in the current year ($\text{ExcessEY}_{n,t} > 0\%$).
- Total Debt/Assets: "DEBT_ASSETS" from WRDS Ratios Suite, defined as total debt (LT) divided by total assets (AT).
- Financial Leverage >0%: Following Strebulaev and Yang (2013), a firm-year is considered to have non-zero financial leverage if DEBT_AT from the WRDS Ratios Suite is greater than 0%. We allow firms that have either DLTT or DLC missing to be included.

- Will Issue Debt: A firm will issue debt in the following year if (#1) the field "SECURITY" in the SDC New Issues dataset for the year after the current fiscal-year end contains any of the following 'BD', 'BKD', 'BOND', 'BUYOUT', 'CD', 'COUPON', 'CP', 'CRT', 'DBS', 'DEB', 'DEBT', 'FL', 'FIX', 'FRN', 'FX', 'LEAS', 'LOAN', 'LYON', 'MORTGAGE', 'MT', 'NOTE', 'NT', 'OBL', 'REV', 'SENIOR', 'SR', 'SUB', 'TERM', 'ZERO', AND (#2) is not classified as convertable debt ('CNV', 'CONV', 'CV', 'CVT', 'DECS'), preferred shares ('PERPET', 'PF', 'PFD', 'PREF', 'PRFD', 'PS', 'TRUPS'), or structured products ('ABS', 'CDO', 'CLO', 'DERIV', 'ETF', 'ETN', 'GTD', 'MBS', 'PACS', 'PASS', 'PERL', 'PERQ', 'SABRE', 'SPV', 'STEER', 'STEP', 'STP', 'STRY', 'SYNT').
- Will Issue Equity: A firm will issue equity in the following year if (#1) the field "SECURITY" in the SDC New Issues dataset for the year after the current fiscal-year end contains any of the following 'ADS', 'ADR', 'CLASS', 'CL', 'COMMON', 'EQUITY', 'OPTION', 'ORD PART', 'PAR VAL', 'RIGHT', 'SHARES', 'SHS', 'STK', 'STOCK', 'UNIT', 'WT' AND (#2) is not classified as debt, convertable debt, preferred shares, or structured products.
- Will Repurchase Shares: Following Kahle and Stulz (2021), repurchases during the fiscal year $t = 1$ are defined as the purchase of common and preferred stock (PRSTKC) minus any reduction in the value of preferred stock (calculated as redemption (PSTKRV), liquidating (PSTKL), or par value (PSTK), whichever is available, in this order), all in $t = 1$. A firm-year is considered to have repurchased shares in the upcoming year if the amount repurchased in the following fiscal year is greater than 1% of its market capitalization at the end of the current fiscal year ($t = 0$).
- ΔCash/Assets: Change in cash and short term investments (CHE) from year $t = 0$ to year $t = 1$ divided by total assets (AT) at $t = 0$.
- Will Pay Target w Stock: For each acquirer-year in SDC M&A, we compute the fraction of all payments made to target shareholders that were paid in stock. To be included in this calculation, SDC M&A needs to specify at least one of the variables measuring the percentage of payment made in stock or cash: PCT_STK or PCT_CASH.
- $\log_2$(Market Cap): The base-2 log of a company's market capitalization at fiscal-year end ($t = 0$) calculated using CRSP, as the number of shares (SHROUT $\times 10^3$) times the absolute value of the share price (abs(PRC)).
- Profitability: Profitability is calculated using Compustat data as the operating income before depreciation (OIBDP) divided by total assets (AT).
- Book To Market: BM in the WRDS Ratios Suite. This variable represents

book equity divided by market equity. Book equity is computed as the sum of stockholders' equity of the parent company (SEQ), deferred taxes and investment tax credit (TXDITC, or the sum of deferred taxes TXDB and investment tax credit ITCB), minus preferred shares (calculated as the first available among PSTKRV, PSTKL, and PSTK). Market equity is computed as Compustat items PRCC_F $\times$ CSHO or CRSP items abs(PRC) $\times$ SHROUT$/10^3$.

- Return On Assets (ROA): ROA from WRDS Ratios Suite. It is calculated as operating income before depreciation (OIBDP) divided by the average of the beginning-of-year and end-of-year total assets (AT). If OIBDP is missing, then sales minus operating expenses (SALE minus XOPR), ortotal revenue minus operating expenses (REVT minus XOPR) are used, in this order.
- Tangibility: Tangibility is computed using Compustat data. It is defined as net Property, Plant and Equipment (PPENT) divided by total assets (AT). Missing PPENT are set to zero.
- Marginal Tax Rate: Simulated pre-interest marginal tax rates, originally used in Graham (1996).

C Two Case Studies

This appendix contains two short case studies, which provide additional context showing how market participants use EPS. In the first case study, we look at an 8-K filing from Humana Inc that announced a change in its expected membership growth. Even though it would be easy to plug this change in growth rates into a DCF model, the company chose to interpret the effects using EPS instead. In the second case study, we describe how market participants handled General Electric's reverse split in 2021. The company was required to restate its past EPS figures to avoid biasing this key performance metric.

C.1 Humana Inc

We have looked at examples of 8-Ks that do mention NPV or discounted cash flows. These terms typically show up in 8-Ks related to a specific security. For example, when a firm awards its CEO new stock options, it must file an 8-K. It is not uncommon for these sorts of reports to talk about the "present value" of the CEO's newly awarded options. This is where the bulk of "NPV" and "DCF" mentions in 8-K filings come from. It is rare to see an 8-K apply take a present-value approach to pricing the whole firm.

Humana Inc's January 9th 2023 8-K is representative of the broader pattern (Humana Inc, 2023). The company had to make this filing because it increased its expected membership growth. If there were ever a time for a firm to use NPV logic, it is here. An increase in expected membership growth directly translates into one of the key parameters in the standard Gordon-growth DCF model.

Yet the 8-K filing contains no discussion of future cash flows or how Humana planned on discounting them. Here is how the company interpreted the effects of this increase:

> "The Company intends to reiterate its commitment to grow 2023 Adjusted earnings per common share ("Adjusted EPS") within its targeted long-term range of 11–15 percent from its expected 2022 Adjusted EPS of approximately $25.00. As communicated on the Company's third quarter 2022 earnings call on November 2, 2022, it expects the consensus estimate of approximately $27.90 to be in line with its initial Adjusted EPS guidance."

When submitting this official legally-binding form to the SEC, Humana chose to focus almost exclusively on EPS.

C.2 General Electric

We have provided a substantial amount of evidence suggesting that the managers of large public corporations are laser-focused on increasing their

EPS. Moreover, the evidence that we have presented so far is just the tip of the iceberg (e.g., see Malenko, Grundfest, and Shen, 2023). As far as we can tell, academic researchers seem to be the only group of people who believe that managers are not mainly interested in increasing their firm's EPS.

Many researchers have a sense that it would be easy for a manager to manipulate her EPS numbers. For example, suppose a firm has $\mathbb{E}[Earnings_1] =$ \$100 and $\#Shares = 100$ to begin with, giving it an $EPS = \$1$. Following a 1-for-2 reverse split, the company would have $\#Shares = 50$ and an $EPS = \$2$. We have spoken to several researchers who saw this hypothetical scenario as proof that managers could not be EPS maximizers.

But there is a simple reason why EPS-maximizing managers are not clamoring for reverse splits in the real world. People have thought about this loophole and closed it. After a reverse split, a firm has to retroactively update its previously reported EPS values. In the above example, when the manager announced the new \$2 EPS, her shareholders would be wholly unimpressed given that she would also have to tell them that her previous EPS was \$2, too.

When GE did a 1-for-8 reverse stock split on July 30, 2021, it posted answers to shareholder FAQs (General Electric Co, 2021), one of which was: "How did the reverse stock split affect the FY'20, 1Q'21, and 2Q'21 EPS and the FY'21 Outlook and how will it impact the future calculation of net earnings or loss per share?"

> "We have adjusted our net earnings or loss per share for FY'20, 1Q'21, and 2Q'21 to reflect the reverse stock split. We have also updated our EPS from March '21 Outlook to reflect the change in share count. This adjustment simply reflects the reduced share count from the reverse stock split and does not otherwise change our previous Outlook.
>
> Additionally, in financial statements issued after the reverse stock split becomes effective, per share net earnings or loss and other per share of common stock amounts for periods ending before the effective date of the reverse stock split will be adjusted to give retroactive effect to the reverse stock split."

This is why EPS-maximizing managers are not in charge of companies whose entire market cap is packed into a single equity share. EPS is not a manipulation-proof measure. But it is not as easy to manipulate as many academic researchers seem to think. There are regulations in place to address obvious shortcomings, such as how to deal with reverse splits. The fact that these policies are needed is further evidence that managers are trying to boost their EPS.