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Abstract

In this conceptual paper, we suggest that estimating the cost of capital at the outset of the strategic decision process alleviates anchoring, which is an overemphasis of the initial assessment of a situation or problem, without a sufficient subsequent correction as more information becomes available. The cost of capital acts as a counter-bias anchor, ensuring a more vigorous analysis of the strategy under assessment. We explain the underlying mechanisms, and how to estimate the cost of capital for a single strategic decision using the “bottom-up” procedure. This procedure relies on financial information about competitors, and is founded on the assumption that equity- and debt investors require compensation for the systematic risk embedded in single strategic decisions in the same way as for other investments.

INTRODUCTION

Strategic decisions are those decisions that essentially are about where the company is going, and how it will get there (Eisenhardt, 1999). These include everything from mergers and acquisitions (M&A), to functional and operational strategies. However, it is not uncommon to read about failed strategic decisions in hindsight. For instance, M&As often lead to immense losses for the acquirer (Bauer and Matzler, 2014), and failure rates in the range of 70% to 90% seem to be usual among large M&As (Christensen *et al.*, 2011; Moeller, Schlingemann, and Stulz, 2004, 2005). To explain such decision failures, a range of perspectives have been suggested by management and psychology scholars, for instance: information overload (e.g., Van Knippenberg *et al.*, 2015); limited attention and processing skills (Cohen and Levinthal, 1990; Zahra and George, 2002); overconfidence among CEOs and managers (Chen, Crossland, and Luo, 2015; Eisenhardt, 1999); miscalibration effects (Grinblatt and Keloharju, 2009); self-attribution biases (Kelley, 1973; Langer and Roth, 1975); confirmation bias (Jonas *et al.*, 2001; Nickerson, 1998); anchoring (Chapman and Johnson, 1999; Sox *et al.*, 1988); loss aversion (Tversky and Kahneman, 1991); tendency for short-term and symptomatic problem solving (Van Oorschot *et al.*, 2013); information distortion (pre- and post- choice) to support own preferences (Russo *et al.*, 2008; Russo, Medvec, and Meloy, 1996); certain cognitive styles (Stanovich,

2009); overly heuristic thinking (Kahneman, 2011); overly controlled thinking in the "wrong" situation (Helfat and Peteraf, 2015); misattribution (using ones' feelings to infer the cause for ones' judgments, for instance Bless *et al.*, 1990; Schwarz and Clore, 1983); and an unfitted mix of managerial capabilities (perception, attention, and problem-solving skill) with regard to identifying and seizing a particular strategic opportunity (Helfat and Peteraf, 2015). Despite this vast literature on biases in decision making, it does not seem that we can use this knowledge well to improve business decisions (Kahneman, Lovallo, and Sibony, 2011). The work experience of managers is also not calibrated for discovering decision biases.

While many scholars have addressed various remedies for cognitive and decision biases, we are missing a more objective and simple decision criterion that will be able to signal when strategic judgments should not be followed. We lack a decision criterion for strategic actions, that when estimated, is not prone to be influenced by cognitive and decision biases. Further, we seek a decision criterion that is not easily misinterpreted by cognitive biases when applied. In this paper, we suggest a relatively simple method for estimating a financial benchmark for a single (or a set of) strategic action(s), which will indicate those actions that should not be pursued given current information. This financial benchmark acts in the same way as when comparing return on equity to the capital asset pricing model (CAPM), or comparing return on invested capital (ROIC) to the weighted average cost of capital (WACC). For instance, if ROIC is lower that WACC, this does not necessarily mean that the project has a negative return, but that the project yields less risk-adjusted profit than the best alternative investment with the same risk. [1] In that case, one should not pursue the investment under assessment.

In this paper, we show how to estimate an appropriate financial benchmark based on information we have about competitors, which will act as a more objective anchor in the decision phase (cf. Elstein and Schwarz, 2002). A strategic judgment signals a "no go" if the estimated financial performance measure from the strategic opportunity is lower than the financial benchmark for several combinations of decision biases. By the phrase "several combinations of decision biases", we mean that managers and executives are likely to try different scenarios using different assumptions when estimating the financial performance from the strategy, as well as when estimating the best alternative financial performance of the strategic actions (i.e., the cost of capital). These varying assumptions will be affected by different sensitivities to cognitive and decision biases over time, and each time the estimations are done. The idea is that on average, we should be able to trust the estimated financial performance from both the strategic

[1] See for instance Berk and DeMarzo (2017) for the estimation of the weighted average cost of capital (WACC).

opportunity, and the best alternative investment (the cost of capital, i.e., the financial benchmark). For instance, if a manager was involved in a team meeting last week discussing a strategic action, the manager is at the current moment not likely to be influenced precisely in the same way from decision biases. This means that if the average of financial performance estimates over time (even hours) is below the financial benchmark (which we show how to estimate below), then the strategic action is likely to decrease firm value for equity- and debt holders. This is the same as the meaning of a negative net present value (NPV), which does not mean that the project is necessarily losing money, but that the estimated financial performance for the project is lower than the best alternative investment with the same systematic risk (i.e., the non-diversifiable risk).

We make three main contributions. First, we add to the management literature on decision making by suggesting a counter-bias anchor for alleviating anchoring effects (e.g., Chapman and Johnson, 1999; Elstein and Schwarz, 2002; Estrada, Isen, and Young, 1997; Mussweiler and Strack, 2001; Russo, Carlson, and Meloy, 2006; Sox *et al.*, 1988; Strack, Bahník, and Mussweiler, 2016). Anchoring is an overemphasis of the initial assessment of a situation or problem, without a sufficient subsequent correction as more information becomes available (Elstein and Schwarz, 2002; Estrada *et al.*, 1997; Lichtenstein and Slovic, 1971; Tversky and Kahneman, 1991). In other words, the final decision is highly sensitive to the impression and judgment at the outset of the decision process. Elstein and Schwarz (2002) put it nicely when they argue that anchoring is when diagnostic probabilities change insufficiently. In this paper, we suggest to use a financial benchmark as an anchor to counter a more biased anchor that in any case will occur (cf. Chapman and Johnson, 1999). We believe that such a numerical anchor will neutralize some of the distortion of information that usually occurs from unchanged initial thoughts and judgments (cf. Estrada *et al.*, 1997). This distortion is partially due to selective accessibility of information, meaning that people tend to seek and interpret information in line with the "incidental" judgmental-anchor at the beginning of the decision-process (Jacowitz and Kahneman, 1995; Mussweiler and Strack, 1999).

Second, we show how to estimate the cost of capital (financial benchmark) for a single strategic action, rather than on the usual project-, division-, and company level of analysis. We present how scholars and managers can use "bottom-up" (industry) coefficients when estimating their performance models, to estimate more accurately and reliably financial performance criteria for their strategic decisions. The term and concept of "bottom-up" we borrow from Damodaran (2012). This method has several advantages: (i) in many cases, it allows the manager to calculate

a financial performance benchmark for a single strategic decision; (ii) it provides more reliable and forward looking (vs historical) estimates for systematic financial risk, which is used to estimate the benchmark in (i); and (iii) the method is as suitable for private companies as for public ones.

As a third contribution, although it is not the focus of this paper, we extend the performance-oriented strategy literature by attributing a financial benchmark to a single strategic action, rather than relying on the usual firm or industry level (e.g., Christensen and Montgomery, 1981; Grant and Jammine, 1988; Rumelt, 1974). Most management and strategy literatures measure financial performance in absolute terms, without considering that two performance measures with different systematic risk (e.g. using ROA) is not equivalent. For instance, ROA is a popular measure of financial performance (Barrick *et al.*, 2015; Choi and Wang, 2009; Girod and Whittington, 2016; Pearce, Freeman, and Robinson, 1987; Post and Byron, 2015; Robins and Wiersema, 1995; Su and Tsang, 2015), as well as Tobin's Q is a popular measure of financial performance (e.g., Choi and Wang, 2009; Girod and Whittington, 2016; Post and Byron, 2015; Uotila *et al.*, 2009). Also unscaled performance measures are used, for instance gross performance adjusted for certain costs (e.g., George, 2005; Vanacker, Collewaert, and Zahra, 2016). Using measures like ROA and Tobin's Q without any adjustment for systematic risk, may lead managers and executives to accept underperforming strategic actions and projects (i.e., with negative NPV), and disregard outperforming actions (i.e., with a positive NPV).

What is also missing from this literature is the lack of decision criteria (financial benchmarks) for when a strategic action creates a satisfactory financial performance. For instance, some managers use the rule of thumb that if the return on equity is above 10%, then the return is acceptable. This is the same as if equity holders and debt holder of the company do not necessarily (or just arbitrarily) require increased return on their shares and bonds when managers take riskier strategic decisions. That is unlikely to be true.

We proceed the article by first explaining the financial benchmark as a counter-bias anchor. We then derive the "bottom-up" procedure and method for estimating the financial benchmark for a single strategic action, or for a set of strategic actions. We consider how the estimations change for different debt policies. We explain further how this method can be implemented by practitioners. Finally, we conclude the paper.

A COUNTER-BIAS FINANCIAL ANCHOR

We suggest that the use of a financial benchmark (cost of capital) for a strategic decision, will counteract some of the tendency toward overemphasizing initial impressions and judgment of the strategic decision under assessment (Chapman and Johnson, 1999; Elstein and Schwarz, 2002; Estrada *et al.*, 1997; Mussweiler and Strack, 2001; Russo *et al.*, 2006; Sox Jr *et al.*, 1988; Strack *et al.*, 2016).[2] This anchoring prevents the retrieval of disconfirming information from semantic memory, as well as inhibits the attention to new information, to overcome the initial judgment (Elstein and Schwarz, 2002; Jacowitz and Kahneman, 1995; Mussweiler and Strack, 1999, 2001; Strack *et al.*, 2016; Tversky and Kahneman, 1975). For instance, Arkes (1991) argues for an association-based error, where irrelevant and counterproductive information may be retrieved from semantic memory, in this setting as associations to the initial judgement about the strategic decision. This leads to an even stronger confirmation bias (Janis and Mann, 1977; Kahneman *et al.*, 2011) as well as framing effects (Chapman and Johnson, 1999; Levin, Schneider, and Gaeth, 1998), and consequently to an insufficient adjustment toward a more correct assessment of the decision to be made (Lichtenstein and Slovic, 1971; Tversky and Kahneman, 1975).

A confirmation bias refers to the tendency of preferring supporting evidence, which can occur both before and after a decision (Festinger, 1957; Frey, 1986; Janis and Mann, 1977; Schulz-Hardt *et al.*, 2000). This may also occur at the group level (Janis, 1982; Schulz-Hardt *et al.*, 2000). Framing means that decision makers are influenced by how information is presented, and which context it is part of (Mellers, Schwartz, and Cooke, 1998).[3] There are different types of framing effects, and these are all founded on (Slovic, 1972) concreteness principle, which means that individuals tend to assess and use information in the form which it is presented. Frames can have both strong inhibiting and facilitating effects on the strategic decision process, since System I thinking is good at relying on (and creating) contexts, and since System I thinking is greatly involved in the daily cognitive activities (Kahneman *et al.*, 2011).

We argue that if the executive or manager estimates a financial benchmark (cost of capital) for the strategic decision under scrutiny before the decision process begins, and keep that in mind during the decision process, an asymmetric dominance effect will assist in inhibiting the otherwise initial and more random anchor. An asymmetric dominance effect means that an

[2] The American Association of Psychology, defines judgment as: "The process by which people form opinions, reach conclusions, and make critical evaluations of events and people based on available material; also, the product of that mental activity" (www.apa.org).

[3] The American Association of Psychology, defines a frame as:" A particular description of a choice; the perspective from which a choice is described or framed affects how a decision is made and which option is ultimately exercised" (www.apa.org).

additional alternative shape the frequency for which one chooses among the prior alternatives (Ariely and Wallsten, 1995; Colman, Pulford, and Bolger, 2007; Huber, Payne, and Puto, 1982). An alternative is asymmetric if is dominated by at least one other alternative, while it is also not dominated by at least one other alternative (Huber *et al.*, 1982). Adding such a decision alternative, could create an asymmetric dominance effect by increasing the likelihood of choosing the alternative that dominates it. The alternative that dominates the anchor (the cost of capital) will be the strategy under assessment. The alternative that is dominated by the anchor is another strategy that is considered inferior to the strategy under assessment. The benefit of having the financial benchmark (the cost of capital) acting as an anchor, is that it will ensure a more vigorous evaluation of the strategy. This could lead to the outcome that the managers realize that the strategy is actually inferior to the financial benchmark, which means that the strategy needs to be redrawn, or that they develop alternative ones.

We suggest that before the strategic decision process is initiated, one estimates the financial benchmark (cost of capital) for the strategic decision using the "bottom-up" method presented below. This means that the initial anchor will be, or colored by, the best alternative financial performance (i.e., the cost of capital) to the strategy under assessment. This cost of capital is associated with at least one alternative strategy by one or more competitors. Inadequate adjustments away from this financial benchmark and associated alternative strategy (or strategies) will occur due to anchoring effects (Elstein and Schwarz, 2002), but in this case the anchoring is helping the decision maker to avoid other more random anchors (cf. Chapman and Johnson, 1999), and to create a more robust assessment of the strategy. Initially, the strategy under assessment is considered to dominate the financial benchmark, otherwise the managers would not initiate the decision process in the first place. This means that the financial benchmark (the cost of capital) is the asymmetric alternative since it is dominated by the strategy under scrutiny (cf. Huber *et al.*, 1982). This will lead to an asymmetric dominance effect by making executives or managers initially more positive toward the strategy. However, the anchoring effect (from the financial benchmark) will during the decision process create a more vigorous assessment of the strategy. This will alleviate the problem of being overoptimistic when operationalizing the assessment of the strategy, for instance when estimating the return on invested capital (ROIC), which is the correct comparison to the financial benchmark.[4] In other words, the financial benchmark acts as a new counter-bias financial anchor.

[4] ROIC, and not return on assets (ROA), is the correct measure of financial performance to compare against the financial benchmark presented below (the weighted average cost of capital for a single strategic decision). The reason for this is that ROIC excludes leverage that belongs to the net working capital, while ROA does not extract

THE "BOTTOM-UP" PROCEDURE AND MEASURE

In this section, we explain the steps toward being able to calculate a financial performance criterion for a single strategic decision or action. The term "bottom-up" here means that we use industry data about the company's competitors to estimate financial benchmarks for strategic decisions of the company. We derive the method below, and we explain how it can be implemented in practice. The "bottom-up" procedure is different dependent on whether the strategic action is financed with a fixed debt level over time, or a target (fixed) debt-to-value ratio (Grinblatt and Titman, 2001; Hamada, 1972; Modigliani and Miller, 1958, 1963; Myers, 1974). This makes it necessary to derive the "bottom-up" method in two instances – the first where we assume that the company and its competitors have a fixed debt level if using debt in the first place, and second, where we assume a constant debt-to-value ratio instead if debt is used for financing the strategic actions. The "bottom-up" financial criterion becomes simpler in the case of a target (fixed) debt-to-value ratio. It is impossible, per definition, to maintain both a fixed debt level and a fixed debt-to-value ratio at the same time.

The "bottom-up" procedure with a fixed debt level

What is the main role for financial performance criteria? This is a way of assessing whether a firm's strategic action yields the results financially as we should expect compared to competitors in the industry (or industries) we are operating. If we perform below the estimated financial benchmark, this does not necessarily mean the strategic decision or action is a failure or creating financial losses, just that we are less effective than our peers. Thus, the strategic decision has a negative net present value (e.g., Berk and DeMarzo, 2017).

We now move on to explain the "bottom-up" procedure with a fixed debt level. Figure 1 presents a company's hypothetical balance sheet of market values for all strategic actions, industry effects, and macro-economic effects. 'PV' stands for present value, and is the market value today of the projected cash flows from a specific strategic action, industry variable, or economy-wide variable. The area in gray is the total value associated with operations of the company disregarding how we finance the strategic action (the unlevered value of the firm), while the present value of financials is the value deriving from the choice of capital structure, for

this leverage (Berk and DeMarzo, 2017). Since the weighted average cost of capital (WACC) also in most cases excludes leverage belonging to net working capital, ROIC is the correct comparison to WACC. Note that ROIC and ROA are not always consistently estimated among financial managers and others, so always check the details of the calculations.

instance the value of the tax shields from using debt. This type of balance sheet is naturally theoretical, and is different from the balance sheet based on book values found in annual reports. However, it is useful to understand the "bottom-up" procedure explained below.

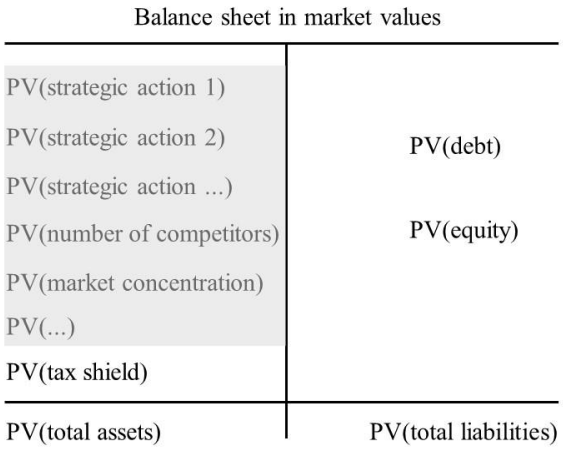

Figure 1. Illustrating a balance sheet in market values for strategic actions and industry effects.

Since the present value of assets and the present value liabilities are the same in the balance sheet, they must also embed the same systematic risk (the financial equity or debt "beta"). This makes it possible to calculate a risk-adjusted performance criterion for values on the left side of the balance sheet based on the right side, which is invaluable since the required return of equity- and debt investors per risk-unit is easier to estimate than any required return (performance criterion) for assets by itself. By this, we are on the way to identify a performance criterion for an individual strategic action. Modigliani and Miller (1958, 1963) and Hamada (1972) showed this transfer of required returns from the 'right' side to the 'left' side:

$$\beta_A = \left(\frac{PV(UA)}{PV(debt) + PV(equity)} \right) \beta_{UA} + \left(\frac{PV(\,financials)}{PV(debt) + PV(equity)} \right) \beta_{Fin} \qquad (1)$$

where 'UA' stands for unlevered assets (the gray area in Figure 1), 'Financials' means the tax shield from using debt, 'A' is the total assets (the value of all the strategic actions and other effects/assets on the left side of the balance sheet in Figure 1), β_A is the systematic risk for all of the company's assets (all strategies, all industry effects, and all economy-wide effects), β_{UA} is the systematic risk for all the unlevered assets, and β_{Fin} is the systematic risk of the arrangement

of the capital structure. To simplify, if we assume that the company's debt is risk free (β_{Fin} is set equal to 0), that the debt level is fixed over time, and that PV(financials) equals the present value of tax shields, equation (1) can be written as:

$$\beta_A = \left[\frac{PV(debt)+PV(equity)-PV(\,financials)}{PV(debt)+PV(equity)}\right]\beta_{UA} \Rightarrow$$
$$\beta_A = \left[1-T_c\frac{PV(debt)}{PV(debt)+PV(equity)}\right]\beta_{UA} \qquad (2)$$

where *PV(financials) = PV(tax shields) =* $T_c PV(debt)$. If the systematic risk of the debt is kept 0 (i.e., in line with the assumption that debt is risk free), systematic risk for equity can be written as (e.g., Grinblatt and Titman, 2001)[5]:

$$\beta_E = \left(1+\frac{PV(debt)}{PV(equity)}\right)\beta_A \qquad (3)$$

where, β_E, is the systematic risk of equity (the other parameters are explained above). When inserting equation (2) into (3), and rearranging to get the systematic risk of unlevered assets on the left side, we get the following (which we will break into specific strategic assets/decisions below):

[5] Equation (3) is the Modigliani and Miller's (1958, 1963) proposition one:
$\beta_A = \left(\frac{PV(equity)}{PV(equity+debt)}\right)\beta_E + \left(\frac{PV(debt)}{PV(equity+debt)}\right)\beta_D$.
In the case where we assume that debt is risk-free (i.e., that debt "beta" is zero), and that debt is perpetual and constant over time (cf. Hamada, 1972), Miller and Modigliani's proposition one reduces to equation (3):
$\beta_A = \left(\frac{PV(equity)}{PV(equity+debt)}\right)\beta_E + \left(\frac{PV(debt)}{PV(equity+debt)}\right)\beta_D \Rightarrow \beta_A = \left(\frac{PV(equity)}{PV(equity+debt)}\right)\beta_E \Rightarrow \beta_E = \frac{\beta_A}{PV(equity)/PV(equity+debt)} \Rightarrow$
$\beta_E = \beta_A + \beta_A\frac{PV(debt)}{PV(equity)} \Rightarrow \beta_E = \left(1+\frac{PV(debt)}{PV(equity)}\right)\beta_A$ (i.e, equation no. 3).

$$\beta_E = \left(1 + \frac{PV(debt)}{PV(equity)}\right)\left[\frac{PV(debt) + PV(equity) - T_c PV(debt)}{PV(debt) + PV(equity)}\right]\beta_{UA} \Rightarrow$$

$$\beta_E = \left[1 + (1 + T_c)\frac{PV(debt)}{PV(equity)}\right]\beta_{UA}$$

Rearranging:

$$\beta_{UA} = \frac{\beta_E + \beta_D(1 - t_c)\dfrac{PV(debt)}{PV(equity)}}{1 + (1 - t_c)\dfrac{PV(debt)}{PV(equity)}} \qquad (4)$$

The purpose with estimating equation (4), β_{UA} (the systematic risk of unlevered assets, which is termed the unlevered "beta"), is that we want to subvert this systematic risk into specific strategic actions, as well as for industry- and macroeconomic effects (but the focus of this paper is on strategic actions). The logic is that if debt- and equity holders require a certain return per systematic risk for holding securities on the 'right' side of the balance sheet, a strategic action (the present value of a strategic action) with the same unlevered systematic risk, β_{UA}, must provide at least this return to create value for the investors. Thus, we have created a performance criterion for a strategic action (the main purpose of his paper), since all the systematic risks (β_E, β_{UA}, β_D, β_A) have the economy's equity market as a base (like the natural logarithm has the number *e* as a base), together with the fact that the company's investors would demand the same return per risk-unit independently of where the investment comes from (otherwise there is an arbitrage opportunity).[6] While the equity "beta", β_E, easily can be estimated using a regression model if the company is listed, or the "bottom-up" method for private companies, as well as using the financial press (for instance the Financial Times), debt "beta" is more difficult. In case the company's debt is not considered to be highly risky, it is usual to set the debt "beta" equal to zero (e.g., Berk and DeMarzo, 2017).[7]

[6] Since the systematic risk for the unlevered assets is estimated in relation to an equity portfolio representing the whole economy (e.g., a national equity index), it can be inserted into the Capital Asset Pricing Model, $r_{UA} = r_f + \beta_{UA}(r_M - r_f)$, in order to estimate the performance criterion, r_{UA} (e.g., Brealey, Myers, and Allen, 2014). The variable, r_f, is a risk free interest rate, and the variable, r_M, is the return on a broad equity market portfolio.

[7] See (Damodaran, 2012) for possibilities of synthetically estimating the debt rating of private companies, and correspondingly suitable debt "betas".

The challenge is to identify the unlevered systematic risk, and consequently the required financial performance criterion, for a specific strategic decision and action. We now turn to this issue.

Estimating financial performance criteria for specific strategies

So far we have estimated the systematic risk of all the unlevered assets in the balance sheet, which then is used to estimate the performance criterion for this group of assets overall (see footnote 1). The financial performance criterion is the required (i.e., minimum) return that existing and new investors of the company demand on the unlevered assets. How well we are able to estimate such a performance criterion for specific strategic actions depends on how different the competitors are, how many competitors there are within the industry (or industries) the company belongs to, and how detailed the information is that we possess about competitors. We explain below how one can approach these issues in practice.

In Figure 2, we assume that a company wants to estimate the financial performance criterion (minimum required return by investors) for strategic action 4 and 5 together (the area marked in light gray).

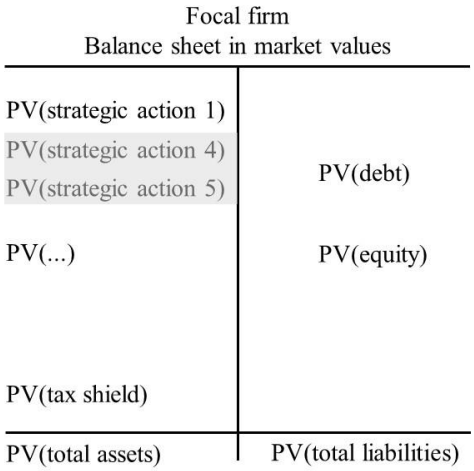

Figure 2. The balance sheet marks the two strategic actions for which we seek to find a financial benchmark.

One way to approach this is to estimate the systematic risk of the total unlevered assets for ones competitors following the equation (4) above, and take an equal or value-weighted average of

these systematic risks ($\beta_{UA,industry}$). Then one identifies a subset of the competitors in the industry that do not seem to pursue the strategic actions 4 and 5, and which are similar to the company in other respects. We calculate the average systematic risk of the unlevered assets for this subset of competitors (i.e., the unlevered "beta", $\beta_{UA,subset}$). We can now write:

$$\beta_{UA,industry} = \beta_{UA4+5,company} w_1 + \beta_{UA,subset}(1 - w_1) \quad (5)$$

where $\beta_{UA4+5,company}$ is the systematic risk of the unlevered assets concerning strategic action 4 and 5 (i.e., the parameter that we seek to find), and w_1 is the estimated present value of strategic action 4 and 5 divided by the present value of the total assets of the company.[8] We can rearrange equation (5) to get the systematic risk for strategic action 4 and 5 on the left side:

$$\beta_{UA4+5,company} = \frac{\beta_{UA,industry} - \beta_{UA,subset}(1 - w_1)}{w_1} \quad (6)$$

If our company does not use any debt to finance the two strategic actions (even though the competitors do use a fixed level of debt), we insert the unlevered systematic risk for the two strategic actions ($\beta_{UA4+5,company}$) into the capital asset pricing model (CAPM, equation no. 7), to estimate our financial benchmark (unlevered cost of capital).[9] If the two strategic actions are financed with a fixed (constant) level of debt, one needs to relever the unlevered "beta" in equation (6) before inserting the "beta" in the CAPM model (explained below). In this case, we move directly from equation (6) to equation (8).

[8] If one does not have an estimate of the PVs needed for calculating the weights in equation (5), then it is also possible to use the average of total projected sales for strategic action 4 and 5 divided by total sales of all the assets of the company (Damodaran, 2012). Operating income can also be used instead of sales, but both sales and operating income are inferior measures to PVs as the foundation for weights, since PVs consider time value of money, and accumulate values.

[9] If the company uses a fixed amount debt, exclude equation (7), and go directly to equation (8). This is explained more thoroughly in the main text. The capital asset pricing model (CAPM) is a method for estimating the equity cost of capital based on an asset's systematic risk with a broad marked-based portfolio (Lintner, 1965; Mossin, 1966; Treynor, 1961).

$$r_{UA4+5,company} = r_f + \frac{\beta_{UA,industry} - \beta_{UA,subset}(1-w_1)}{w_1}\left(r_M - r_f\right)$$
$$\Rightarrow \quad (7)$$
$$r_{UA4+5,company} = r_f + \beta_{UA4+5,company}\left(r_M - r_f\right)$$

The parameter, r_f, is a risk-free interest rate. The parameter, r_M, is a broadly-based market portfolio, for instance the S&P 500. The unlevered systematic risk for strategic actions 4 and 5 ($\beta_{UA4+5,company}$) in equation (6), is the systematic risk for these strategies assuming that no debt is used to finance these strategies. The purpose of equation (4) is to extract the effects on systematic (equity) risk from using debt. The reason for this is that it is not possible to simply take an average of the systematic risks (equity "betas") among the competitors, since our company will most likely have a different financial structure than the average of the competitors, and since leverage (debt) influences equity "betas". In equation (4), it is assumed that the competitors use a fixed level of debt, rather than a fixed debt-to-value ratio.

If our company uses a fixed (constant) level of debt (with or without equity) to finance the two strategic actions, we need to factor in the effects of debt when estimating the systematic risk on equity and consequently the required cost of capital (the financial benchmark) for the two strategic actions. This we do in equations (8) to (10). The reason for why we have to adjust the unlevered "beta" in equation (6), is that when the two strategies are financed with debt, their return on equity (ROE) will fluctuate more since the denominator (market value of equity) in the calculation of ROE, is smaller than in the case without any debt (Pike, Neale, and Linsley, 2012).

$$\beta_{E\,4+5,company} = \beta_{UA4+5,company}\left(1 + (1-t_c)\frac{PV(debt)_{4+5,company}}{PV(equity)_{4+5,company}}\right) - \beta_{D4+5,company}(1-t_c)\frac{PV(debt)_{4+5,company}}{PV(equity)_{4+5,company}} \quad (8)$$

Equation (8) is simply a rearrangement of equation (4), because we now want to embed the effects of debt on the systematic risk of levered equity ($\beta_{E,4+5,company}$) explained above.[10] The

[10] It is usual to term equity as levered if the project or company also includes debt. If no debt is used, the unlevered equity is the same as the value of total assets (unlevered assets) (e.g., Berk and DeMarzo, 2017).

unlevered value of assets ($\beta_{UA,4+5,company}$), comes from equation (6). The PV(debt) and PV(equity) in equation (8), is now the present value of debt and equity for the two strategic actions (hence the label "*4+5, company*"), respectively, and not the average of the values of debt and equity from our competitors (which was the case in equation (4) above).

The next step on the way to estimating the financial benchmark for strategic actions 4 and 5 (assuming the company as a fixed amount of debt), is to insert equation (8) into the CAPM:

$$r_{E4+5,company} = r_f + \beta_{E4+5,company}\left(r_M - r_f\right) \quad (9)$$

Equation (9) only gives us the financial benchmark for the equity that finances the two strategic actions. To estimate the financial benchmark completely for the strategic actions 4 and 5, we need to insert equation (9) into the weighted average cost of capital (WACC)[11]:

$$r_{WACC4+5,company} = r_{E4+5,company}\frac{PV(equity)_{4+5,company}}{PV(\text{total assets})_{4+5,company}} + r_{D4+5,company}(1-t_c)\frac{PV(debt)_{4+5,company}}{PV(\text{total assets})_{4+5,company}} \quad (10)$$

The financial benchmark (required rate of return for the two strategic actions) is the parameter, $r_{WACC4+5,company}$, in equation (10). For a general explanation of the WACC and its origin, see for instance Berk and DeMarzo (2017).

In the section that follows, we consider how managers can approach implementing the "bottom-up" method in practice. In the subsequent section, we explain the "bottom-up" method under the assumption of a fixed debt-to-value ratio rather than a fixed debt level.

[11] The weighted average cost of capital (WACC) is simply a weighted average of the different cost of capitals of a company. It is usual to simply divide between equity and debt when estimating WACC (e.g., Berk and DeMarzo, 2017), but one could also split equity and debt into specific types and weigh these separately, for instance common stock, preferred stock, leasing, 5-year corporate bonds, and 10-year corporate bonds.

Procedure and practical considerations

To use the "bottom-up" method in practice to estimate the financial benchmark for a single (or a set of) strategic action(s), you need to first identify the industry or industries that the company is part of, as well as your competitors for each of these industries (step 1 of the "bottom-up" method). Usually the executives or managers have a good grasp on this already. It is also possible, for instance, to use the Thomson Reuters Eikon database to search up the company, and click on the peers-analysis tab to get suggestions for relevant competitors. Here one also finds a range of financial information about the competitors, such as annual reports, financial ratios (e.g., the debt-to-equity ratio), and news about the competitors (e.g., about mergers and acquisitions). This makes it easier to implement the "bottom-up" method, whether the debt level is fixed (constant), or the debt-to-value ratio is fixed (the latter case is explained below).

Step 2 is to estimate the unlevered equity "beta" for all the competitors, in addition to the unlevered equity "beta" for those competitors that do not follow the two strategies (equations no. 4 and 5). This includes estimating, or retrieving from a database such as Thomson Reuters Eikon, the five parameters in equation (4): PV(debt); PV(equity); β_E (average equity "beta" across the competitors); β_D (average debt "beta" across the competitors); and average marginal tax rate (not the average effective tax rate of the competitors). If one is not able to estimate the market value of debt (PV of debt), then it is possible to use the book value of debt found in annual reports.[12] However, when it comes to the PV(equity), it is important to only use estimates of market value, not book value. For listed companies, PV(equity) is the market capitalization (i.e., the number of shares outstanding multiplied by the spot price). Inserting these five parameters into equation (4), one gets the systematic risk of the unlevered assets for each of the competitors. Within each industry, one estimates the unlevered "equity" beta as an average among the competitors by inserting these five parameters into equation (4).

It is challenging to estimate the systematic risk for those competitors that do not follow strategic actions 4 and 5. Executives and managers will likely be able to alleviate this obstacle using their experience. Obligatory news from listed companies will also contribute. Employees hired from competitors are also a source of information, and mergers and acquisitions undertaken by competitors could indicate their strategic directions. One can also use industry reports and other analyses by external institutions.

[12] The book value of debt will in many cases approximate the market value of debt well enough.

Step 3 of the "bottom-up" method is to estimate how much present value the company generates within each of the industries defined in step 1. One uses this information to weigh the unlevered "betas" from step 2, such that one gets only one unlevered "beta" among all the competitors ($\beta_{UA,industry}$), as well as only one unlevered "beta" for the subset of competitors not implementing strategic actions no. 4 and 5 ($\beta_{UA,subset}$). This we use to estimate the unlevered systematic risk ($\beta_{UA4+5,company}$) for the two strategic actions in equation (6).

Step 4 includes to estimate the levered equity "beta" for the two strategic actions ($\beta_{E4+5,company}$) using equation (8). The term "levered" means that we adjust the unlevered equity "beta" for the effects of debt. If the two strategic actions are financed with debt, the ROE will fluctuate more than in the case of no debt, and this fact will increase the systematic risk of the two strategies ($\beta_{E4+5,company}$) compared to the unlevered systematic risk ($\beta_{UA4+5,company}$).

In step 5, one inserts the levered equity "beta" from step 4 into the CAPM, as well as inserting the resulting required return on equity into the WACC in equation (10). The latter is the financial benchmark for the two strategies, which will act as a counter-bias anchor in the decision process.

The "bottom-up" procedure with a fixed debt-to-value ratio

If the competitors use a fixed debt-to-value ratio rather than a fixed debt level perpetually, equation (1) above does not simplify to equation (2).[13] This means that equation (1) rather than equation (2) is inserted into equation (3), and equation (4) changes to equation (11), which is Miller and Modigliani's proposition one (cf. Modigliani and Miller, 1958, 1963):

$$r_{UA} = \beta_E \frac{PV(equity)}{PV(\text{total assets})} + \beta_D \frac{PV(debt)}{PV(\text{total assets})} \qquad (11)$$

[13] The reason for this is that the debt level is perfectly correlated with the fluctuations in the market value of the total assets, which means that the systematic risk of the debt is equal to the systematic risk of the unlevered assets. One is therefore not able to put the debt "beta" equal to zero, as was the case when the debt level was fixed.

Equation (11) is applied to estimate the unlevered "beta" among all the competitors ($\beta_{UA,industry}$), as well as for the subset of competitors not implementing the two strategic actions ($\beta_{UA,subset}$). These two parameters are inserted into equation (6) to find the unlevered "beta" for the two strategic actions ($\beta_{UA4+5,company}$).

In the case when the two strategies are financed with a fixed debt-to-value ratio rather than a fixed debt level perpetually, the relevering in equation (8) changes to equation (12):

$$\beta_{E\,4+5,company} = \beta_{UA4+5,company} + \left(\beta_{UA4+5,company} - \beta_{D4+5,company}\right)\frac{PV(debt)_{4+5,company}}{PV(equity)_{4+5,company}} \qquad (12)$$

Equation (12) is where we add the effects of debt on the unlevered "beta" of the two strategic actions. As explained above, when debt is used as a source of financing in addition to equity, the denominator in the estimation of ROE is reduced compared to the all-equity case. This means that the ROE is more sensitive to changes in net income for the two strategic actions, which is a risk that equity investors demand compensation for. Thus, the systematic risk of levered equity ($\beta_{E\,4+5,company}$) increases.

Whether the competitors and company use a perpetual fixed debt level or a fixed debt-to-value ratio, the procedure explained above is the same. What changes are equations (1), (4), and (8). The remaining equations are the same in both cases.

The "bottom-up" procedure with a mixed debt policy

In the two cases presented above – a fixed perpetual debt level and a fixed debt-to-value ratio – we have assumed that both the competitors and the company's two strategic actions use the same debt policy. In other words, it is assumed that if competitors use a fixed debt level, then the company also uses a fixed debt level for financing the two strategic actions. This does not need to be the case. For instance, the competitors may use a fixed debt-to-value ratio on average, while the company uses a fixed debt level. In these mixed cases, we combine the two approaches above. This is illustrated in Figure 3.

Path (i) and (ii) in Figure 3 are the two cases where both the competitors and the company use either a fixed debt level or a fixed debt-to-value ratio. In path (iii) and (iv), the

competitors and the company diverge in their debt policy. In path (iii), the competitors use on average a fixed debt level, while the company uses a fixed debt-to-value ratio to finance the two strategic actions. In path (iv), the competitors use on average a fixed debt-to-value ratio, while the company finances the two strategic actions with a fixed debt level. The procedure and practical considerations are the same irrespectively of the debt policy, but the combination of equations (4), (8), (11), and (12) changes.

	Industry (competitors) [unlevering]	**Strategic actions [relevering]**
Fixed perpetual debt level	[Equation (4)] (i) $\beta_{UA} = \frac{\beta_E + \beta_D(1-t_c)\frac{PV(debt)}{PV(equity)}}{1+(1-t_c)\frac{PV(debt)}{PV(equity)}}$ (iii)	[Equation (8)] $\beta_{E\,4+5,company} = \beta_{UA4+5,company}\left(1+(1-t_c)\frac{PV(debt)_{4+5,company}}{PV(equity)_{4+5,company}}\right) - \beta_{D4+5,company}(1-t_c)\frac{PV(debt)_{4+5,company}}{PV(equity)_{4+5,company}}$
Fixed debt-to-value ratio	[Equation (11)] (iv) $r_{UA} = \beta_E\frac{PV(equity)}{PV(\text{total assets})} + \beta_D\frac{PV(debt)}{PV(\text{total assets})}$ (ii)	[Equation (12)] $\beta_{E\,4+5,company} = \beta_{UA4+5,company} + \left(\beta_{UA4+5,company} - \beta_{D4+5,company}\right)\frac{PV(debt)_{4+5,company}}{PV(equity)_{4+5,company}}$

Figure 3. Illustration of unlevering and relevering with mixed debt policies.

CONCLUDING REMARKS

In this paper, we have argued for how executives and managers can use the cost of capital for a single strategy as an anchor in its decision process. The aim is to alleviate more random cognitive effects on the decision outcome, for instance being overly optimistic about the strategy under assessment. We rely on a "bottom-up" procedure for estimating the financial benchmark (the cost of capital) for a single strategy, which rely on systematic-risk information about competitors. To our knowledge, equation (5) is new, and the stepping stone for being able to estimate the cost of capital for a single strategic decision and action (and not only on the usual

project- or firm level of analysis). We argue for estimating and applying this financial benchmark before initiating the decision process to avoid more random initial impressions and judgment (cf. Chapman and Johnson, 1999; Elstein and Schwarz, 2002; Strack *et al.*, 2016). This anchor will create an asymmetric dominance effect (Ariely and Wallsten, 1995; Colman *et al.*, 2007; Huber *et al.,* 1982), in which the financial benchmark prevents certain disconfirming evidence toward itself, while the managers keep a positive view on the strategy under assessment since the strategic alternative (the strategy in scrutiny) dominates the best alternative investment (the financial benchmark). If the latter where not true, the managers would not initiate the decision process in the first place.

We believe that managers will be more conservative and objective during their strategic decision process if they apply the "bottom-up" procedure at the outset of the decision process. The equations presented in this paper can easily be operationalized (in Excel, Phyton, Matlab, or similar software), and the information needed for estimating these equations are easily available. For instance, for public companies, Financial Times include updated financial equity betas each week. Additionally, the manager can easily estimate this beta using publicly available data such as stock prices of competitors and at least one market portfolio (e.g., the S&P500).

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