ONLINE APPENDIX

Accompanying

Accessing the Untapped Brand Leverage Potential – A Strategic Framework from a Capital Market View

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WEB APPENDIX A – MODELING

Literature on CBBE and Financial Value Drivers

We briefly overview the literature that has investigated how CBBE relates to the four financial value drivers (see Table A.1). This work provides evidence that CBBE improves profitability (e.g., Aaker and Jacobson 2001). However, insights on the other three value drivers are either hardly available (earnings growth and sustainability) or inconclusive (capital cost).

TABLE A.1: Related Prior Literature on CBBE and Financial Value Drivers

			Impact on financial value driver (-/+)				
Reference	**Observation period**	**CBBE metric**	Profit-ability[1)]	Risk/cost of capital[2)]	Earnings growth	Sustain-ability of excess return	**Mode-ration of CBBE impact**
Aaker and Jacobson (2001)	1988-1994	Index (Techtel Corp.)	✓ (+)				
Bharadwaj et al. (2011)	2000-2005	Dimensions (EquiTrend)		✓ (+)			
Fischer and Himme (2017)	2005-2012	Index (EquiTrend)		✓ (-/+)			
Luo et al. (2013a)	2008-2011	Index (YouGov)		✓ (n.s.)			
Mizik (2014)	2000-2010	Index (BAV)	✓ (+)				
Rego et al. (2009)	2000-2006	Index (EquiTrend)		✓ (-)			
Stahl et al. (2012)	1998-2008	Dimensions (BAV)	✓ (+)				
This study	*2005-2013*	*Index + dimensions (EquiTrend)*	✓ (+)	✓ (-/+)	✓ (+)	✓ (+)	✓

Notes: Because our focus is on CBBE, we do not include studies using other brand equity measures, such as sales-based brand equity (Datta et al. 2017) and financial brand equity (e.g., Himme and Fischer 2014; Bharadwaj et al. 2020).
BAV = Brand Asset Valuator (Young & Rubicam). n.s. = non-significant (p >.05)
1) Profitability: ROA (return on assets), ROE (return on equity), ROIC (return on invested capital)
2) Risk: systematic risk, idiosyncratic risk, credit spread, WACC (weighted average cost of capital)

Notably, with regard to capital cost, CBBE appears to reduce the cost of debt but increase the equity/debt ratio (Fischer and Himme 2017), which in turn increases capital cost. Findings on the cost of equity, that is, systematic risk, are mixed and range from positive (e.g., Bharadwaj et al. 2011) to negative relations (e.g., Rego et al. 2009), leaving it open to what extent CBBE truly influences capital cost, which is the ultimate composite cost of financing metric relevant to corporate valuation and which we study here.

Decomposition of the CBBE-Firm Value Effect

Deriving Equation 1. To obtain the CBBE-firm value effect, we consider the firm value function FV = f[CBBE, **Y**] and analyze its total differential. This is given by

$$dFV = \frac{\P FV}{\P CBBE} dCBBE + \frac{\P \mathbf{FV}\text{¢}}{\P \mathbf{C}} d\mathbf{Y}. \tag{W1.1}$$

We multiply the expression by 1/FV and expand the terms on the r.h.s. with CBBE and **Y**, respectively, to obtain

$$\underbrace{\frac{dFV}{FV}}_{\rho_{FV}} = \underbrace{\frac{\partial FV}{\partial CBBE}\frac{CBBE}{FV}}_{\varepsilon_{FV,CBBE}} \underbrace{\frac{dCBBE}{CBBE}}_{\rho_{CBBE}} + \underbrace{\frac{\partial \mathbf{FV}'}{\partial \mathbf{Y}}\frac{\mathbf{Y}}{FV}}_{\boldsymbol{\varepsilon}'_{FV,Y}} \underbrace{\frac{d\mathbf{Y}}{\mathbf{Y}}}_{\boldsymbol{\rho}_{Y}},$$

which equals Equation 1 in the paper.

Deriving Equation 2. Consider the expanded firm value function FV = f[ROIC(CBBE), WACC(CBBE), EGR(CBBE), SUS(CBBE), **Y**]. We derive the total differential with

$$\begin{aligned} dFV = &\left(\frac{\partial FV}{\partial ROIC}\frac{\partial ROIC}{\partial CBBE} + \frac{\partial FV}{\partial WACC}\frac{\partial WACC}{\partial CBBE} + \frac{\partial FV}{\partial EGR}\frac{\partial EGR}{\partial CBBE} + \frac{\partial FV}{\partial SUS}\frac{\partial SUS}{\partial CBBE} \right) dCBBE \\ &+ \frac{\partial \mathbf{FV}\text{¢}}{\P \mathbf{Y}} d\mathbf{Y}. \end{aligned} \tag{W1.2}$$

We multiply Equation W1.2 by 1/FV and expand the respective terms on the r.h.s. with ROIC, WACC, EGR, SUS, CBBE, and **Y** to obtain

$$\begin{aligned} \rho_{FV} = \frac{dFV}{FV} = &\left(\underbrace{\frac{\partial FV}{\partial ROIC}\frac{ROIC}{FV}}_{\varepsilon_{FV,ROIC}} \underbrace{\frac{\partial ROIC}{\partial CBBE}\frac{CBBE}{ROIC}}_{\varepsilon_{ROIC,CBBE}} + \ldots + \underbrace{\frac{\partial FV}{\partial SUS}\frac{SUS}{FV}}_{\varepsilon_{FV,SUS}} \underbrace{\frac{\partial SUS}{\partial CBBE}\frac{CBBE}{SUS}}_{\varepsilon_{SUS,CBBE}} \right) \underbrace{\frac{dCBBE}{CBBE}}_{\rho_{CBBE}} \\ &+ \underbrace{\frac{\partial \mathbf{FV}'}{\partial \mathbf{Y}}\frac{\mathbf{Y}}{FV}}_{\boldsymbol{\varepsilon}'_{FV,Y}} \underbrace{\frac{d\mathbf{Y}}{\mathbf{Y}}}_{\boldsymbol{\rho}_{Y}}, \end{aligned}$$

which equals Equation 2 in the paper.

Corporate Valuation Model

Deriving Equation A.3. Several approaches to firm valuation exist, the most prevalent one being the discounted cash flow framework. Most importantly for our purposes, the discounted cash flow framework is transparent about the mechanism of value generation (see Copeland et al. 2013). In this framework, firm value in period t = 0, FV_0, is equal to the sum of all expected future cash flows that are discounted at the company's weighted average cost of capital,[1]

(W2.1) $$FV_0 = \frac{EBIT_1 \times (1-\tau) - I_1}{(1+WACC)} + \frac{EBIT_2 \times (1-\tau) - I_2}{(1+WACC)^2} + \frac{EBIT_3 \times (1-\tau) - I_3}{(1+WACC)^3} + \ldots ,$$

where $EBIT_t$ denotes EBIT in period t, I_t are investments in new capital in period t, WACC is the weighted average cost of capital, and τ denotes the cash tax rate. Note that WACC and τ are constant. This assumption is not too restrictive and is frequently applied in practice because these metrics only change as a result of substantial exogenous shocks (e.g., a recession or a change in tax law), which are difficult to predict.

The stream of cash flows can also be expressed as follows

(W2.2) $$\begin{aligned} FV_0 = {} & \frac{EBIT_1 \times (1-\tau) - I_1}{(1+WACC)} + \frac{EBIT_1 \times (1-\tau) + ROIC_1 \times I_1 - I_2}{(1+WACC)^2} \\ & + \ldots + \frac{EBIT_1 \times (1-\tau) + \sum_{t=1}^{N-1} ROIC_t \times I_t - I_N}{(1+WACC)^N}, \end{aligned}$$

where $ROIC_t \times I_t$ measures net cash flows, which are assumed to cover the payments to suppliers of capital and the initial investment. Hence, cash flows from each year’s investment are sufficient to provide for the necessary replacement investment in the future.

[1] Without loss of generality, we neglect the value contribution of a tax advantage that accrues from debt capital valued at market rates, which is not relevant for our derivation (Copeland et al. 2013, p. 505).

Ignoring the unreasonable result that a firm has an infinite value, Copeland et al. (2013, p. 499f) show that the sum in W2.2 has a solution that decomposes firm value into the value of current earnings strength and the value of future growth

$$FV_0 = \underbrace{\frac{EBIT_t \times \left(1-\tau\right)}{WACC}}_{\substack{\text{Value of current}\\ \text{earnings strength}}} + \underbrace{\sum_{t=1}^{\infty} \frac{I_t(ROIC_t - WACC_t)}{WACC\left(1+WACC\right)^t}}_{\text{Value of future growth}}. \tag{W2.3}$$

Note that the firm only generates value from future growth if this growth is profitable, i.e., the average rate of return of new invested capital ROIC is greater than the cost of capital WACC. It is not consistent with competition theory to assume that a firm can earn superior rents forever. Competition will eventually drive ROIC down to the level of WACC. Let the period of excess return denote with SUS. Let us further assume that the firm invests a constant fraction K of its cash flow into new investments, i.e. $I_t = K \times [EBIT\,(1-\tau)]$.[2] Then, we have

$$\begin{aligned} FV_0 &= \frac{EBIT_t\left(1-t\right)}{WACC} + \sum_{t=1}^{\infty} \frac{K \times \left[EBIT_t\left(1-t\right)\right]\left(ROIC - WACC\right)}{WACC\left(1+WACC\right)} \\ &= \frac{EBIT_t\left(1-t\right)}{WACC}\left[1+\sum_{t=1}^{\infty} \frac{K \times \left(ROIC - WACC\right)}{\left(1+WACC\right)}\right]. \end{aligned}$$

Under the assumption of a limited period of excess returns SUS, expression W2.3 can be restated as follows

$$FV_0 = \frac{EBIT_t(1-t)}{WACC}\left[1+\frac{K \times (ROIC - WACC)}{1+ROIC \times K}\sum_{t=1}^{SUS}\left(\frac{1+ROIC \times K}{1+WACC}\right)^t\right],$$

Copeland et al. (2013, p. 502ff) further simplify this expression to

$$FV_0 = \frac{EBIT_t(1-t)}{WACC}\left[1+\frac{K \times (ROIC - WACC)}{WACC - ROIC \times K}\left[1-\left(\frac{1+ROIC \times K}{1+WACC}\right)\right]^{SUS}\right]. \tag{W2.4}$$

---

[2] Note that this is an assumption about how a valuator uses an investment rate over future periods at the time of valuation t=0. The actual rate is likely to differ over the years although we know that companies try to achieve consistency in dividend payout ratios. That in turn implies consistency in investment rates.

The binomial expansion can be used to approximate the last term on the r.h.s.

$$\text{(W2.5)} \qquad \left(\frac{1+ROIC\times K}{1+WACC}\right)^{SUS} \cong 1-SUS\left(\frac{WACC-K\times ROIC}{1+WACC}\right)$$

Substituting W2.5 into W2.4 and rearranging terms leads to

$$\text{(W2.6)} \qquad FV_0 = \frac{EBIT_t(1-\,t\,)}{WACC} + \frac{EBIT_t(1-\tau)\times K\times(ROIC\text{ -}WACC)\times SUS}{WACC\times(1+WACC)}$$

Copeland et al. (2013) prove that the following identity must hold

$$\text{(W2.7)} \qquad ROIC´\ \ K = EGR,$$

where EGR measures the growth rate in earnings or cash flows, respectively. Substituting K for W2.7 in W2.6 and rearranging terms leads to our Equation A.3 in the paper, i.e.,

$$\text{(W2.8)} \qquad FV_0 = \underbrace{\frac{EBIT_1\left(1-\tau\right)}{\widetilde{WACC}}}_{\text{Value of current earnings strength}} \times \underbrace{\left[1+\frac{\left(\widetilde{ROIC}-\widetilde{WACC}\right)\widetilde{EGR}\cdot\widetilde{SUS}}{\widetilde{ROIC}\left(1+\widetilde{WACC}\right)}\right]}_{\text{Value of growth expectations}}$$

where we use expected values for the value drivers.

Deriving Equation A.8. We use expression W2.8 to obtain our measure of the sustainability of excess return SUS. Let us first bring EBIT(1-τ)/WACC on the l.h.s. of (W2.8)

$$\text{(W2.9)} \qquad FV_0 - \frac{EBIT_t(1-\,t\,)}{WACC} = \frac{EBIT_t(1-\tau)‹\ EGR\times(ROIC - WACC)\times SUS}{ROIC\times WACC\times(1+WACC)}.$$

It is now straightforward to solve for SUS

$$\text{(W2.10)} \qquad SUS = \left(FV_0 - \frac{EBIT_t(1-\,t\,)}{WACC}\right)\left(\frac{ROIC\times WACC\times(1+WACC)}{EBIT_t(1-\,t\,)\times EGR\times(ROIC - WACC)}\right).$$

Since SUS is defined for ROIC > WACC and takes on only nonnegative values we obtain the following expression, which is consistent with Equation A.8 in the paper

$$\text{(W2.11)}\quad \widetilde{SUS}_{it} = \begin{cases} Max\left[\left(FV_{it} - \dfrac{EBIT_{it}(1-\tau)}{\widetilde{WACC}_{it}}\right)\left(\dfrac{\widetilde{WACC}_{it} \times \widetilde{ROIC}_{it} \times \left(1+\widetilde{WACC}_{it}\right)}{\widetilde{EGR}_{it} \times EBIT_{it}(1-\tau) \times \left(\widetilde{ROIC}_{it} - \widetilde{WACC}_{it}\right)}\right), 0\right] \\ \text{for } \widetilde{ROIC}_{it} - \widetilde{WACC}_{it} > 0 \\ \qquad\qquad 0 \text{ else.} \end{cases},$$

and where we use expected values for the value drivers.

Resource Allocation Model

Deriving Equation 5. In this section, we derive the solution to allocate resources across activities to drive the three strategy emphasis multipliers to their optimal level, i.e., the level that maximizes the change in firm value due to a change in CBBE. We consider the constrained maximization problem as given by Expression 4. Note that it is sufficient to maximize firm value before investment cost since these costs are fixed by the total budget B and therefore not relevant to the optimization. Let us write the Lagrange objective function compactly in matrix form as follows

$$\text{(W3.1)}\quad L = \frac{\partial \mathbf{FV}}{\partial \mathbf{FVD}} \frac{\partial \mathbf{FVD}}{\partial \mathbf{CBBE}}(\mathbf{z})\, dCBBE + \mu\left[B - C(\mathbf{z})\right].$$

The first-order conditions are given by

$$\text{(W3.2)}\qquad \frac{\partial \mathbf{FV}}{\partial \mathbf{FVD}} dCBBE \frac{\partial\left(\partial \mathbf{FVD}/\partial \mathbf{CBBE}\right)}{\partial \mathbf{z}} - \mu \frac{\partial C(\mathbf{z})}{\partial \mathbf{z}} = 0$$

and

$$\text{(W3.3)}\qquad \frac{\partial L}{\partial \mu} = B - C(\mathbf{z}) = 0.$$

Divide W3.2 by *dCBBE* and multiply by *CBBE/FV*. Expand then the terms on the l.h.s., which we showcase for the first-order conditions w.r.t. the segmentation emphasis multiplier SEG

$$
\begin{aligned}
&\frac{\partial FV}{\partial ROIC}\frac{ROIC}{FV}\frac{\partial\left(\partial ROIC/\partial CBBE\right)}{\partial SEG}\frac{SEG}{\left(\partial ROIC/\partial CBBE\right)}\frac{\partial ROIC}{\partial CBBE}\frac{CBBE}{ROIC}\frac{1}{SEG}\\
\text{(W3.4)}\quad &+\ldots+\frac{\partial FV}{\partial SUS}\frac{SUS}{FV}\frac{\partial\left(\partial SUS/\partial CBBE\right)}{\partial SEG}\frac{SEG}{\left(\partial SUS/\partial CBBE\right)}\frac{\partial SUS}{\partial CBBE}\frac{CBBE}{SUS}\frac{1}{SEG}\\
&-\mu\frac{\partial C\left(\mathbf{z}\right)}{\partial SEG}\frac{C\left(SEG\right)}{C\left(SEG\right)}\frac{CBBE}{dCBBE\cdot FV}=0
\end{aligned}
$$

Multiplying W3.4 by SEG and summarizing the resulting expression in terms of elasticities yields the following result for the optimal budget of SEG

$$
\begin{aligned}
&\left(\text{W3.5}\right)\quad C\left(SEG^{*}\right)=\\
&\frac{dCBBE\cdot FV}{\mu\, CBBE}\left(\begin{array}{l}\varepsilon^{*}_{FV,ROIC}\varepsilon^{*}_{ROIC,CBBE}\varepsilon^{*}_{(\partial ROIC/\partial CBBE),SEG}+\varepsilon^{*}_{FV,WACC}\varepsilon^{*}_{WACC,CBBE}\varepsilon^{*}_{(\partial WACC/\partial CBBE),SEG}\\ +\varepsilon^{*}_{FV,EGR}\varepsilon^{*}_{EGR,CBBE}\varepsilon^{*}_{(\partial EGR/\partial CBBE),SEG}+\varepsilon^{*}_{FV,SUS}\varepsilon^{*}_{SUS,CBBE}\varepsilon^{*}_{(\partial SUS/\partial CBBE),SEG}\end{array}\right)\frac{1}{\varepsilon^{*}_{C(SEG),SEG}},
\end{aligned}
$$

where the asterisk indicates that variables are in their optimum and $\varepsilon^{*}_{FV,ROIC}=\frac{\partial FV}{\partial ROIC}\frac{ROIC^{*}}{FV^{*}}$,

$\varepsilon^{*}_{ROIC,CBBE}=\frac{\partial ROIC}{\partial CBBE}\frac{CBBE^{*}}{ROIC^{*}}$, $\varepsilon^{*}_{(\partial ROIC/\partial CBBE),SEG}=\frac{\partial\left(\partial ROIC/\partial CBBE\right)}{\partial SEG}\frac{SEG^{*}}{\left(\partial ROIC/\partial CBBE\right)^{*}}$, and

$\varepsilon^{*}_{C(SEG),SEG}=\frac{\partial C\left(SEG^{*}\right)}{\partial SEG}\frac{SEG^{*}}{C\left(SEG^{*}\right)}$.

Recall that the budget constraint is binding and has to be satisfied in the optimum. From W3.5, we obtain the optimal share of the budget that is allocated to multiplier l

$$
\text{(W3.6)}\quad \frac{C\left(z_{l}^{*}\right)}{B}=\frac{\frac{dCBBE\cdot FV}{\mu\cdot CBBE}\sum_{FVD}\varepsilon^{*}_{FV,FVD}\varepsilon^{*}_{FVD,CBBE}\varepsilon^{*}_{(\partial FVD/\partial CBBE),z_{l}}\left(\varepsilon^{*}_{C(z_{l}),z_{l}}\right)^{-1}}{\sum_{m}\frac{dCBBE\cdot FV}{\mu\cdot CBBE}\sum_{FVD}\varepsilon^{*}_{FV,FVD}\varepsilon^{*}_{FVD,CBBE}\varepsilon^{*}_{(\partial FVD/\partial CBBE),z_{m}}\left(\varepsilon^{*}_{C(z_{m}),z_{m}}\right)^{-1}},
$$

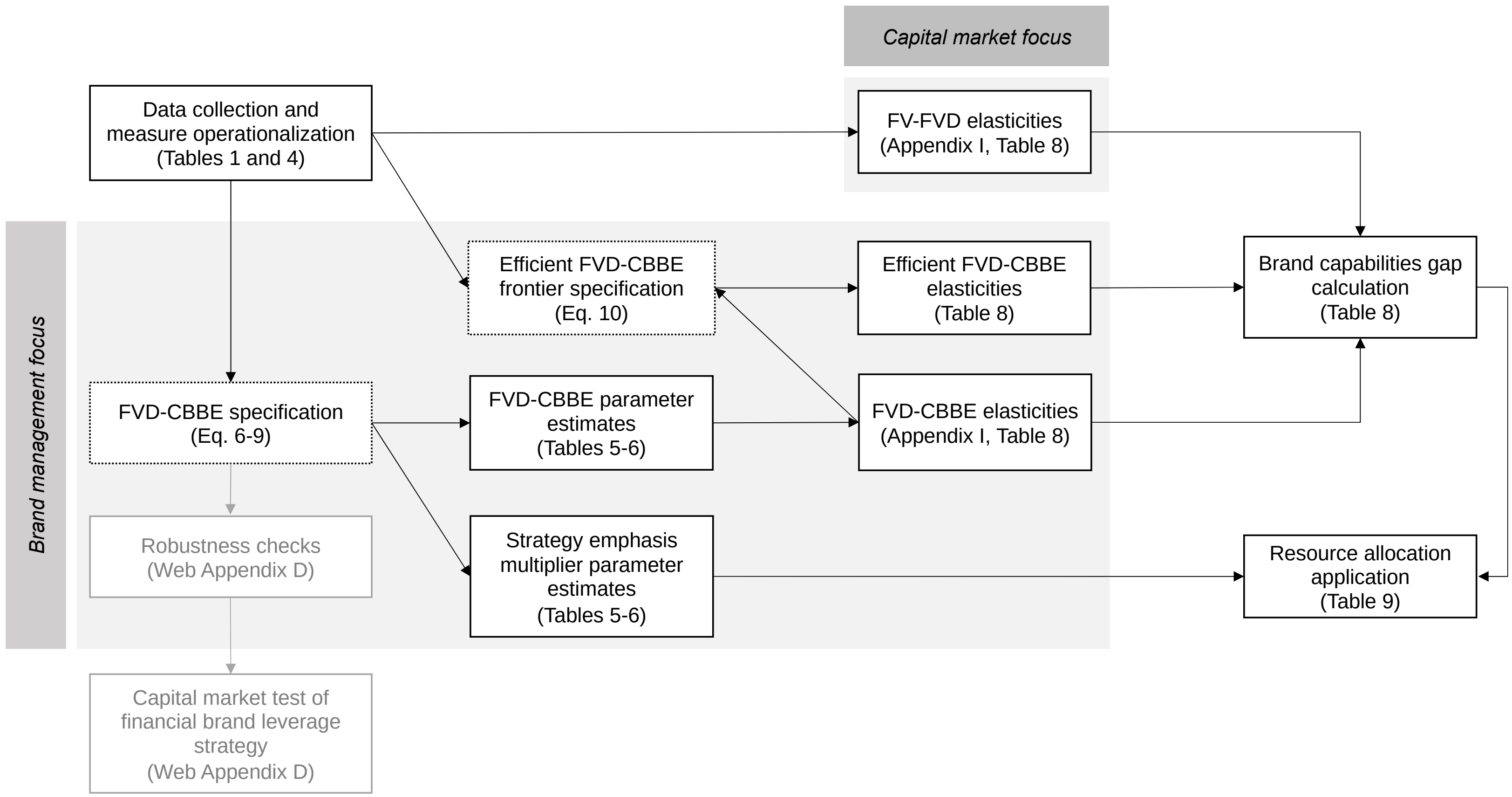
$$
\forall\ l,m\in\left\{SEG,PEN,EXP\right\}\ \text{and}\ FVD\in\left\{ROIC,WACC,EGR,SUS\right\}.
$$

The term $\frac{dCBBE \times FV}{\mu \times CBBE}$ cancels out. By defining $v_l^* = \sum_{FVD} \frac{\varepsilon^*_{FV,FVD}\,\varepsilon^*_{FVD,CBBE}\,\varepsilon^*_{(\partial FVD/\partial CBBE),z_l}}{\varepsilon^*_{C(z_l),z_l}}$ and substituing it for the respective terms in W3.6, W3.6 reduces to Equation 5 in the paper. The solution establishes a global maximum because the objective function is concave in **z***.

TABLE A.2 Firm-Specific Control Variables and Expected Impact on Financial Value Drivers in the Estimation Equations 6-9

	Profitability/ROIC		*Earnings growth/EGR*		*Cost of capital/WACC*		*Sustainability/SUS*	
Variables	*Exp. Sign*	*Support*	*Exp. Sign*	*Support*	*Exp. Sign*	*Support*	*Exp. Sign*	*Support*
Advertising and other expenditures	+/-	Ailawadi et al. (2003); Rao, Bharadwaj (2008)	+/-	Kim, McAlister (2011); Joshi, Hanssens (2010)	-	McAlister et al. (2007)	+/-	Srivastava, et al. (1998); Vorhies, Morgan (2009)
R&D expenditures	+/-	Boulding, et al. (1995); Erickson, Jacobson (1992)	+/-	Geroski et al. (1997); Erickson, Jacobson (1992)			+/-	MacDonald, Ryall (2004), Rappaport, Mauboussin (2001)
Firm size	-	McAfee, McMillan (1995)	-	Chan et al. (2003), McAfee, McMillan (1995)	-	Beaver, et al. (1970); Blume, et al. (1998)	+/-	Acs, Audretsch (1987); McAfee, McMillan (1995)
Industry concentration	+/-	Demsetz (1982); Scherer (1980)	+/-	Demsetz (1982); Scherer (1980)	+/-	Hou, Robinson (2006); Himme, Fischer (2014)	+/-	Demsetz (1982); Lustgarten, Thomadakis (1987)
Financial leverage	+	Kemsley, Nissim (2002)	-	Myers (1977)	-	Beaver, et al. (1970); Rego, et al. (2009)		
Capital expenditures	+/-	Copeland et al. (2013)	+/-	Copeland et al. (2013)				
Earnings			+	Hou, Robinson (2006)				
Negative earnings			+/-	Stickel (1990); Matsumoto (2002)				
Profitability			+	Copeland et al. (2013); Myers (1977)				
Investment rate			+	Copeland et al. (2013); Myers (1977)				
Sales growth			+	Copeland et al. (2013)				
Pretax interest coverage					-	Blume, et al. (1998)		
Operating margin					-	Blume, et al. (1998)		
Dividend payout					-	Beaver, Kettler, Scholes (1970)		
Asset growth					+	Beaver, et al. (1970)	+	Rappaport, Mauboussin (2001)
Liquidity					-	Beaver, et al. (1970)		

FIGURE A.1 Flow of the Analysis Steps in the Empirical Application



Stochastic Frontier Modeling Approach

Rationale behind the efficient frontier analysis. When developing the stochastic frontier model (Equation 10), we follow conceptually the marketing capabilities literature (e.g., Dutta et al. 1999) and econometrically the stochastic frontier estimation (SFE) methodology (e.g., Aigner et al. 1977; Stevenson 1980). The general idea of measuring a firm's capabilities follows an input-output approach where the firm's capability is defined as its ability to deploy the available resources (input) to achieve a desired objective (output). Different input-output relations have been studied with outputs as diverse as sales, technological innovation, or cost of production. There is no conceptual restriction on the definition of this relation and the output measure; it is the problem context that defines what the objective and thus output measure is.

In our decision context, the key output variables are the firm value driver elasticities w.r.t. CBBE. For ease of exposition, let us focus on the ROIC-CBBE elasticity in the following. The logic does not change for the other elasticities (note, however, that the WACC-CBBE elasticity is a cost elasticity to be minimized). The efficient frontier or transformation function, respectively, describes how the input factors translate into the maximum attainable output, the ROIC-CBBE elasticity in our case, by most efficiently deploying the resources. This is the structural relationship we model in Equation 10. Since firms do not necessarily achieve the maximum elasticity, in reality, any under-attainment of this objective is attributable to the functional inefficiency of the firm. Measuring these inefficiencies is the key purpose of economic efficiency analysis.

In the literature, there are two approaches to estimating economic efficiency: Data Envelopment Analysis (DEA) and Stochastic Frontier Estimation (SFE). For identification, both these approaches need to observe different combinations of inputs and outputs; in our case, this is the variation of elasticities and inputs over firms and time. DEA uses linear programming techniques and is a nonparametric method that does not require a functional form imposed on the data. Despite this flexibility, it has two main drawbacks. First, by construction, some observations are 100% efficient, which is unlikely, especially if different samples are drawn from the firm population. Second, the economic frontier is assumed to be deterministic. However, the realized input-output relation is often subject to inherent randomness (resulting from events outside the firm's control). SFE explicitly handles this randomness by specifying a standard purely stochastic component assumed to be normally distributed as in Equation 10. In addition, SFE adds a non-negative error component that we assume to be gamma distributed and which ensures identification of the deviations from the efficient frontier, the inefficiency terms. Predicting these inefficiency errors is the main objective of SFE. As a result, the (unbiased) estimation of parameters of the transformation function is of less interest and concern to the researcher (Greene 2012).

Consistency between functional forms of value driver regressions and stochastic frontier regression. The value driver-CBBE elasticities are the focal objective to be maximized (minimized for WACC) in our framework. The ROIC-CBBE elasticity, therefore, serves as the DV of the frontier regression model in our following exposition. This elasticity is an estimated quantity. We estimate this quantity based on Equation 6.1, which gives rise to the following expression for the elasticity (we omit time and firm index for ease of exposition):

(W4.1) $\varepsilon_{ROIC,CBBE} = a_2 \frac{CBBE}{ROIC}$.

Hence, the elasticity depends not only on the marginal effect, a_2, but also on the levels of CBBE and ROIC. The marginal effect of $\varepsilon_{ROIC,CBBE}$ w.r.t. CBBE, as an example, is given by

(W4.2) $\frac{\partial\, \varepsilon_{ROIC,CBBE}}{\partial\, CBBE} = a_2 \frac{1}{ROIC}$.

Recall that the objective of stochastic frontier regression Equation 10 is to estimate the extent of inefficiency as part of the estimated ROIC-CBBE elasticity. The attainable maximum elasticity depends on various market conditions and firm-specific factors, including the level of CBBE and ROIC as shown in (W4.1). Therefore, we need to control for CBBE and ROIC, which is implemented in linear form in the stochastic frontier Equation 10. Implicit to this specification is the following marginal effect of $\varepsilon_{ROIC,CBBE}$ w.r.t. CBBE:

(W4.3) $\frac{\partial\, \varepsilon_{ROIC,CBBE}}{\partial\, CBBE} = \theta_1$, where θ_1 is a parameter to be estimated and associated with CBBE in Equation 10.

The two marginal effects w.r.t. CBBE that derive from the functional forms of Equations 6.1 and 10 are consistent with each other. To see this, we write down the relevant, structural part of Equation 10 (again omitting indexes and other symbols for ease of exposition):

(W4.4) $\varepsilon_{ROIC,CBBE} = \theta_1 CBBE.$

Substitute θ_1 for the marginal effect (W4.2) as implied by the firm value driver Equation 6.1. As a result, we obtain

(W4.5) $\varepsilon_{ROIC,CBBE} = a_2 \frac{CBBE}{ROIC},$

which is consistent with Expression W4.1, the elasticity implied by Equation 6.1. The same is true if we differentiate Expression W4.1 w.r.t. ROIC ($= -a_3 \frac{CBBE}{ROIC^2}$), with the exception that the marginal effects are expected to be negative. Consistency of functional forms is also given w.r.t. Equation 9. The elasticity is different here and does not depend on the respective financial value driver but only on CBBE (see A.2). Equation 10 therefore does not include the value driver as predictor as shown in Table 7.

We also verified whether the empirical data support that the marginal elasticity effects of (W4.2) and (W4.3) approximate each other. For Expression W4.2, we estimate a value of .394 with CI95 [.295, .492] and for Expression W4.3, we estimate a value of .285 with CI95 [-.044, .614]. The confidence intervals are overlapping, supporting the consistency argument. We note, however, that sample sizes are different for estimating the different equations due to the different sets of predictors.

Finally, we note that the two models 6.1 and 10 should not be interpreted as "alternative" models to estimate the ROIC-CBBE elasticity. Equation 10 could be understood as an auxiliary, second-stage regression that we estimate for the purpose of the economic efficiency analysis. This analysis exploits the variance of estimated elasticities across firms and time to decompose the observed (estimated) elasticities based on Equation 6.1 into an efficient frontier part and the inefficiency part. It uses additional information on firm resources and other input factors to predict the efficient frontier.

WEB APPENDIX B – DATA AND SAMPLE

Representativeness of Smallest Estimation Sample

In Table B.1, we compare the firms included in the smallest estimation sample with those of the total sample that are excluded across several firm characteristics. Firm characteristics do not differ significantly between the two groups except for the mean CBBE rating.

TABLE B.1 Comparison of Firms Based on Estimation with Smallest Sample

		Firms excluded Mean	**Firms included** Mean	**Mean difference test** *p*-value
Sales	($m)	21,214	25,424	.351
	N	479	107	
CBBE	(0-100)	55.21	59.51	.000
	N	491	107	
Financial leverage		3.61	3.23	.765
	N	467	107	
Liquidity		1.76	1.62	.228
	N	404	107	
Operating margin		-.076	.164	.477
	N	475	107	
Industry membership				.121[1]
Automobile		6.2%	2.8%	
Consumer durables & apparel		10.9%	10.3%	
Consumer services		8.1%	9.3%	
Media		7.4%	1.9%	
Retailing		11.5%	17.8%	
Food & staples retailing		3.0%	5.6%	
Food, beverage and tobacco		10.4%	15.0%	
Household & personal products		4.6%	4.7%	
Health care		7.6%	2.8%	
Information technology		12.3%	13.1%	
Telecom services		3.5%	3.7%	
Transportation		3.7%	6.5%	
Industrial, energy & utilities		10.2%	6.5%	

Notes: [1)] Based on χ^2-test.

Sample Selection Issues Related to Missing Information on Advertising and R&D

Our data is subject to the limitation that firms may not report advertising expenditures in their financial reports. We need to evaluate the consequences for our results that may arise from these missing values.

Alternative data sources. One option to avoid loss of information on advertising expenditures is to consider alternative data sources, such as KantarMedia, a frequently used substitute data source. KantarMedia infers advertising expenses from marketplace behavior. As such, this data source suffers from its own disadvantages, such as systematically underestimating advertising of B2B firms which do not engage in observable marketplace advertising, or by reporting gross prices of advertising instead of net prices firms actually pay for. We note that KantarMedia data is incomplete for a significant number of firms in our sample, making this alternative data source infeasible for our estimation.

Type of firms reporting advertising data. Our study focuses on the brand asset and how this asset is leveraged for value generation. Firms that consider brands as potentially important assets are usually differentiators, not cost leaders from a competitive strategy point of view. Based on the U.S. GAAP's materiality condition that requires firms to report advertising if advertising is material to their business, McAlister et al. (2016) argue that reporting firms are rather differentiators than cost leaders. Our study and conclusions are probably of less value for cost leaders, so leaving out those firms should not compromise our conclusions.

We document strong empirical evidence for the argument that cost leaders are less invested in brands and therefore have less strong brands that are monitored by leading brand data providers such as Harris Poll. For this purpose, we compared the percentage of firms reporting advertising in our sample with the universe of firms covered by COMPUSTAT during our observation period (17,634 firms in 2005-2013). 72.3% of firms in our sample report advertising, while only 27.1% of firms report advertising in the full COMPUSTAT sample. The average reported advertising expense between the samples differs by a factor of 25, and by a factor of 171 when we consider the median that is less affected by extreme values.

Investigating potential selection bias. As a robustness check, we estimated all four financial value driver models by including the inverse mill's ratio that corrects for a potential sample selection bias due to missing advertising data. For the selection equation, it turns out that the level of cash (size and financial strength), age, book-to-market value, and industry fixed effects are significant predictors of whether a firm reports advertising expenditures (prediction accuracy = 74.9%). Table B.2 shows the parameter estimates of the inverse mill's ratio that we add to the focal equation in order to correct for a potential selection bias. None of these parameters is significant in any equation. We conclude that sample selection does not appear to be an issue for our data.

As another robustness check, we estimated all four financial value driver models by excluding advertising expenditures from the control variables (details are available from the authors). As a result, sample sizes are larger, but we do not encounter any substantial change to the results.

TABLE B.2 Results for Inverse Mill's Ratio Parameter

Dependent variable	**ROIC**	**EGR**	**WACC**	**SUS**
Inverse mill's ratio	.011 (.008) p = .181	-.005 (.009) p = .581	-.003 (.003) p = .239	.096 (.166) p = .561

Missing values on R&D. In the paper, we argue that missing R&D data are not necessarily missing data but rather reveal that the firm does not substantially invest in R&D. For example, service firms typically do not have an engineering department. The development of new services does not incur significant R&D expenditures at a regular basis as is the case for many product companies. Consequently, we find an extremely low rate of R&D reporting companies among service companies, e.g., consumer services (7%), financial services (1%), transportation services (4%), and retailing (9%). In contrast, 93% in the automotive sector, 86% in the information technology sector, and even 67% in the consumer durables & apparel sector report R&D expenditures. Therefore, we set R&D expenditures to zero for non-reporting firms instead of deleting these observations because their R&D expenditures can reasonably be assumed to be negligible but not missing.

Nevertheless, we checked the robustness of our findings against this procedure. We re-estimated all four financial value driver models by excluding all firms with missing R&D expenditures (details are available from the authors). Although the resulting sample sizes are much lower, the results are stable.

Measurement of Strategy Emphasis Multipliers

Measurement approach. Strategy emphases are not directly observed and are not easy to measure; to circumvent these challenges, researchers have used indirect approaches based on objective, comparable, and repeatedly available data that reflect outcomes connected with the strategy. Following this tradition, we exploit the raw consumer-level data used to calculate the aggregate CBBE score to capture the three strategies and examine how they moderate the relationship between CBBE and the four respective value drivers. As detailed in Table 1 in the manuscript, to operationalize CBBE, we use the EquiTrend survey measure (e.g., Rego et al. 2009), which is composed of consumer responses to three items that capture brand knowledge (familiarity and quality items) and purchase consideration (purchase intention item) of a brand. By operationalizing our multipliers based on these consumer-level data, we follow the practice of strategy researchers who have constructed their strategy measures from secondary data sources, e.g., by computing differences between variables (Mizik and Jacobson 2003), second moments of the distribution (Luo et al. 2013), and entropy measures (Fang et al. 2011). An alternative would be to develop a psychometric scale, which is, however, expensive, prone to subjectivity and key informant biases, and usually not available for historical time series of firms.

That being said, we recognize the constraints of our operationalizations, which are partially attributed to the limitations in how the EquiTrend metric is defined. In other settings, when researchers and practitioners use CBBE data from different providers like Young & Rubicam and YouGov, or collect their own data, the items used for operationalization could vary, and there might exist other reasonable approaches to measure the three strategy emphasis multipliers. To bolster confidence in our measurement approach, we next overview the validation exercises we conducted.

Measure validation. To provide evidence that the suggested measures are appropriate and capture the postulated strategy activity, we follow common scale development practice and test for the convergent and nomological validity of the measures. For evaluating the convergent validity, we look for alternative operationalizations of the focal multiplier variables based on the same customer-level CBBE data. We expect a high correlation between these alternative operationalizations and our focal measures. For evaluating nomological validity, we use data at a different outcome level, such as the product market or the financial market. The idea here is to demonstrate the connection between our multipliers and economic outcomes that can be plausibly derived from the conceptual and theoretical underpinnings of the respective market strategy. Because the theoretical relationships are more complex and economic outcomes are influenced by many other variables, we expect the correlations to be lower than for the convergent validity tests. Table B.3 overviews the various convergent and nomological validity tests we pursue.

(a) *Segmentation emphasis.* Regarding convergent validity, we determine segmentation emphasis using the standard deviation of the CBBE ratings across customers as an alternative measure to the coefficient of variation. We evaluate the nomological validity based on investors' common categorization of stocks as growth vs. value stocks. Growth stocks are shares of companies that are expected to increase their revenue and earnings at a faster rate than the average business in their industry. In contrast, value stocks do not show these higher growth rates but derive their intrinsic value from more stable cash flows and higher dividend yields. Because segmentation focuses on serving a concise group of loyal customers, it offers fewer opportunities for growing the customer base but fosters profit margins and the stability of cash flows. We, therefore, expect a negative correlation of segmentation emphasis with growth stocks and a positive correlation with value stocks. For categorizing the companies, we follow the standard measurement approach in finance (Fama and French 1993). Here, value stocks are identified as stocks with a book-to-market ratio above the 70th percentile in the industry-year distribution, growth stocks are stocks below the 30th percentile.

(b) *Penetration emphasis.* For evaluating convergent validity, we consider two alternative operationalizations. First, we compute the relative (percentage) difference between purchase consideration and brand knowledge instead of the taking the direct difference between the two components. Second, we ignore the quality item when measuring brand knowledge, i.e., penetration emphasis is measured by the difference between the rating for purchase consideration and familiarity only. To evaluate the nomological validity, we use a measure for penetration in terms of product market outcomes. For many markets with repeat buying, penetration is not only driven by the proportion of customers buying a brand but also by the extent of repeat purchases. A useful and established measure here is the share of wallet, i.e., the proportion of the annual budget that a household allocates to a specific brand. We do not have this information available in the EquiTrend data, but we have access to two representative surveys of cosmetics and grocery retail brands in a large European country. The data are described in full detail in (source blinded to maintain author anonymity) and, based on surveying more than 500 respondents, inform about consumers' actual brand purchase patterns. Data collection includes four items that measure brand knowledge (brand likeability, quality, trust, and differentiation), which follows Keller's (1993) CBBE concept and is reasonably similar to the EquiTrend approach. Finally, survey participants rated each brand in terms of purchase consideration/intention, which allows us to compute the penetration emphasis multiplier for these datasets.

(c) *Geographic expansion emphasis.* Our geographic expansion emphasis multiplier is based on an entropy measure. This approach does not only focus on the brand preference share by U.S. state (measured by counting brand #1 ranks among consumers) but also considers how evenly these shares are distributed across the country. An alternative would be to only focus on the average level of brand preference achieved across the 50 U.S. states. As convergent validity check, we therefore compute two variants. As a first measure, we determine the brand preference share within each state per period and brand, and sum these shares up. As a second measure, we take the square of these shares and sum them up.

For evaluating the nomological validity of our measure, we follow the idea that a successful geographic market expansion should manifest in the proportion of the market that is being served, which we proxy by market share and market leadership based on sales. We obtain these data for each firm and year in relation to its four-digit SIC competitors in our dataset. To account for differences in the competitive structure of industries, we compute the firm's market share relative to the industry average share. We note that sales do not reflect U.S. sales alone but global sales, albeit for the majority of firms in our sample the U.S. market is by far the largest and often contributes for more than 50% of sales (see also the robustness test in Web Appendix D). In the end, this makes our test more conservative as the measurement noise drives down the correlation estimate. We expect a positive correlation between geographic expansion and market share and market leadership, albeit this correlation might not be strong because of the many other factors that influence sales performance.

Table B.3 displays the correlations we find among the various variables to test for convergent and nomological validity. The results are in line with the expectations and provide confidence in our measures. In Web Appendix D, we also verify the robustness of our findings using these alternative operationalizations for the strategy emphasis multipliers.

TABLE B.3 Convergent and Nomological Validity Test Results of Strategy Emphasis Multipliers

		Correlation with focal measure …		
		Segmentation emphasis	**Penetration emphasis**	**Geographic expansion emphasis**
Segmentation emphasis	*Convergent validity*			
	Standard deviation of CBBE	.766***		
	Nomological validity			
	Value stock	.324***		
	Growth stock	-.182***		
Penetration emphasis	*Convergent validity*			
	Percentage difference		.868***	
	Purchase consideration ./. familiarity		.877***	
	Nomological validity[1]			
	Share of wallet cosmetics		.812***	
	Share of wallet grocery retailers		.881***	
Geographic expansion emphasis	*Convergent validity*			
	Sum of brand preference shares			.913***
	Sum of squared brand preference shares			.722***
	Nomological validity			
	Market sales leadership			.266***
	Sales market share			.267***

1) The nomological validity test for the penetration emphasis multiplier is based on different datasets that include additional items.

TABLE B.4 Definition and Measurement of Firm Value, Financial Value Drivers, and Controls

Variables	Definition	Measure	Source / COMPUSTAT
Firm value (FV)	Market capitalization of equity + preferred stock + book value of debt + minority interest	(Yearly average of monthly stock prices · outstanding shares) + preferred stock + total liabilities	CRSP (market capitalization equity) + DATA 10 (preferred stock); DATA 5 (current Liabilities) + DATA 9 (long-term debt) + DATA 49 (minority interest)
Profitability (ROIC)	Net operating profit after tax / invested capital	EBIT×(1- τ) / invested capital	DATA 308 (operating cash flow), DATA 37 (invested Capital)
Earnings growth (EGR)	5y-estimates of earnings growth (consensus)	Arithmetic mean across analysts	I/B/E/S
Earnings (EARN)	Net operating profit after tax	EBIT×(1- τ)	DATA 308 (operating cash flow)
Negative earnings (NEARN)	Negative earnings in previous year	1 if EARN (t-1) < 0, 0 else	
Cost of capital (WACC)	Weighted-average cost of capital	[Equity×cost of equity + debt ×cost of debt×(1-τ)]/Total capital	Bloomberg
Advertising expenditures (ADV)	Advertising expenditures	-	DATA 45 (advertising)
Other expenditures (OE)	Other expenditures	SG&A expense – non-coordinating costs (advertising, R&D, bad debt expense, provision for doubtful accounts, employee benefit expenses)	DATA 189 (SG&A); DATA 45 (advertising); DATA 46 (R&D); DATA 67 (estimated doubtful receivables); DATA 43 (pension/retirement expense); DATA 215 (stock options)
R&D expenditures (RD)	R&D expenditures	-	DATA 46 (R&D), missing values set to 0
Firm size (SIZE)	Total assets	Log of total assets	DATA 6 (total assets)
Financial leverage (LEV)	Book value total debt / (book value equity + preferred stock)	-	DATA 5 (current Liabilities) + DATA 9 (long-term debt); DATA 60 (common Equity) + DATA 10 (preferred stock)
Industry concentration (CONC)	Four-firm concentration index	Cumulative market share of the top four firms in the industry defined by two digits of the NAICS	DATA 12 (sales)
Investment rate (IR)	(1-cash dividends) / Net operating profit after tax	(1-cash dividends) / [EBIT×(1- τ)]	DATA 21 (cash dividend); DATA 308 (operating cash flow)
Operating margin (OPM)	Operating income before depreciation/sales	Operating income before depreciation/sales	DATA 13 (operating income before depreciation); DATA 12 (sales)
Pre-tax interest coverage (INT)	EBIT divided by interest expense	(Operating income after depreciation + interest expense)/interest expense	DATA 178 (operating income after depreciation); DATA 15 (interest expense)
Capital expenditures (CAPEX)	Capital expenditures	-	DATA 128 (capital expenditures)
Sales growth (SALGR)	Sales growth	[Sales (t) / sales (t-1)] - 1	DATA 12
Dividend payout (DIV)	Cash dividends/earnings	Cash dividends/available income	DATA 21 (cash dividend); DATA 20 (income to common stockholders)
Asset growth (A_GROWTH)	Terminal total assets/initial assets	Total assets/total assets$_{t-1}$	DATA 6 (total assets)
Liquidity (LIQ)	Current ratio	Current assets/current liabilities	DATA 4 (current assets); DATA 5 (current liabilities)
GDP growth (GDPGR)	U.S. GDP gross rate	(Real US GDP$_t$ - Real US GDP$_{t-}$)/ Real US GDP$_{t-1}$	Bureau of Economic Analysis (BEA)
Number of employees	Number of employees	Log of number of employees	DATA 29 (employees)
Cash position	Cash and cash equivalents	Cash and short-term investments/total assets	DATA 1 (cash and short-term investments); DATA 6 (total assets)
Receivables	Accounts receivables	-	DATA2 (receivables)
Type of business: service	Services versus goods industry	Dummy variable classified depending on industry classification	Self-coded
Main type of customer: consumer	Main business is with consumers versus businesses	Dummy variable classified depending on industry classification	Self-coded

TABLE B.5 Correlation Matrix (Equations 6-9)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
1. CBBE	1.00 (3289)																	
2. ROIC	.05** (2796)	1.00 (4478)																
3. EGR	.03 (2183)	.40** (3077)	1.00 (3292)															
4. WACC	.04 (2034)	.02 (2998)	.07** (2281)	1.00 (3364)														
5. SUS	.08 (452)	-.12* (491)	.02 (491)	.21** (485)	1.00 (491)													
6. Advertising expenditures	.04 (1702)	.04* (2563)	.03 (2055)	-.07** (1727)	-.14** (487)	1.00 (2593)												
7. Other expenditures	.08** (2794)	.02 (4368)	-.05** (3054)	-.08** (2986)	-.13** (487)	.40** (2562)	1.00 (2562)											
8. R&D expenditures	.01 (3289)	.03* (4478)	.00 (3292)	-.03 (3364)	-.14** (491)	.47** (2593)	.35** (2593)	1.00 (4472)										
9. Firm size	-.19** (2826)	.00 (4478)	-.06** (3085)	-.22** (3012)	-.14** (491)	.43** (2593)	.45** (2593)	.30** (4410)	1.00 (4522)									
10. Financial leverage	-.07** (2668)	.01 (4268)	-.02 (2982)	-.08** (2893)	.00 (485)	-.03 (2399)	-.02 (2399)	-.02 (4167)	.03* (4284)	1.00 (4270)								
11. Industry concentration	-.01 (3289)	.03* (4478)	-.05** (3292)	-.04* (3364)	-.07 (491)	.00 (2593)	.07** (2593)	.01 (4472)	.04* (5517)	-.01 (4522)	1.00 (4284)							
12. Investment rate	.02 (2753)	.00 (4295)	.00 (3071)	.01 (2929)	.13** (491)	-.01 (2589)	.00 (2589)	.00 (4232)	-.04** (4338)	.00 (4336)	.01 (4091)	1.00 (4338)						
13. GDP growth	.04* (3289)	.02 (4478)	.03ü (3292)	-.02 (3364)	.07 (491)	.00 (2593)	-.02 (2593)	-.01 (4472)	-.01 (5517)	.00 (4522)	.05** (4284)	-.02 (5517)	1.00 (4338)					
14. Operating margin	-.02 (2796)	.11** (4412)	-.01 (3044)	-.03 (2987)	-.17** (491)	.03 (2592)	.01 (2592)	.01 (4358)	.07** (4457)	.00 (4456)	.00 (4205)	.00 (4457)	.00 (4279)	1.00 (4457)				
15. Pretax interest coverage	.02 (2607)	.014 (4089)	.00 (2789)	.02 (2742)	.01 (488)	.01 (2282)	-.01 (2282)	.00 (4037)	.00 (4133)	-.01 (4130)	.00 (3879)	.00 (4133)	-.02 (3958)	.00 (4083)	1.00 (4133)			
16. Dividend payout	-.07 (2515)	.00 (3839)	-.01 (3022)	.00 (2636)	.06 (490)	-.01 (2583)	-.01 (2583)	-.01 (3778)	.01 (3882)	.00 (3880)	.01 (3643)	.15** (3882)	.00 (3878)	.00 (3823)	.00 (3507)	1.00 (3882)		
17. Asset growth	.02 (2758)	.03 (4362)	.07** (3033)	.02 (2948)	.15** (491)	-.02 (2511)	.00 (2511)	.00 (4294)	-.02 (4399)	-.01 (4399)	.03* (4164)	-.02 (4399)	.11** (4224)	-.05** (4335)	.01 (4021)	.01 (3770)	1.00 (4399)	
18. Liquidity	.07** (2458)	-.05** (3851)	.03 (2561)	.13** (2588)	.04 (491)	-.15** (2299)	-.12** (2299)	-.01 (3851)	-.25** (3894)	-.07** (3892)	-.06** (3666)	-.01 (3894)	-.01 (3714)	-.10** (3886)	.05** (3720)	-.02 (3266)	.07** (3779)	1.00 (3894)

TABLE B.5 Correlation Matrix (Equations 6-9) [continued]

	19. Negative earnings	20. Earnings [EBIT (1-τ)]	21. Capital expenditures	22. Sales growth	23. Stock return	24. Penetration emphasis	25. Segmentation emphasis	26. Expansion emphasis
1. CBBE	.00 (3289)	-.08 (2938)	-.01 (2597)	.00 (2844)	.03 (2050)	-.01 (1546)	-.67 (1546)	.41 (1084)
2. ROIC	-.01 (4625)	.04 (4093)	.03 (4071)	.00 (4498)	.00 (3065)	-.05 (1478)	-.12 (1478)	.09 (1044)
3. EGR	-.24 (3184)	-.06 (2916)	-.02 (2775)	.04 (3002)	.01 (2639)	-.02 (1335)	-.06 (1335)	.06 (972)
4. WACC	.02 (3039)	-.15 (3039)	-.12 (2759)	-.02 (2708)	-.09 (2108)	.07 (1166)	-.11 (1166)	-.04 (820)
5. SUS	-.05 (578)	-.14 (578)	.04 (578)	.03 (578)	-.07 (576)	.00 (452)	-.05 (452)	.04 (365)
6. Advertising expenditures	-.04 (2694)	.48 (2377)	.44 (2367)	-.02 (2606)	-.01 (2139)	-.25 (1158)	.00 (1158)	.13 (824)
7. Other expenditures	.00 (4498)	.56 (4098)	.46 (4020)	-.02 (4313)	.01 (3025)	-.13 (1511)	-.03 (1511)	.19 (1074)
8. R&D expenditures	.05 (5517)	.34 (4904)	.37 (4114)	-.02 (4541)	-.01 (3131)	-.12 (1605)	-.16 (1605)	.07 (1129)
9. Firm size	.01 (4676)	.55 (4135)	.41 (4112)	-.05 (4541)	.04 (3074)	-.12 (1492)	.21 (1492)	.00 (1084)
10. Financial leverage	.00 (4438)	.10 (3911)	-.01 (3879)	.00 (4301)	-.01 (2945)	-.04 (1455)	.01 (1455)	-.04 (1037)
11. Industry concentration	.02 (5517)	.14 (4904)	.26 (4114)	.02 (4541)	.01 (3131)	.25 (1605)	.00 (1605)	-.14 (1129)
12. Investment rate	.00 (4488)	-.11 (3968)	-.02 (3954)	.00 (4365)	.00 (3068)	.01 (1532)	-.02 (1532)	.01 (1091)
13. GDP growth	-.07 (5517)	.03 (4904)	.01 (4114)	.04 (4541)	.04 (3131)	.04 (1605)	-.02 (1605)	.09 (1129)
14. Operating margin	.00 (4612)	.03 (4077)	.01 (4057)	.01 (4484)	.00 (3034)	.02 (1526)	.09 (1526)	-.01 (1086)
15. Pretax interest coverage	.00 (4270)	.00 (3784)	-.01 (3774)	.00 (4152)	.00 (2766)	-.02 (1407)	.02 (1407)	.01 (1006)
16. Dividend payout	.00 (4004)	.00 (3538)	.00 (3526)	-.01 (3883)	.00 (3062)	.00 (1524)	-.01 (1524)	.04 (1086)
17. Asset growth	-.03 (4549)	.03 (4015)	-.01 (3996)	.32 (4541)	.05 (3015)	.02 (1509)	.04 (1509)	.09 (1089)
18. Liquidity	.00 (4036)	-.11 (3574)	-.13 (3563)	.02 (3912)	.00 (2550)	-.04 (1317)	.01 (1317)	.11 (933)

TABLE B.5 Correlation Matrix (Equations 6-9) [continued]

	19. Negative earnings	20. Earnings	21. Capital expenditures	22. Sales growth	23. Stock return	24. Penetration emphasis	25. Segmentation emphasis	26. Expansion emphasis
19. Negative earnings	1.00 (5517)							
20. Earnings	-.01 (4904)	1.00 (4904)						
21. Capital expenditures	.00 (4114)	.62 (4114)	1.00 (4114)					
22. Sales growth	-.01 (4541)	.01 (4008)	-.01 (3993)	1.00 (4541)				
23. Stock return	-.01 (3131)	.01 (2930)	.01 (2861)	.00 (3014)	1.00 (3131)			
24. Penetration emphasis	.01 (1605)	-.13 (1534)	-.13 (1398)	.00 (1509)	.02 (1271)	1.00 (1605)		
25. Segmentation emphasis	-.04 (1605)	-.09 (1534)	-.06 (1398)	-.02 (1509)	-.02 (1271)	-.06 (1605)	1.00 (2196)	
26. Geographic expansion emphasis	-.06 (1129)	.144 (1092)	.08 (1088)	.08 (1089)	.07 (934)	-.44 (1129)	-.39 (1129)	1.00 (2142)

WEB APPENDIX C – ESTIMATION

Model Estimation and Identification

Financial value driver models. We use a simulated maximum likelihood approach for estimating the heterogenous model parameters of Equations 6-9 (Greene 2012). This estimator produces conditional means of firm-specific parameters that are comparable to posterior means estimated in Bayesian analysis.

The large variation in our focal variables across and within firms provides the source for identifying effects. A major concern that threatens the validity of these effects, as common with observational data, is that our focal variable (CBBE) could be correlated with the error term and bias our estimates. Germann et al. (2015) review at full length the types of endogeneity that are common to models of firm performance as ours and offer remedies. In the following, we discuss these issues and explain how we address them.

(#1) Omitted variables of financial and operational performance. Firm performance as reflected in the financial value drivers is not only the result of CBBE but also driven by factors of financial and operational performance. Extant research in finance and accounting has identified several drivers such as financial leverage, operating margin, capital expenditures, and others that are relevant to the financial value drivers in different ways. Because brand investments tend to be higher with better financial and operational performance, these efforts are also likely to affect CBBE and could introduce an error correlation if not controlled for. We therefore carefully selected relevant controls of financial and operational performance as reported in the literature to reduce this source of endogeneity (see Table A.2).

(#2) Omitted marketing and non-financial variables. Marketing and related non-financial variables are another potential source of relevant omitted variables. Prior research shows that marketing efforts such as advertising, R&D, and other marketing-related expenditures impact the financial performance of firms (e.g., Edeling and Fischer 2016). At the same time these expenditures are instrumental to build up CBBE. Hence, they should be correlated with CBBE. By including advertising and R&D expenditures as well as other expenditures that cover personal selling expenditures, retail support, and other marketing spend categories, we effectively control for their influence.

Both the accounting and marketing performance literature stress the importance of non-financial metrics for explaining the residual variance in traditional firm performance models that rely on "hard" financial metrics. Aside from the brand, this literature has mainly focused on customer metrics and corporate reputation including corporate social responsibility in the past (e.g., Himme and Fischer 2014; Tuli and Bharadwaj 2009). This raises the question as to what extent the omission of other non-financial metrics could create a variable omission bias. This would be the case if the various metrics capture important influences on the value drivers jointly that appear in the error term if the model misses these variables. Interestingly, studies on the role of non-financial metrics for firm performance investigate only a single non-financial metric. An exception is Himme and Fischer (2014) who examine the joint impact of brand equity, customer satisfaction, and corporate reputation on WACC. They do not find evidence for a variable omission bias if the metrics are included separately and conclude that the three metrics offer different informational value for investors and creditors through their focus on the product, the customer, and the firm. Following these arguments, we do not expect that the exclusion of other non-financial metrics biases our results but we also test this assumption.

For this purpose, we collected data on two types of customer metrics used in past research and on corporate reputation. For the customer metrics, we computed the customer asset strength measure suggested by Fang et al. (2011) and collected ratings from the American Customer Satisfaction Index (ACSI). We used Fortune's annual report on America's Most Admired Corporations to measure firm reputation. A major drawback from including these additional metrics, that was already pointed out by Himme and Fischer (2014), is that the sample sizes reduce dramatically by 26% (customer asset strength) up to 65% (ACSI and Fortune reputation score). Panel II in Table C.1 presents the estimation results for the non-financial metrics and the difference test for the CBBE coefficient that informs about a potential omission bias.

Table C.1: Testing for Variable Omission Bias (Equations 6-9)

	Profitability Estimate (SE)		Earnings growth Estimate (SE)		Cost of capital Estimate (SE)		Sustainability Estimate (SE)	
I) Focal model								
CBBE (t-1)	.119	(.015)***	.035	(.017)**	.015	(.005)***	.565	(.181)***
N	1,312		1,142		770		491	
II) Non-financial metrics								
Customer asset strength (t-1)[1]	.151	(.012)***	-.028	(.002)***	.016	(.004)***	1.036	(.159)***
CBBE (t-1)	.129	(.017)***	.038	(.003)***	.020	(.005)***	.639	(.204)***
CBBE estimate difference test		*p* = .66		*p* = .86		*p* = .50		*p* = .78
N (ΔN)	942	(-28%)	810	(-29%)	570	(-26%)	359	(-27%)
Customer satisfaction (t-1)[2]	.001	(.001)	.002	(.000)***	-.001	(.000)***	-.012	(.005)**
CBBE (t-1)	.069	(.023)***	.008	(.014)	.023	(.006)***	.048	(.235)
CBBE estimate difference test		*p* = .07		*p* = .21		*p* = .34		*p* = .08
N (ΔN)	460	(-65%)	407	(-64%)	278	(-64%)	189	(-62%)
Corporate reputation rating (t-1)[3]	.002	(.001)*	.000	(.001)	.001	(.000)**	-.033	(.014)**
CBBE (t-1)	.128	(.024)***	.096	(.033)***	.025	(.009)**	.421	(.293)
CBBE estimate difference test		*p* = .75		*p* = .09		*p* = .37		*p* = .68
N (ΔN)	439	(-67%)	435	(-62%)	268	(-65%)	175	(-64%)
III) Brand interest								
Google Trends brand search (t)	.003	(.007)	.053	(.010)***	-.001	(.001)	.193	(.126)
CBBE (t-1)	.120	(.015)***	.049	(.017)***	.016	(.005)***	.562	(.186)***
CBBE estimate difference test		*p* = .96		*p* = .56		*p* = .97		*p* = .99
N (ΔN)	1,312	(0%)	1,142	(0%)	770	(0%)	491	(0%)

Notes: * $p < .10$; ** $p > .05$; *** $p < .01$ (two-sided).

1) Customer asset strength is the average of the two variables customer asset breadth and customer asset depth as described in Fang et al. (2011). The variables use sales information from COMPUSTAT business segments.

2) Customer satisfaction is the ACSI score (range = 0-100) obtained from the National Quality Research Center at the University of Michigan. A representative sample of consumers is surveyed each year.

3) Corporate reputation ratings are based on Fortune's annual report on America's Most Admired Corporations. The score ranges from 0 to 10 and is solicited primarily from company executives.

Results on the impact of customer satisfaction and firm reputation on WACC, as an example, confirm findings in the literature (e.g., Himme and Fischer 2014; Tuli and Bharadwaj 2009). Most importantly, the differences w.r.t. the estimated CBBE coefficient of our focal model (first row of Table C.1) are not statistically significant ($p > .05$) suggesting that our results are not likely to be subject to a bias from omitted non-financial metrics. Because of the dramatic sample size decreases and the resulting lower power of tests, we do not add these metrics as further controls.

(#3) Simultaneity. In addition to these omitted variables, there may be concerns that estimation results are affected by a simultaneity bias. For instance, while CBBE is expected to drive ROIC, higher ROIC in a given year might also provide more funds to invest in the brand which results in higher CBBE. To control for potential (contemporaneous) simultaneity effects, we include lagged values of the predictor variables in the equations, which is also consistent with the idea that investors update their expectations based on information available from the previous period.

Nevertheless, it is possible that firms anticipate investors' expectations for financial value drivers, which in turn influences current and prior firm investments in CBBE to meet these expectations. To minimize this potential simultaneity, we follow the recent marketing performance literature (e.g., Frennea, Han, and Mittal 2019; McAlister et al. 2016) and measure CBBE relative to the industry average instead of using absolute CBBE levels. The key argument is that relative CBBE levels are not set strategically in anticipation of performance outcomes. For this strategy to be successful, the focal firm would need to anticipate the CBBE investments and outcomes of each competitor to adjust its own investments. It is unreasonable to believe that competitors in an industry are capable of adjusting their relative CBBE level in this way, which is further complicated by the fact that CBBE is an intermediate brand outcome variable that cannot be changed as directly as advertising expenditures, as an example.

(#4) Unobserved time-invariant effects on performance. Unobserved firm-specific effects could present another source of variable omission bias. For example, firms with strong brands have an advantage in attracting more competent talent and may even pay less to their top executives (Tavassoli, Sorescu, and Chandy 2014). Higher quality of employees and executives is likely to result in superior

firm performance but is unobservable to the researcher. To capture these and other unobserved time-invariant firm-specific effects, we exploit the advantages of panel data and estimate firm-specific effects as described in the paper. We note that there might also be industry-specific unobserved effects that explain systematic differences in firm performance and CBBE levels between industries. Such effects should be absorbed in the firm effects, which we also test for.

(#5) Unobserved time-varying effects on performance. An important source of identification are within-firm changes in the predictor variables. These changes should not be correlated with changes in the error term, but there could be unobserved time-varying effects that impact both firm performance and CBBE. For example, top management might engage in strategic initiatives to adapt to a changing market environment or counter a competitive threat. Such initiatives may result in specific investment programs, cost-cutting measures, or major restructuring efforts that should raise performance, but which might also have an effect on CBBE. The influence of strategic programs should manifest in serially correlated firm performance measures. By including the lagged dependent variable (and other financial controls as mentioned before), we effectively control for such firm-specific time-varying unobserved influences. The identifying assumption here is that there is no serial correlation present in the error term, which we test for and report on subsequently.

(#6) Carryover and cumulative evolvement of effects. Advertising campaigns, earned publicity in social media, new product campaigns, and other brand-related activities happen during the year. Their impact on the financial value drivers is not necessarily immediate but unfolds over time. As a result, the dependent variables evolve continuously over time, while we only observe their end-of-year values. The aggregation of evolving errors to the end-of-year value does not jeopardize the identification of the CBEE effect as long as they are not correlated with CBBE that enters the equation with its previous year value. Given our model design, we think this situation is unlikely to be present for several reasons. First, it is hard to believe that new brand-related events and activities in year t are systematically correlated with past values of CBBE. However, they could have effects that spill over between years and result into a continuous carryover process reflected in the evolvement of financial value drivers and their errors in

future years. By including the lagged dependent variable, we explicitly model this continuous dynamic process. Specifically, our approach is consistent with the partial adjustment model that assumes the absence of serial error correlation (Hanssens, Parsons, and Schultz 2001, 147f). This model represents a parsimonious but powerful approach to measure the carryover of effects from now into future periods in form of a continuous geometric process.

Finally, note that CBBE is a construct designed to measure an intangible, non-financial asset from which future economic benefits are expected to flow (Aaker 1991; Srinivasan and Hanssens 2009). Technically, the construct measures the stock of (more or less deliberately) remembered semantic and episodic experiences the customer had with the brand from both firm-initiated and non-firm-initiated contacts (Keller 2008). Like other non-financial metrics, CBBE is a forward-looking outcome measure that anticipates and captures the complex and evolving brand spillover effects into the future, which would otherwise become manifest in the error term.

We admit that all of the prior arguments hinge upon the assumption that the error terms are not serially correlated, which we can test for. The autocorrelation coefficient in each of the four Equations 6-9 is close to zero: -.020 (profitability), -.053 (earnings growth), -.026 (WACC), and -.006 (sustainability). The common Durbin-Watson (DW) statistic strongly supports the finding of uncorrelated errors: DW = 2.04 (profitability), DW = 2.11 (earnings growth), DW = 2.05 (WACC), and DW = 2.01 (sustainability). However, the test is considered to be weak and potentially misleading in dynamic panel data models as ours (Born and Breitung 2016). Born and Breitung (2016) review various serial correlation tests that are suitable for panel data. The WD test is especially powerful and suited for our data as it does not require a balanced panel. For this test, the differenced residuals are regressed on their lagged differences. In the absence of autocorrelated errors, their first differences should be correlated with -.50 (Arellano 2003). Based on this test, we cannot reject the assumption of uncorrelated errors for any of the equations: WD = 1.42, p = .16 (profitability), WD = .02, p = .98 (earnings growth), WD = 1.49, p = .14 (WACC), and WD = .00, p = .99 (sustainability).

To further establish confidence that the current-period errors are not confounded with factors that affected CBBE in the past and still exist in the current period, we searched for an appropriate covariate that effectively controls for these effects. Google Trends appears to be a useful alternative. The metric has been used in prior research to measure brand presence (e.g., Stäbler and Fischer 2020; Stephen and Galak 2012). It is a normalized index for search volume data. Our motivation for using this variable is that online search for the brand is a highly sensitive seismograph of the general interest in the brand for various reasons that are not limited to firm-initiated activities. It evolves over time, fluctuates with specific events within a given year but also incorporates waves of longer-term interest and brand hypes. For example, the launch of the movie "House of Gucci" in November 2021 led to substantial increases in search volume for the brand of up to 71% reported by various shopping sites (McCall 2021).

We collected monthly Google Trends data on searches for each brand and its parent company included in our sample. We compute the average monthly search volumes and divide the volume for the brand by the volume for the parent company. This is to separate the idiosyncratic interest in the brand from the interest in the company, the economic entity behind the brand, which may also have an impact on the financial value drivers. We then compute the relative difference of the search index between the current and the previous year and add this quantity as predictor to each estimation equation. We compare the results between models that include and exclude the additional variable. If current-period errors contain brand-related factors correlated with lagged CBBE, we would expect to encounter significant deviations between the estimated coefficients for CBBE. As Panel III in Table C.1 shows, this is not the case for any of the financial value drivers. The differences are small and are likely due to sampling error.

Finally, although we tried to address identification issues in various ways as discussed above, we must admit that we cannot claim to have perfectly solved every potential issue. But we are confident that our strategy helps reduce these concerns to a minimum.

Granger-Causality Test for Strategy Emphasis Multipliers

In this section, we test whether the strategy emphasis multipliers drive CBBE; we assume that the multiplier variables do not Granger-cause CBBE scores. The result of the test is shown in Table C.2. The coefficients associated with the lagged multiplier variables are not significant, which supports the assumption that the strategy emphasis multipliers do not drive CBBE.

Table C.2 Estimation Results of Granger-Causality Model

Dependent variable	**CBBE**	
Intercept	3.749	(2.226)*
CBBE (t-1)	.950	(.026)***
Brand segmentation emphasis (t-1)	-1.022	(2.030)
Brand penetration emphasis (t-1)	.314	(.321)
Brand geographic expansion emphasis (t-1)	.017	(.029)
Sample size	891	
R^2	.931	

Notes: * $p < .10$; ** $p > .05$; *** $p < .01$ (two-sided). Standard errors in parentheses.

Panel Unit-Root Tests

We apply Fisher-type augmented Dickey-fuller panel unit-root tests (Choi 2001) to test whether any of the focal variables has a unit root, which would suggest that the respective time series is not stationary. The test combines the *p*-values from independent unit-root tests on each firm's series separately to obtain an overall test statistic. Specifically, we use the inverse Chi-squared $\chi^2 P_m$ statistic, which has been suggested for datasets with a large number of cross sections. The results are as follows: CBBE ($\chi^2 P_m$,= 3.97, p =.000), ROIC ($\chi^2 P_m$,= 59.56, p =.000), EGR ($\chi^2 P_m$,= 17.42, p =.000), and WACC ($\chi^2 P_m$,= 12.41, p =.000). The unit-root hypothesis is rejected for all variables and thus the stationarity assumption supported.

Additional Estimation Results Including 95% Confidence Intervals and Time Fixed Effects

Tables C.3-C.5 present coefficient estimates of Equations 6-10 together with their 95% confidence interval boundaries. Tables C.6 and C.7 display model estimation results for Equations 6-9 by including time fixed effects.

TABLE C.3 Financial Value Driver Estimation Results for Profitability and Cost of Capital (Equations 6 and 7) with CI 95%

	Profitability Coefficient (CI 95%)	**Profitability Coefficient (CI 95%)**	**Cost of capital Coefficient (CI 95%)**	**Cost of capital Coefficient (CI 95%)**
Intercept	.225 (.188, .262)	.373 (.316, .429)	.116 (.102, .131)	.109 (.088, .130)
Estimated SD (Intercept)	.307 (.285, .330)	.101 (.065, .136)	.008 (-.001, .016)	.006 (-.005, .016)
Carryover				
Dependent variable	.374 (.361, .387)	.452 (.422, .481)	.301 (.239, .363)	.302 (.230, .375)
Firm-specific CBBE parameter function				
Overall constant	.119 (.089, .149)	-.029 (-.071, .014)	.015 (.006, .025)	.014 (4x10^{-4} .027)
Brand segmentation emphasis	-	.225 (.155, .295)	-	-.008 (-.030, .015)
Brand penetration emphasis	-	.005 (-.014, .023)	-	-.003 (-.009, .003)
Brand geographic expansion emphasis	-	.015 (.014, .016)	-	-1.8x10^{-4} (-5x10^{-4}, 2x10^{-4})
Estimated SD	.024 (.020, .027)	.162 (.157, .166)	.008 (.007, .009)	.008 (.006, .009)
Controls				
Advertising expenditures[1]	.011 (-.025, .046)	-.007 (-.042, .029)	.001 (-.009, .011)	-.006 (-.018, .005)
R&D expenditures[1]	-.154 (-.178, -.130)	-.147 (-.175, -.118)	.015 (.007, .023)	.013 (.004, .022)
Other expenditures[1]	.003 (-.003, .010)	-.002 (-.009, .005)	-.002 (-.004, -.001)	-.002 (-.004, -4x10^{-4})
Capital expenditures[1]	.049 (.036, .061)	.055 (.040, .069)		
Financial leverage[1]	.360 (-1.22, 1.94)	4.21 (.500, 8.00)	.105 (-.895, 1.11)	-.252 (-1.27, .767)
Asset growth			.004 (-.003, .010)	.003 (-.004, .010)
Pretax interest coverage[1]			.001 (-.005, .017)	.001 (-.001, .017)
Operating margin			-.013 (-.025, -4x10^{-4})	-.005 (-.019, .008)
Dividend payout			-.001 (-.002, .001)	-2.4x10^{-4} (-.002, .002)
Liquidity			.001 (-2x10^{-4}, .002)	.001 (-4x10^{-4}. 002)
GDP growth	.047 (-.116, .211)	.064 (-.122, .250)		
Observed heterogeneity				
Firm size	-.007 (-.010, -.005)	-.020 (-.024, -.016)	-.004 (-.005, -.002)	-.002 (-.004, -7x10^{-4})
Industry concentration	-.098 (-.129, -.067)	-.086 (-.120, -.052)	-.023 (-.033, -.014)	-.024 (-.034, -.013)
Unobserved heterogeneity				
Firm random effects	Yes	Yes	Yes	Yes
Industry fixed effects	Not supported	Not supported	Not supported	Not supported
Log likelihood	1,211.40	999.47	1,982.42	1,746.34
Sample size (Pseudo-R^2)	1,312 (.837)	967 (.858)	770 (.546)	675 (.543)

Standardized coefficients w.r.t. strategy emphasis multiplier (p<.05)[2]				
Brand segmentation emphasis		.048		-
Brand penetration emphasis		-		-
Brand geographic expansion emphasis		.147		-

Notes: Two-sided t-tests. Pseudo-R^2 based on estimated error variance and observed variance of dependent variable. All predictor variables are lagged by (t-1).
[1)] For reading convenience, coefficients are multiplied by 10,000. [2)] Only significant (p < .05) parameters reported.

TABLE C.4 Financial Value Driver Estimation Results for Earnings Growth and Sustainability (Equations 8 and 9) with CI 95%

	Earnings growth Coefficient (CI 95%)		Earnings growth Coefficient (CI 95%)		Sustainability Coefficient (CI 95%)		Sustainability Coefficient (CI 95%)	
Intercept	.104	(.058, .151)	.074	(-.004, .151)	.858	(.347, 1.37)	.536	(-.184, 1.26)
Estimated SD (Intercept)	.002	(-.031, .034)	.014	(-.024, .053)	.718	(.349, 1.09)	3.16	(2.71, 3.62)
Carryover								
Dependent variable	.831	(.806, .856)	.853	(.827, .878)				
Firm-specific CBBE parameter function								
Overall constant	.035	(.002, .067)	-.066	(-.121, -.010)	.565	(.210, .920)	.380	(-.097, .857)
Brand segmentation emphasis	-		.034	(-.057, 124)	-		.296	(-.585, 1.18)
Brand penetration emphasis	-		.070	(.050, .091)	-		.772	(.564, .981)
Brand geographic expansion emphasis	-		.011	(.010, .012)	-		.005	(-.006, .016)
Estimated SD	.042	(.039, .044)	.035	(.033, .038)	.228	(.188, .269)	.711	(.666, .756)
Controls								
Advertising expenditures[1]	-.044	(-.083, -.004)	-.049	(-.091, -.006)	.249	(-.230, .798)	.670	(.120, 1.22)
R&D expenditures[1]	-.050	(-.074, -.026)	-.009	(-.039, .022)	-.201	(-.530, .128)	-.741	(-1.10, -.386)
Other expenditures[1]	-.009	(-.015, -.003)	-.015	(-.022, -.008)	-.371	(-.424, -.319)	-.392	(-.446, -.339)
Capital expenditures[1]	.030	(.011, .050)	.014	(-.013, .040)				
Financial leverage	-.002	(-.002, -.002)	-.002	(-.003, -.001)				
Asset growth					.707	(.571, .842)	.669	(.513, .826)
Earnings[1]	.020	(.008, .032)	.003	(-.018, .012)				
Negative earnings	-.215	(-.229, -.202)	-.264	(-.278, -.250)				
Investment rate[1]	-1.70	(-20.5, 17.2)	-5.14	(-18.8, 8.5)				
Sales growth	.016	(.006, .027)	.038	(.028, .048)				
GDP growth	-.091	(-.383, .201)	-.093	(-.428, .241)	3.50	(1.95, 5.05)	3.32	(1.81, 4.82)
Observed heterogeneity								
Firm size	-.002	(-.005, .002)	.006	(.001, .010)	.200	(.149, .251)	.258	(.203, .313)
Industry concentration	-.057	(-.102, -.012)	-.066	(-.114, -.019)	-1.09	(-1.43, -.745)	-1.50	(-1.84, -1.16)
Unobserved heterogeneity								
Firm random effects	Yes		Yes		Yes		Yes	
Industry fixed effects	Not supported		Not supported		Not supported		Not supported	
Weibull scale parameter					.477 (.452, .502)		.451 (.426, .475)	
Log likelihood	3,231.16		2,597.57		-542.07		-502.55	
Sample size (Pseudo-R2)	1,142 (.808)		869 (.800)		491 (n.a.)		451 (n.a.)	
Standardized coefficients w.r.t. strategy emphasis multiplier (p<.05)[2]								
Brand segmentation emphasis			-				-	
Brand penetration emphasis			.107				.223	
Brand geographic expansion emphasis			.267				-	

Notes: Two-sided t-tests. Pseudo-R^2 based on estimated error variance and observed variance of dependent variable. All predictor variables are lagged by (t-1).
[1)] For reading convenience, coefficients are multiplied by 10,000. [2)] Only significant (p < .05) parameters reported.

TABLE C.5 Stochastic Frontier Estimation Results for Elasticities of Financial Value Drivers w.r.t. CBBE (Equation 10) with CI 95%

	$\varepsilon_{ROIC,CBBE}$ Coefficient (CI 95%)		$\varepsilon_{WACC,CBBE}$ Coefficient (CI 95%)		$\varepsilon_{EGR,CBBE}$ Coefficient (CI 95%)		$\varepsilon_{SUS,CBBE}$ Coefficient (CI 95%)	
Intercept	.017	(-.566, .599)	-.175	(-.480, .130)	-1.410	(-1.94, -.883)	-7.581	(-12.2, -2.93)
Own elasticity-related performance levels								
CBBE	.285	(-.044, .614)	-.151	(-.341, .039)	.537	(.153, .920)	3.442	(.419, 6.46)
Related financial value driver	-.059	(-187, .068)	4.069	(3.54, 4.60)	.071	(-.123, .265)	-[1]	
Elasticities of other financial value drivers								
$\varepsilon_{ROIC,CBBE}^{\dagger}$	-		.213	(.054, .373)	.897	(.408, 1.39)	-3.429	(-5.69, -1.17)
$\varepsilon_{WACC,CBBE}^{\dagger}$	.182	(-.168, .533)	-		.270	(-208, .749)	7.319	(5.42, 9.21)
$\varepsilon_{EGR,CBBE}^{\dagger}$	-.085	(-.502, .002)	.400	(.196, .605)	-		-5.908	(-9.40, -2.41)
$\varepsilon_{SUS,CBBE}^{\dagger}$	-.148	(-.228, -067)	.115	(.080, .151)	-.063	(-.193, .068)	-	
Firm resources and industry conditions								
Number of employees (ln)	.017	(-.008, .042)	.003	(-.014, .019)	.023	(-.016, .061)	.372	(.166, .578)
Cash position relative to competitors	.049	(-.016, .114)	.014	(-.027, .054)	.207	(.116, .299)	-.328	(-1.09, .437)
Financial leverage relative to competitors	-.008	(-.063, .048)	-.076	(-.106, -.047)	.136	(.061, .212)	.774	(.393, 1.15)
Receivables relative to competitors	.001	($5x10^{-5}$, .002)	.000	(-.001, .002)	.003	($-2x10^{-4}$, .007)	-.004	(-.018, .010)
Type of business: services (dummy)	$1.2x10^{-4}$	(-.080, .081)	-.068	(-.110, -.026)	.276	(.172, .381)	.746	(.118, 1.37)
Main type of customers: B2C (dummy)	.092	(.020, .165)	-.071	(-.110, -.032)	.157	(.036, .278)	.570	(.001, 1.14)
Industry concentration	.273	(.001, 546)	-.094	(-.2310 .043)	.414	(-.039, .866)	2.993	(1.20, 4.78)
Macroeconomic conditions								
Time fixed effects	Yes		Yes		Yes		Yes	
Instrumental variables correction (control function)								
Correction term $\varepsilon_{ROIC,CBBE}$	-		-.210	(-.370, -.051)	-.889	(-1.37, -.404)	3.699	(1.38, 6.02)
Correction term $\varepsilon_{WACC,CBBE}$	-.369	(-.762, .024)	-		.373	(-.100, .845)	-8.807	(-11.2, -6.42)
Correction term $\varepsilon_{EGR,CBBE}$	.050	(-.368, .467)	-.353	(-.558, -.148)	-		5.051	(1.45, 8.66)
Correction term $\varepsilon_{SUS,CBBE}$	.177	(.096, .259)	-.109	(-.145, -.073)	.031	(-.102, .163)	-	
Error components								
SD of inefficiency terms	.171		.096		.236		.361	
SD of random error of frontier function	.139		.110		.242		1.978	
Log likelihood	-34.31		304.05		-184.14		-1,187.59	
Sample size	561		561		561		561	

Notes: Elasticities w.r.t. profitability, earnings growth, and sustainability are production frontiers, i.e., to be maximized. Elasticity w.r.t. capital cost is a cost frontier, i.e., to be minimized.

† Endogenous variable.

1) Elasticity does not formally depend on SUS. We tested for the inclusion of the level of SUS, but the variable addition was rejected by the likelihood ratio test (p > .10).

*** $p < .01$; ** $p < .05$; * $p < .10$. Two-sided t-tests.

TABLE C.6 Financial Value Driver Estimation Results for Equations 6 and 7 with Time Fixed Effects and CI 95%

	Profitability Coefficient (CI 95%)		Profitability Coefficient (CI 95%)		Cost of capital Coefficient (CI 95%)		Cost of capital Coefficient (CI 95%)	
Intercept	.204	(.149, .258)	.394	(.323, .466)	.120	(.106, .133)	.114	(.093, .134)
Estimated SD (Intercept)	.282	(.260, .304)	.073	(.038, .109)	.002	(-.007, .010)	.006	(-.005, .017)
Carryover								
Dependent variable	.371	(.368, .385)	.452	(.420, .485)	.281	(.212, .350)	.276	(.197, .356)
Firm-specific CBBE parameter function								
Overall constant	.097	(.068, .126)	-.067	(-.111, -.023)	.015	(.006, .023)	-.001	(-.004, .022)
Brand segmentation emphasis	-		.266	(.196, .336)	-		-.007	(-.030, .016)
Brand penetration emphasis	-		.012	(-.007, .030)	-		6.4×10^{-6}	(-.006, .006)
Brand geographic expansion emphasis	-		.013	(.012, .014)	-		-1.5×10^{-4}	(-5×10^{-4}, 2×10^{-4})
Estimated SD	.105	(.101, .109)	.162	(.158, .166)	.015	(.014, .016)	.008	(.007, .009)
Controls								
Advertising expenditures[1]	.067	(-.032, .103)	-.019	(-.016, .054)	2.6×10^{-4}	(-.010, .010)	-.007	(-.018, .004)
R&D expenditures[1]	-.148	(-.172, -.123)	-.154	(-.181, -.126)	.017	(.010, .025)	.014	(.005, .024)
Other expenditures[1]	.008	(-.001, .020)	.007	(4×10^{-4}, .014)	-.001	(-.003, -.003)	-.002	(-.004, -1×10^{-4})
Capital expenditures[1]	.048	(.035, .061)	.067	(.052, .082)				
Financial leverage[1]	.586	(-1.00, 2.14)	4.21	(.500, 8.00)	.015	(-1.09, 1.11)	-.352	(-1.53, .831)
Asset growth					.004	(-.002, .011)	.003	(-.003, .011)
Pretax interest coverage[1]					.001	(-.006, .015)	.004	(-.001, .014)
Operating margin					-.010	(-.021, .002)	-.001	(-.015, .011)
Dividend payout					-.001	(-.002, .001)	-8.2×10^{-5}	(-.002, .002)
Liquidity					.001	(-2.4×10^{-4}, .002)	.001	(-4×10^{-4}. 002)
GDP growth	.982	(.267, 1.67)	.800	(-.013, 1.61)				
Observed heterogeneity								
Firm size	-.004	(-.007, -.002)	-.020	(-.024, -.016)	-.003	(-.005, -.002)	-.002	(-.003, -3×10^{-4})
Industry concentration	-.198	(-.230, -.167)	-.194	(-.228, -.160)	-.027	(-.037, -.018)	-.029	(-.040, -.019)
Unobserved heterogeneity								
Firm random effects	Yes		Yes		Yes		Yes	
Industry fixed effects	Not supported		Not supported		Not supported		Not supported	
Time fixed effects	Yes		Yes		Yes		Yes	
Log likelihood	1,159.40		976.53		2,000.31		1,762.25	
Sample size (Pseudo-R^2)	1,312 (.843)		967 (.862)		770 (.583)		675 (.580)	

Standardized coefficients w.r.t. strategy emphasis multiplier (p<.05)[2]	Profitability	Cost of capital
Brand segmentation emphasis	.057	-
Brand penetration emphasis	-	-
Brand geographic expansion emphasis	.127	-

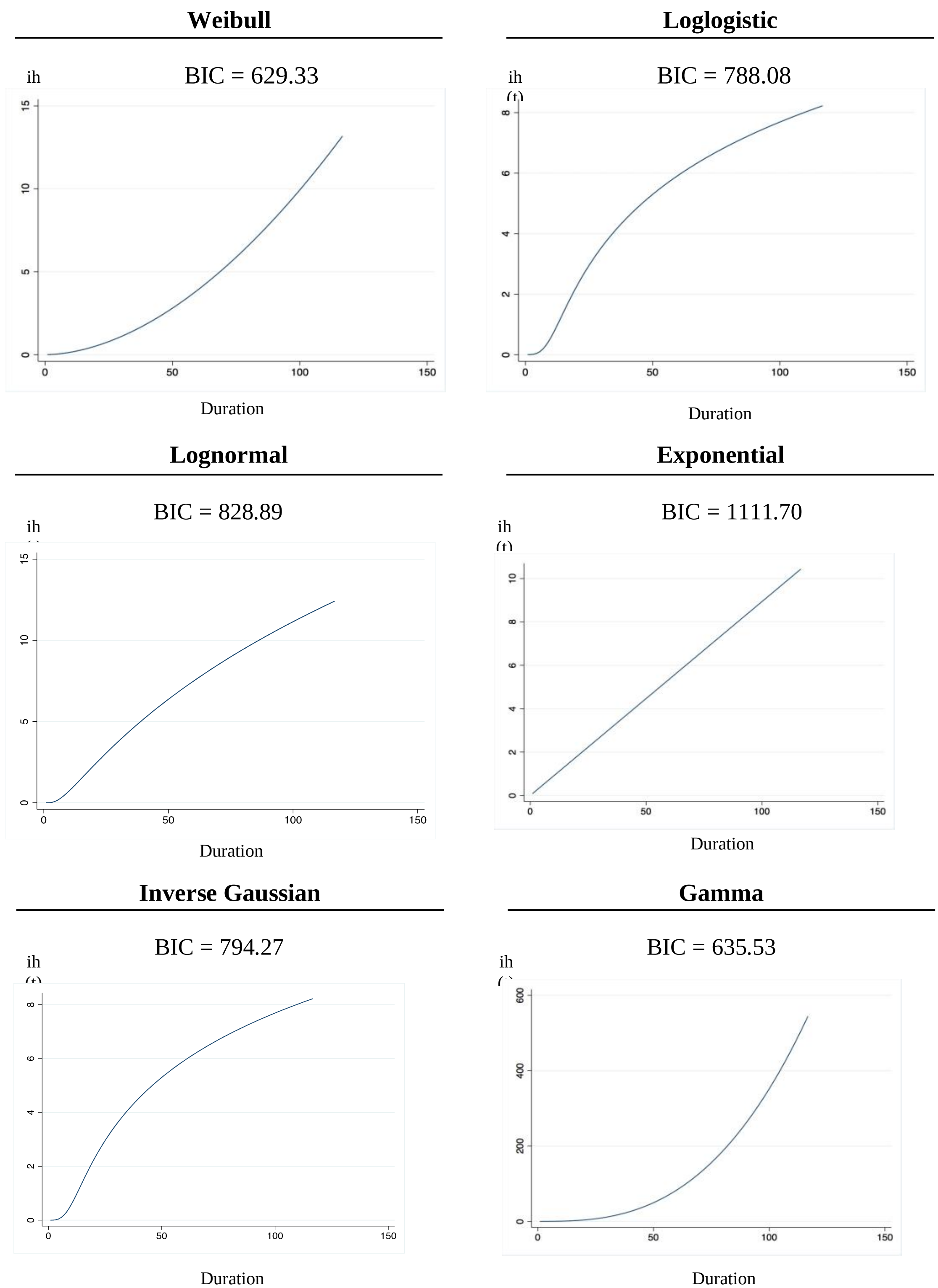
Notes: Two-sided t-tests. Pseudo-R^2 based on estimated error variance and observed variance of dependent variable. All predictor variables are lagged by (t-1).
[1)] For reading convenience, coefficients are multiplied by 10,000. [2)] Only significant ($p < .05$) parameters reported.

TABLE C.7 Financial Value Driver Estimation Results for Equations 8 and 9 With Time Fixed Effects and CI 95%

	Earnings growth Coefficient (CI 95%)		Earnings growth Coefficient (CI 95%)		Sustainability Coefficient (CI 95%)		Sustainability Coefficient (CI 95%)	
Intercept	.139	(.059, .219)	.145	(.001, .288)	1.27	(.605, 1.94)	1.42	(.531, 2.30)
Estimated SD (Intercept)	.007	(-.023, .037)	.014	(-.031, .058)	.742	(.384, 1.10)	1.04	(.585, 1.50)
Carryover								
Dependent variable	.807	(.780, .834)	.918	(.886, .950)				
Firm-specific CBBE parameter function								
Overall constant	.061	(.030, .093)	-.076	(-.144, -.008)	.829	(.478, 1.18)	.201	(-.275, .677)
Brand segmentation emphasis	-		.080	(-.029, .189)	-		.507	(-.436, 1.45)
Brand penetration emphasis	-		.031	(.004, .057)	-		.600	(.374, .824)
Brand geographic expansion emphasis	-		.006	(.005, .008)	-		.016	(.004, .028)
Estimated SD	.031	(.028, .033)	.021	(.018, .024)	.218	(.179, .258)	-.038	($-4.5\text{x}10^{-4}$, .080)
Controls								
Advertising expenditures[1]	-.039	(-.078, $-1.5\text{x}10^{-4}$)	.027	(-.025, .078)	.180	(-.365, .724)	.233	(-.330, .800)
R&D expenditures[1]	-.050	(-.074, -.026)	.053	(.019, .087)	-.221	(-.550, .108)	-.203	(-.593, -.188)
Other expenditures[1]	-.007	(-.013, $-6.6\text{x}10^{-4}$)	-.008	(-.016, $-2.9\text{x}10^{-4}$)	-.370	(-.421, -.318)	-.350	(-.404, -.295)
Capital expenditures[1]	.024	(.005, .042)	.040	(.009, .072)				
Financial leverage	-.002	(-.002, -.002)	-.001	(-.003, .001)				
Asset growth					.560	(.405, .715)	.581	(.392, .769)
Earnings[1]	.020	(.009, .031)	.018	(-.033, -.003)				
Negative earnings	-.217	(-.233, -.201)	-.197	(-.219, -.175)				
Investment rate[1]	-5.70	(-15.7, 4.40)	-2.70	(-.004, .003)				
Sales growth	.061	(.056, .066)	.015	(-.006, .035)				
GDP growth	-.648	(-2.15, .852)	.751	(-1.73, 3.24)	-3.59	(-11.4, 4.19)	-2.30	(-11.1, 6.55)
Observed heterogeneity								
Firm size	-.005	(-.008, -.002)	-.003	(-.008, .003)	.181	(.131, .230)	.203	(.146, .260)
Industry concentration	-.052	(-.096, -.008)	-.096	(-.149, -.042)	-1.21	(-1.54, -.872)	-1.31	(-1.67, -.940)
Unobserved heterogeneity								
Firm random effects	Yes		Yes		Yes		Yes	
Industry fixed effects	Not supported		Not supported		Not supported		Not supported	
Time fixed effects	Yes		Yes		Yes		Yes	
Weibull scale parameter					.461 (.437, .495)		.462 (.437, .487)	
Log likelihood	2,595.46		2,095.90		-530.70		-495.65	
Sample size (Pseudo-R2)	1,142 (.816)		869 (.800)		491 (n.a.)		451 (n.a.)	
Standardized coefficients w.r.t. strategy emphasis multiplier (p<.05)[2]								
Brand segmentation emphasis			-				-	
Brand penetration emphasis			.047				.173	
Brand geographic expansion emphasis			.145				.074	

Notes: Two-sided t-tests. Pseudo-R^2 based on estimated error variance and observed variance of dependent variable. All predictor variables are lagged by (*t*-1).
[1)] For reading convenience, coefficients are multiplied by 10,000. [2)] Only significant ($p < .05$) parameters reported.

Figure C.1 Integrated Hazard Function ih(t) = -logS(t) and BIC for Different Distributional Assumptions



WEB APPENDIX D – ROBUSTNESS CHECKS

In this section, we document several analyses to test the robustness of our findings and model assumptions with respect to the financial value driver models (Equations 6-9). In addition, we report on a capital market test of the effectiveness of aligning the strategy emphasis multipliers to their optimal levels.

Alternative Operationalizations of Strategy Emphasis Multipliers

Table D.1 reports on the estimation results for alternative operationalizations of the three strategy emphasis multipliers. In Table B.3, we documented their convergent validity, which is supported for all measures. The objective of this analysis is to check for the stability of results and conclusions from the analysis. Estimation results show that our findings are robust to the alternative variable operationalizations.

TABLE D.1 Results for Alternative Operationalizations of Strategy Emphasis Multipliers

Dependent variable	**ROIC**	**EGR**	**WACC**	**SUS**
Brand segmentation emphasis				
Focal measure	.225 (.036)***	.034 (.046)	-.008 (.011)	.296 (.449)
Standard deviation	.008 (.001)***	$4.1\text{x}10^{-4}$ ($1.3\text{x}10^{4}$)	$-1.1\text{x}10^{-4}$ ($1.8\text{x}10^{-4}$)	.045 (.012)***
Brand penetration emphasis				
Focal measure	.005 (.009)	.070 (.011)***	-.003 (.003)	.772 (.106)***
Percentage difference	-.016 (.026)	.120 (.031)***	-.008 (.008)	1.75 (.320)***
Purchase consideration ./. familiarity	.010 (.004)**	.058 (.005)***	.002 (.002)	.272 (.052)***
Brand geographic expansion emphasis				
Focal measure	.015 (.001)***	.011 (.001)***	$1.8\text{x}10^{-4}$ ($1.8\text{x}10^{-4}$)	.005 (.006)
Sum of brand preference shares	.034 (.001)***	.018 (.001)***	$-4.1\text{x}10^{-4}$ ($3.8\text{x}10^{4}$)	.049 (.014)***
Sum of squared brand preference shares	.068 (.004)***	.015 (.003)***	$-2.6\text{x}10^{-4}$ (.001)	.141 (.034)***

Notes: * $p < .10$; ** $p > .05$; *** $p < .01$ (two-sided). Standard errors in parentheses.

Alternative Model Specifications

The financial value driver Equations 6-9 specify a moderation process, consistent with the suggested conceptual framework. Here, the brand penetration emphasis moderator is based on the three brand perception items that Harris Poll uses to compute its EquiTrend CBBE measure (see Table 1 in the manuscript). Alternatively, we could model a different process of how these items exert their influence on the financial value drivers. They could do this directly or via CBBE as a mediator, which gives rise to three alternative model specifications, which we label *direct effects model*, *partial mediation model*, and *full mediation model.* The direct effects model follows the idea of a full compositional approach, i.e., the three CBBE components enter the model as separate variables. In the partial mediation model, we include the three CBBE components but also add the CBBE construct to the model. The full mediation model includes only the CBBE construct and no CBBE components as separate variables. It is a model that is nested in our focal specification because we add our three moderators to this specification. We apply the likelihood ratio test to decide between the focal and the full mediation model. The other two models, however, are non-nested variants, which require the use of a non-nested specification test such as the Davidson-McKinnon J-test (Greene 2012).

Table D.2 reports the results of the model selection tests. We have 3 (alternative specifications) $\times$ 4 (equations) model comparisons. It turns out that our focal model is preferred in 7 out of 12 comparisons. The non-nested model test is inconclusive in 4 cases, i.e., the test does not prefer one specification over the other. The full mediation model is only preferred over the focal model in the WACC equation, which is not surprising given the fact that we do not find significant effects for any of the three moderators. Based on these specification tests, we conclude that the suggested moderation framework seems to best represent the conditions for the firms and periods included in our dataset.

TABLE D.2: Results of Model Selection Tests (Equations 6-9)

	Comparison of focal model with alternative model specification: superior specification			
Alternative model	**Profitability**	**Cost of capital**	**Earnings growth**	**Sustainability**
1. Direct effects model	*Focal model (p = .00)*	Inconclusive	*Focal model (p = .00)*	Inconclusive
2. Partial mediation model	*Focal model (p = .00)*	Inconclusive	*Focal model (p = .00)*	Inconclusive
3. Full mediation model	*Focal model (p = .00)*	Full mediation (p = .25)	*Focal model (p = .00)*	*Focal model (p = .06)*

Notes: Comparing the focal model with the directs effects and partial mediation model is based on the Davidson-MacKinnon non-nested J-test (Greene 2012). The full mediation model is nested in the focal model. We therefore apply the likelihood ratio-test.

Additional Tests on Possible Biases in Focal CBBE Variable Estimates

In the following, we document a series of additional tests. First, we test whether the decisions to specify a random intercept to account for unobserved, firm-specific effects and to exclude annual fixed effects are supported. Second, we test the stability of results in a subsample of firms whose lion's share of business is generated in the U.S. Third, we examine to what extent CBBE ratings from the U.S. may serve as a reliable proxy to measure a latent global CBBE rating.

Random intercept. In our model specification, we specify the intercept to be firm-specific, where we assume that the firm-specific effects follow a normal distribution. The advantage of this specification over a specification with firm dummies is that we can also leverage the cross-sectional variance of the dataset, which is a rich information source in our dataset. An important assumption underlying the random effects specification, however, is that these are independent of the CBBE variable. Fortunately, we can test this assumption. To this end, we take the deviations from the brand means instead of the original CBBE variable (Greene 2012, Hausman and Taylor 1981). By construction, these deviations are orthogonal to the random effects, which essentially represents the familiar, fixed effects, least squares dummy variable estimator. Panel II in Table D.3 shows the results of comparing the consistent estimates with the estimates of our focal random effects specification. There are no significant differences across the four equations, supporting our focal specification.

TABLE D.3: Testing for Possible Biases in Focal CBBE Variable Estimates (Equation 6-9)

	Profitability Estimate (SE)		Earnings growth Estimate (SE)		Cost of capital Estimate (SE)		Sustainability Estimate (SE)	
I) Focal model								
CBBE (t-1)	.119	(.015)***	.035	(.017)**	.015	(.005)***	.565	(.181)***
II) CBBE instrumented with orthogonal deviations from mean								
CBBE (t-1)	.171	(.040)***	.144	(.078)*	.035	(.027)	1.143	(.455)**
Difference in CBBE estimate	.052	(.043) *p* = .22	.109	(.080) *p* = .17	.019	(.027) *p* = .48	.579	(.489) *p* = .24
III) Adding annual fixed effects								
CBBE (t-1)	.097	(.015)***	.061	(.016)***	.015	(.004)***	.829	(.179)***
Difference in CBBE estimate	-.023	(.021) *p* = .29	.027	(.023) *p* = .25	-.001	(.006) *p* = .88	.264	(.254) *p* = .30
IV) Sample composed of firms with sales > 50% in the U.S.								
N		975		962[1]		579		401
CBBE (t-1)	.083	(.017)***	.026	(.015)**	.010	(.005)*	.615	(.198)***
Difference in CBBE estimate	-.036	(.023) *p* = .11	-.009	(.022) *p* = .68	-.005	(.007) *p* = .43	.050	(.269) *p* = .85

Notes: ** $p > .05$; *** $p < .01$ (two-sided).

[1)] Because of convergence issues with a sample of firms with U.S. sales > 50%, we set the threshold to 40%.

Annual fixed effects. As shown in Tables C.6 and C.7, we also estimated the value driver models including annual fixed effects. Adding these effects increases the number of parameters to be estimated even further. A basic OLS estimation shows that only 1 out of 32 fixed time effects estimates across the four equations is significant ($p < .05$). Given this limited support (also based on the Bayesian Information Criterion), we do not include these effects in the main analyses. The results in Table D.3 (Panel III), complementing the full report of the estimates in Tables C.6 and C.7, show that none of the differences in CBBE effect estimates are statistically significant and support our preference for our focal, parsimonious models without time fixed effects.

U.S. CBBE rating. Our data provider for the CBBE measure, Harris Poll, collects representative data for the U.S. Although many firms in our sample are U.S.-based or generate the largest share of their revenues in this major market, there remain concerns that using U.S. CBBE data alone introduces an error-in-variables problem. Ideally, we could use data that represent the global CBBE rating for a brand; however, these data are not available to us. We share this limitation with many prior studies that used U.S. data on brand perception, customer satisfaction, or other mindset metrics in firm performance models (e.g., Aaker and Jacobson 2001; Bharadwaj et al. 2011; Fischer and Himme 2017; Mizik 2014; Mizik and Jacobson 2008; Rego et al. 2009).

Nevertheless, we investigate the error-in-variables problem and find evidence that it seems to be rather small. Our basic assumption here is that the U.S. CBBE rating is still a very good proxy for the latent global CBBE rating that we would ideally connect with global revenues. We investigated the idea of a latent global CBBE rating that is measured by using country-specific CBBE ratings. The reliability statistics for this construct will be informative about the size of the measurement error that we have to accept when using only a single country rating as a proxy for the global rating.

We had access to brand time-series from the YouGov brand index, another CBBE metric that has been used in marketing research (Hewett et al. 2016; Malshe et al. 2020). This database includes all brands that YouGov has measured in Germany, France, the U.K., and the U.S. during the period 2008-2012. The selection of brands covered by YouGov varies by country and we used the intersection of the four countries.

Tables D.4 and D.5 show the correlation matrix and factor-analytic results. The intercorrelation among CBBE country scores is very high (on average > .90). The exploratory factor analysis suggests only one joint factor to be extracted, the latent global CBBE rating, which explains 95% of the variance. Cronbach’s Alpha amounts to .978 and composite reliability is .986. Individual-item factor loadings and item-total correlations are high with values far above .90. Based on these statistics, we conclude that measurement reliability is very high and, therefore, that the measurement error we are subject to by using only the CBBE rating of a single country is very low. Hence, the CBBE ratings of the U.S. used in our estimations are a reasonable proxy for the latent global CBBE. Note also that the CBBE levels might still be different across countries since the main focus from the measurement reliability point of view is on the intercorrelation. In addition, the variance of the CBBE variable is the main source for estimating parameters in the focal equations.

TABLE D.4: Correlation of YouGov CBBE Scores Across Countries

N = 464	1. Germany	2. USA	3. France	4. U.K.
1. Germany	1.0	-	-	-
2. USA	.921	1.0	-	-
3. France	.926	.889	1.0	-
4. U.K.	.946	.959	.939	1.0

TABLE D.5: Exploratory Factor Analysis Results for YouGov CBBE Scores Across Countries

Country	Communality	Factor loading
Germany	.949	.974
USA	.937	.968
France	.929	.964
U.K.	.975	.987
1 factor solution: Eigenvalue = 3.79 / Total extracted variance = 94.8%		

Notes: Communality measures the variance of an item explained by the factor. The factor loading measures the correlation of the item with the factor.

U.S. sales sample. Even though we have good reasons to believe that U.S. CBBE ratings are a good proxy for a latent global rating (see the discussion before), we checked the robustness in a subsample of firms which derive the majority of their revenues (> 50%) from the U.S., based on regional segment data provided by COMPUSTAT. Panel IV in Table D.3 shows that our results are robust and do not significantly deviate from the full sample. We note that the sample sizes reduce by only 21%, on average, when we apply this rule.

SURE Estimation

The financial value driver models establish a system of equations. There are efficiency gains from estimating the system by allowing the errors to be correlated across equations. This approach is neither feasible with our data nor is it likely to improve efficiency for several reasons. The biggest concern is that we are no longer able to obtain firm-specific parameters for CBBE because they are not identified (Masten 2017). Nevertheless, we use the SURE estimator to estimate our equations for ROIC, EGR, WACC, and SUS as a system where errors are correlated across equations (Greene 2012). Since SUS is specified as a hazard model that cannot be integrated into the SURE system, we estimate a linear equation with the log of SUS as dependent variable. We also use the weight to account for measurement error in SUS as we do for the focal hazard specification. Table D.6 shows the estimation results. Although parameters are assumed to be homogenous, results are generally consistent with the findings from our focal models.

TABLE D.6: SURE Estimation Results (Balanced Sample)

	Profitability		*Capital cost*		*Earnings growth*		*Sustainability (log)*	
	Expected sign	*Coefficient (Standard Error)*	*Expected sign*	*Coefficient (Standard Error)*	*Expected sign*	*Coefficient (Standard Error)*	*Expected sign*	*Coefficient (Standard Error)*
Intercept		1.159 (.110)***		.104 (.010)***		.181 (.031)***		2.167 (.459)***
Carryover								
Dependent variable (*t*-1)	+	1.48 (.080)***	+	.370 (.056)***	+	-.006 (.039) ***	+	---
CBBE construct								
CBBE (*t*-1)		.236 (.077)***	+	.006 (.007) ***	+	.049 (.022)** *	+/-	.733 (.335)***
Controls								
Advertising expenditures (*t*-1)[1]	+	.226 (.116)* **	+/-	.003 (.011) ***	+/-	-.016 (.033) ***		.302 (.500) **
R&D expenditures (*t*-1)[1]	+/-	.286 (.069)***	+/-	-.013 (.007)** *	+/-	.045 (.022)** *		-.154 (.304)***
Other expenditures (*t*-1)[1]	+	.025 (.014)* **	+/-	-.003 (.001)***	+/-	.000 (.004) ***		-.125 (.049)***
Operating margin (*t*-1)	+	---		-.015 (.009)*		---	-	---
Earnings (*t*-1)[1]	+	---		---	+/-	-.021 (.011)** *		---
Negative earnings dummy (*t*-1)		---		---	+	.037 (.027) ***		---
Financial leverage (*t*-1)		-.001 (.001)	+	.000 (.000)** *	+/-	.000 (.000) ***	+/-	----
Capital expenditures (*t*-1)[1]		.104 (.043)**		---	+	.037 (.016)** *		---
Investment rate (*t*-1)		---		---	+	.037 (.011)***		---
Pretax interest coverage (*t*-1)[1]		---		-.013 (.010) ***		---	-	---
Dividend payout (*t*-1)		---		-.002 (.002) ***		---	+	---
Asset growth (*t*-1)		---		.010 (.004)***		---	-	1.178 (.172)***
Liquidity (*t*-1)		---		.003 (.001)***		---	+	---
US GDP growth (*t*-1)		-1.234 (.368)***	+/-	---	+/-	-.037 (.105) ***		5.577 (1.56)***
Sales growth (*t*-1)						.065 (.013)***		
Observed firm heterogeneity								
Size (*t*-1)	+/-	-.110 (.010)***	+/-	-.001 (.001) ***	-[1)]	-.012 (.003)***	-	-.036 (.045) ***
Industry concentration (*t*-1)	+/-	-.221 (.075)***	+/-	-.024 (.007)***	+/-	-.063 (.021)***	+/-	-.837 (.310)***
Sample size		475		475		475		475

Notes: Two-sided t-tests. *** $p < .01$; ** $p < .05$; * $p < .1$. [1)] For reading convenience, coefficients are multiplied by 10,000.

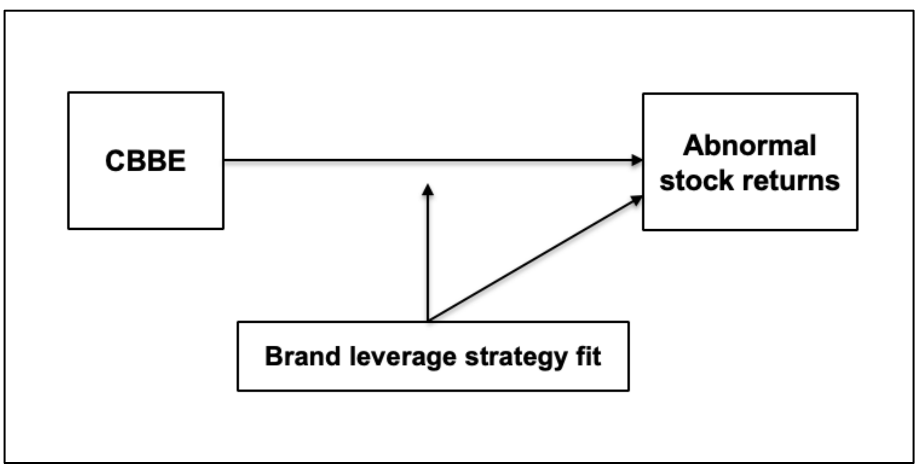
Capital Market Test of Financial Brand Leverage Strategy

In this section, we test whether optimizing the financial brand leverage strategy is indeed relevant to the capital market. Our approach is depicted in Figure D.1. Following Mizik (2014), we model abnormal returns as:

(W5.1)
$$AR_{it} = \delta_0 + \delta_1 U\Delta CBBE_{it} + \delta_2 U\Delta LeverageStrategyFit_{it} + \delta_3 U\Delta CBBE_{it} * U\Delta LeverageStrategyFit_{it} + \mathbf{\Omega}'\mathbf{Controls}_{it} + \nu_{it},$$

where AR_{it} are abnormal returns generated from a Carhart/Fama-French asset pricing model and $LeverageStrategyFit_{it}$ measures how close the observed strategy emphasis multipliers are to their optimal levels. Consistent with the notion that only new information is relevant in efficient capital markets, $U\Delta$ indicates unanticipated changes in the focal variables. $\mathbf{Controls}_{it}$ is a vector of variables which includes predicted (from Equation A.3 in the paper) firm value $U\Delta$E(FV), emphasis multipliers $U\Delta$PEN, $U\Delta$SEG, and $U\Delta$EXP, their respective interaction terms with $U\Delta$CBBE, and return on assets $U\Delta$ROA. The δ and $\mathbf{\Omega}$ parameters are to be estimated and ν_{it} is an i.i.d. normally distributed error term.

FIGURE D.1: Investor Response to Optimal Financial Brand Leverage Strategy



Results. Table D.7 reports the estimation results for different specifications of Equation W5.1 which together provide comprehensive insights into how investors use CBBE information in their investment decisions. Serving as our benchmark, Model I includes only unanticipated changes in CBBE and ROA and confirms prior research on the value relevance of brands (δ_1 =.530, p <.05) (e.g., Mizik 2014). Note that the brand parameter can be directly interpreted as elasticity, but one that refers to the market value of equity. To obtain the CBBE-firm value elasticity, we need to scale it to the firm level by multiplying it with the average share of equity in total assets. As a result, we compute an elasticity of .13 that is statistically not different from the average actual CBBE-firm value elasticity of .11 per Equation 2 (see also Table 8 in the paper), our proposed decomposition approach ($p > .05$). Model II adds unanticipated changes in predicted firm value, E(FV), which turns out to be positive and significant ($\omega_1 = .530$, $p < .01$), whereas CBBE becomes insignificant ($\delta_1 = .256$, $p > 0.10$). This finding supports our premise that CBBE impacts shareholder value through the financial value drivers that are used to predict firm value per Equation A.3 and confirms that investors apply the valuation principles encapsulated in Equation A.3.

Models III and IV add the strategy emphasis multipliers and their interaction with CBBE to the benchmark model. Here, we test whether the emphasis multipliers themselves carry any value-relevant information for investors. Since none of the associated coefficients are significant, we conclude this is not the case. This result suggests that market strategy emphasis per se is not driving firm value. It rather depends on whether the right combination of strategy emphasis is in place when leveraging CBBE, which is the key argument of our decomposition framework. The right mix of strategy emphasis multipliers is the outcome of the normative allocation model (Equation 4).

From the first-order conditions to solve the optimization problem, we construct a single variable that measures the fit between optimal emphasis multiplier levels and their observed levels (see below for further details). We add this strategy fit measure and its interaction with CBBE to the benchmark model (see Models V-VII). In Model V, we find that the brand leverage strategy fit is significantly positive ($\delta_2 = .018$, $p < .01$), as is its interaction with CBBE ($\delta_3 = .754$, $p < .01$). Both coefficients are consistently positive and significant across Models VI and VII to which further controls are added. Hence, we find robust empirical support for our main premise that brands should leverage their strength via financial value drivers conditional on an optimal mix of strategy emphasis multipliers.

Measurement of leverage strategy fit. We now describe how we measure the strategy fit variable. Using the estimated elasticities from our empirical analysis, we can measure how far our sample firms deviate with their mix of emphasis multipliers from the optimal mix. For this purpose, let us rewrite the first-order conditions for the brand segmentation multiplier of Expression W3.5 (illustrative of the three strategy emphasis multipliers) as follows

$$(\mathrm{W5.2})\ C\left(SEG^*\right)e^*_{C(SEG),SEG} =$$
$$\frac{dCBBE\cdot FV}{m\,CBBE}\begin{pmatrix} e^*_{FV,ROIC}\,e^*_{ROIC,CBBE}\,e^*_{(\partial ROIC/\partial CBBE),SEG} + e^*_{FV,WACC}\,e^*_{WACC,CBBE}\,e^*_{(\partial WACC/\partial CBBE),SEG} \\ + e^*_{FV,EGR}\,e^*_{EGR,CBBE}\,e^*_{(\partial EGR/\partial CBBE),SEG} + e^*_{FV,SUS}\,e^*_{SUS,CBBE}\,e^*_{(\partial SUS/\partial CBBE),SEG} \end{pmatrix},$$

using the definition $e^*_{C(SEG),SEG} = \frac{\P C\left(SEG^*\right)}{\P SEG}\frac{SEG^*}{C\left(SEG^*\right)}$, we can restate the l.h.s. of Expression W5.2

$$C\left(SEG^*\right)\frac{\P C\left(SEG^*\right)}{\P SEG}\frac{SEG^*}{C\left(SEG^*\right)} = SEG^*\,\frac{\P C\left(SEG^*\right)}{\P SEG}$$ and obtain

$$(\mathrm{W5.3})\ SEG^* =$$
$$\frac{dCBBE\cdot FV}{m\,CBBE}\begin{pmatrix} e^*_{FV,ROIC}\,e^*_{ROIC,CBBE}\,e^*_{(\partial ROIC/\partial CBBE),SEG} + e^*_{FV,WACC}\,e^*_{WACC,CBBE}\,e^*_{(\partial WACC/\partial CBBE),SEG} \\ + e^*_{FV,EGR}\,e^*_{EGR,CBBE}\,e^*_{(\partial EGR/\partial CBBE),SEG} + e^*_{FV,SUS}\,e^*_{SUS,CBBE}\,e^*_{(\partial SUS/\partial CBBE),SEG} \end{pmatrix}\frac{1}{\partial C\left(SEG^*\right)/\partial SEG}$$

as expression for the optimal level of the segmentation multiplier.

Instead of measuring the absolute level, we consider the ratio between the optimal levels of two multipliers. For example, for the ratio between the brand segmentation and expansion multipliers, we obtain

$$(\mathrm{W5.4})\ \frac{SEG^*}{EXP^*} = \frac{\begin{pmatrix} e^*_{FV,ROIC}\,e^*_{ROIC,CBBE}\,e^*_{(\partial ROIC/\partial CBBE),SEG} + e^*_{FV,WACC}\,e^*_{WACC,CBBE}\,e^*_{(\partial WACC/\partial CBBE),SEG} \\ + e^*_{FV,EGR}\,e^*_{EGR,CBBE}\,e^*_{(\partial EGR/\partial CBBE),SEG} + e^*_{FV,SUS}\,e^*_{SUS,CBBE}\,e^*_{(\partial SUS/\partial CBBE),SEG} \end{pmatrix}}{\begin{pmatrix} e^*_{FV,ROIC}\,e^*_{ROIC,CBBE}\,e^*_{(\partial ROIC/\partial CBBE),EXP} + e^*_{FV,WACC}\,e^*_{WACC,CBBE}\,e^*_{(\partial WACC/\partial CBBE),EXP} \\ + e^*_{FV,EGR}\,e^*_{EGR,CBBE}\,e^*_{(\partial EGR/\partial CBBE),EXP} + e^*_{FV,SUS}\,e^*_{SUS,CBBE}\,e^*_{(\partial SUS/\partial CBBE),EXP} \end{pmatrix}}\frac{\partial C\left(EXP^*\right)/\partial EXP}{\partial C\left(SEG^*\right)/\partial SEG},$$

which we can quantify using the available elasticity estimates.

Based on the implied optimal ratio for two emphasis multipliers, we construct our final strategy fit measure. Specifically, the brand leverage strategy fit for firm *i* in period *t* is given by

$$\text{(W5.5)} \quad Leverage\,Strategy\,Fit_{it} = -\frac{1}{3}\left[\left|\frac{SEG_{it}}{PEN_{it}} - \frac{\widehat{SEG}^{*}_{it}}{\widehat{PEN}^{*}_{it}}\right| + \left|\frac{SEG_{it}}{EXP_{it}} - \frac{\widehat{SEG}^{*}_{it}}{\widehat{EXP}^{*}_{it}}\right| + \left|\frac{PEN_{it}}{EXP_{it}} - \frac{\widehat{PEN}^{*}_{it}}{\widehat{EXP}^{*}_{it}}\right|\right],$$

where the hat indicates that values are predicted values. We multiply the expression by -1 to turn the average absolute difference into a measure that can easily be interpreted as a fit measure.

Note that we do not observe the marginal investment cost ratio for the multipliers as given in W5.4. However, it is reasonable to assume that they are not very different from each other. Technically, this introduces measurement error into the strategy fit variable. We checked the robustness of the results in Table D.7 by using instrumental variables for the strategy fit variable to address this issue. Specifically, we follow Lewbel (1997) who has proven that exploiting third moments of the data provides valid instruments. The results are robust (details are available from the authors on request).

TABLE D.7: Abnormal Returns Estimation Results

	(Model I)		(Model II)		(Model III)		(Model IV)		(Model V)		(Model VI)		(Model VII)	
	AR		**AR**		**AR**		**AR**		**AR**		**AR**		**AR**	
	Coefficient	**(SE)**	**Coefficient**	**(SE)**	**Coefficient**	**(SE)**	**Coefficient**	**(SE)**	**Coefficient**	**(SE)**	**Coefficient**	**(SE)**	**Coefficient**	**(SE)**
Intercept	.114	(.016)***	.070	(.020)***	.093	(.031)***	.092	(.031)***	-.021	(.049)	-.033	(.050)	-.021	(.048)
U△ROA	.969	(.166)***	1.230	(.272)***	1.050	(.225)***	1.070	(.225)***	1.680	(.546)***	2.270	(.561)***	2.370	(.538)***
U△CBBE	.530	(.291)**	.256	(.367)	-.213	(.349)	-.001	(.006)	-.462	(.530)	-.685	(.578)	-.041	(.546)
U△E(FV)[1]			.551	(.178)***									.882	(.338)***
Brand strategy emphases														
UΔPEN					-.257	(.255)	-.297	(.256)			-.392	(.383)		
UΔSEG					-.666	(.702)	-.534	(.764)			-1.43	(1.09)		
UΔEXP					.013	(.010)	.001	(.010)			-.002	(.012)		
UΔPEN x UΔCBBE							5.210	(5.66)						
UΔSEG x UΔCBBE							6.740	(9.72)						
UΔEXP x UΔCBBE							-.379	-.239						
Brand leverage strategy														
UΔLeverage strategy fit									.018	(.004)***	.018	(.004)***	.018	(.004)***
UΔ Leverage strategy fit x UΔCBBE									.754	(.125)***	.742	(.126)***	.757	(.123)***
Sample size (R^2)	1712.0	(0.11)	386.0	(.293)	699.0	(.228)	699.0	(.233)	198.0	(.408)	198.0	(.416)	198.0	(.429)

Notes: One-sided t-tests only for expectations; two-sided test otherwise. [1)] For reading convenience, coefficients are multiplied by x10^6. *** $p < .01$; ** $p < .05$; * $p < .10$.

WEB APPENDIX E – FIRM VALUE EFFECTS AND BRAND CAPABILITIES GAP BY INDUSTRY

TABLE E.1: Firm Value Effects and Brand Capabilities Gap by Industry

	Average firm value change assuming a 10% increase in CBBE [in $m]				Decomposition of brand capabilities gap by financial value driver [in $m]			
	Actual condition	Efficient condition	Utilized potential	Brand capabilities gap	Profitability	Cost of capital	Earnings growth	Sustainability
Automobile	786.45	1,836.99	43%	1,050.55	138.97	234.48	300.01	377.09
Consumer durables & apparel	1,252.01	2,298.22	54%	1,046.21	134.88	346.66	249.63	315.05
Consumer services	207.01	662.01	31%	455.00	205.99	87.47	61.63	99.91
Food & staples retailing	6,335.51	9,517.87	67%	3,182.37	326.20	1,000.06	568.67	1,287.43
Food, beverage & tobacco	1,363.03	3,100.50	44%	1,737.46	195.19	497.31	363.27	681.69
Health care	2,303.63	5,029.34	46%	2,725.71	228.34	525.39	851.53	1,120.45
Household & personal products	1,271.93	3,157.19	40%	1,885.26	148.19	581.77	367.88	787.42
Industrial, energy & utilities	246.42	594.27	41%	347.85	100.51	62.11	66.24	118.99
Information technology	780.08	6,754.34	12%	5,974.25	465.80	751.12	2,938.45	1,818.90
Media	1,335.06	5,151.91	26%	3,816.86	811.44	639.04	1,279.72	1,086.65
Retailing	33.32	1,514.96	2%	1,481.64	362.30	250.95	324.40	543.99
Telecom services	- 1,002.09	7,687.86	0% [1)]	8,689.95	509.11	2,300.96	3,459.10	2,420.79
Transportation	877.58	1,383.75	63%	506.18	80.49	96.89	160.80	168.00
Overall mean	**1,152.48**	**3,290.38**	**35%**	**2,137.90**	**260.88**	**470.00**	**686.71**	**720.31**

Notes: Analysis is based on cases for which efficient brand-firm value elasticity > 0 (91% of all firms).

[1)] The actual brand-firm value elasticity for the average firm in the telecom service sector is negative and driven by a negative elasticity of earnings growth w.r.t. CBBE and a positive elasticity of capital cost w.r.t. CBBE.

WEB APPENDIX F – ALLOCATION HEURISTIC FOR HARLEY DAVIDSON

We apply the allocation solution to the situation of Harley Davidson during our observation period (2005-2013). Given that Equation 5 can only be solved numerically and firms are reluctant to accept black box recommendations, we apply a heuristic that does not require numerical optimization but only uses the available elasticity estimates. It has been shown that such an allocation heuristic is a powerful tool associated with significant profit improvement potential and wide acceptance among practitioners because of its clear structure (Fischer et al. 2011).

We compute the allocation weight for a multiplier in Equation 5 based on the available (estimated) values for financial value driver, CBBE, and multiplier elasticities. Because closing the efficiency gap is the intermediate target for closing the brand capabilities gap, we use this gap, i.e., the distance between the current CBBE elasticity and its efficient frontier. Unfortunately, estimates for multiplier investment cost elasticities are not readily available. However, only relative differences between investment cost elasticities are relevant since Expression 5 is a ratio. We believe it is reasonable to assume that the ratio between the *rates* of *cost increase* is fairly constant across a wide range of multiplier values. It only increases significantly when a multiplier approaches its top level. For values in the top 20% deciles of a multiplier's empirical distribution, we apply a cost elasticity that is two times higher than normal. The allocation outcome shown in Table 9 in the paper, however, is not very sensitive to changes of this assumption

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