
Research Article

Pricing ROI, pricing capabilities and firm performance

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ABSTRACT Pricing is not only an important activity but frequently also a very important expense for industrial companies. In this short article we examine whether an improvement in measuring the return from pricing (pricing return on investment (ROI)) leads to an improvement in pricing capabilities and firm profits. The answer to this question is not trivial: performance measurement is costly and could, at least in theory, reduce performance. We survey 166 marketing and pricing managers from business-to-business companies globally and find that the effectiveness of pricing ROI measurement is positively related to firm performance only if pricing capabilities are well developed. This article offers two contributions: it explores the concept of pricing ROI, and it documents a positive link between pricing ROI and firm performance. To the ongoing debate on antecedents of pricing capabilities this research thus adds a further, so-far unexplored, perspective.

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INTRODUCTION

Pricing is a key element of the marketing mix: ‘Of all the tools available to marketers, none is more powerful than price’ (Han *et al.*, 2001, p. 435). Effective pricing has benefits, but pricing is also costly. Consider the following: business-to-business (B2B) companies are increasingly establishing a dedicated pricing function, which comes at an expense (Hinterhuber and Liozu, 2012). In many B2B companies, chief executive

officers are personally championing the pricing function, dedicating substantial managerial attention, resources and time on the corporate agenda to pricing, which again has non-trivial costs (Liozu and Hinterhuber, 2013). Finally, price promotions are a very substantial expense and a key concern for manufacturers and retailers alike (Hilarides, 1999).

Obviously, a number of companies measure the returns from marketing and pricing activities.

Consider the following two contrasting examples. Take General Electric: a reporter asks Beth Comstock, Chief Marketing Officer, about the specific approach the company uses to relate multibillion marketing investments to financial outcomes. She answers flatly: 'I would say that we haven't figured it out yet' (Comstock, 2008, p. 1). Contrast this with Coca Cola: in a presentation at the Marketing Science Institute, Ram Krishnamurthy, Group Marketing Director, illustrates the company's approach to optimizing the return on investment (ROI) from pricing and marketing activities. The company uses marketing variance analysis and a hierarchical Bayesian approach to determine how many dollars to allocate to which brand in which territory at any given moment in time so as to generate a pre-defined level of incremental profits (Krishnamurthy, 2010). Model parameters adjust in real time, and marketing executives activate only those specific levers (for example, a price increase; a cut in media spend) that maximize the expected incremental contribution margin.

These two companies, both highly admired and highly profitable, represent the two extreme points on a spectrum of effective marketing ROI measurements. Our key research question is: Does this difference make a difference? More formally: Does the difference in effectiveness of measuring the return from pricing lead to performance differences?

The answer to this question is not trivial. Measurement effectiveness could be associated with firm performance. Measurement itself, however, is costly; furthermore, intuition, which is quick, could, at least in principle, lead to better performance than analytical performance measurements.

We survey 166 marketing and pricing managers from B2B companies globally and find that the effectiveness of pricing ROI measurement is positively related to firm performance only when pricing capabilities are well developed. If pricing capabilities are weak, improvements in measurement effectiveness do not lead to superior performance. Our data thus suggest that firms need to

develop their pricing capabilities first in order to improve firm performance via measurement systems that analyze the effectiveness of investments in pricing. Our data suggest that investments aimed at improving measurement effectiveness – investments in software, for example – are misguided and will not increase firm performance unless pricing capabilities are well developed in the first place.

The results of this study therefore seem to indicate that, for a quantitative discipline such as pricing, formal analysis leads to high performance under conditions of high pricing capabilities. Whether this is true also for other marketing disciplines – say, branding or product development – would make a fascinating study for future research.

This short article is organized as follows. We first summarize the relevant literature and then present our key hypotheses. Following that, we describe our survey instrument and the sample and subsequently discuss key findings and implications for industrial marketing theory and practice.

THEORETICAL BACKGROUND

Our simple model examines whether improvements in the perceived effectiveness of pricing ROI measurement contribute to pricing capabilities and firm performance. Figure 1 describes our hypothesized research model.

Table 1 defines the three constructs.

Defining and measuring pricing ROI

The focal construct in our research is the *effectiveness of pricing ROI measurement*. In this section we first define pricing ROI and then discuss current research in this area.

Traditional marketing metrics are imperfect: Seggie *et al* (2007) outline key ways that effective marketing metrics should evolve in order to be both academically rigorous and managerially relevant: (i) from non-financial to financial, (ii) from backward-looking to forward-looking, (iii) from short-term to

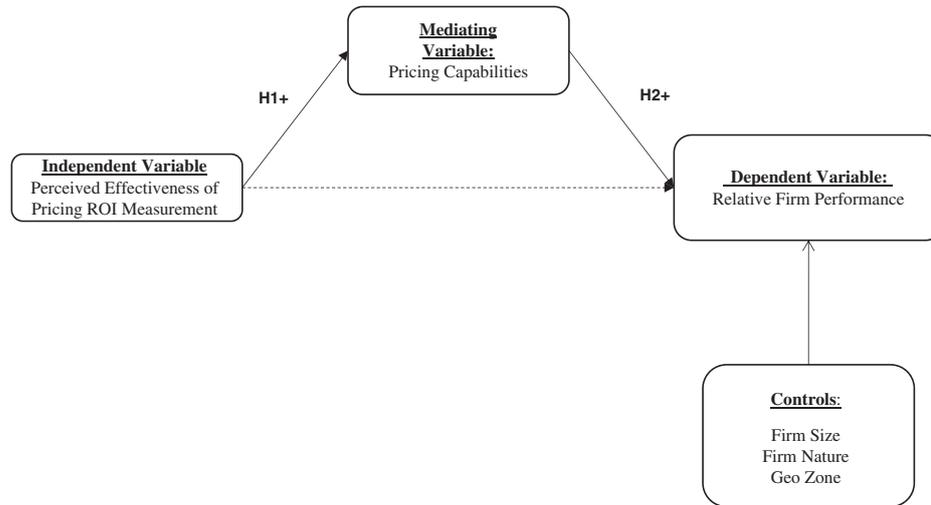


Figure 1: Hypothesized research model.

Table 1: Construct definitions

Name	Construct definition
Effectiveness of pricing ROI measurement	Perceived ability to appropriately quantify the ROI of the pricing function, of specific pricing activities (for example, price increases), of the pricing infrastructure (for example, IT systems) or of the overall organizational transformation related to pricing
Pricing capabilities	Set of skills referring, on the one hand, to the price-setting capability and, on the other hand, to the price-getting capability <i>vis-à-vis</i> customers
Firm performance	Subjective performance vs. key competitors, taken as average over two subsequent years

long-term, (4) from macro to micro data, (5) from independent metrics to causal chains, (6) from absolute to relative and (7) from subjective to objective. Marketing ROI meets these criteria better than other marketing performance metrics (Rust *et al.*, 2004; Best, 2012).

Marketing ROI considers costs and benefits of marketing activities and is calculated as follows (Lenskold, 2003; Rust *et al.*, 2004; Farris *et al.*, 2010):

$$\text{Marketing ROI} = \frac{CM - I}{I}, \quad (1)$$

where CM is the incremental contribution margin associated with specific marketing

activities, and I is the investment in marketing activities. Like traditional ROI measurement, marketing ROI is the result of dividing incremental marketing returns by associated marketing investments.

Marketing scholars adapt this ROI calculations to sub-domains of marketing: concepts such as social media ROI (Kumar *et al.*, 2013), advertising ROI (Danaher and Rust, 1996), new product ROI (Scheuble, 1969), ROI from customer relationship management (Streukens *et al.*, 2011), promotional ROI (Wittink, 2002) and even training ROI (Phillips, 1997) are all now quite well established concepts.

Since we are interested in costs and returns from pricing activities, we adapt the

formula and propose to define pricing ROI as follows:

$$\text{Pricing ROI} = \frac{CM - I}{I}. \quad (2)$$

Investments in pricing can be broadly divided into four main groups: (i) investments in the organization of pricing (Homburg *et al.*, 2012), such as investments to establish a chief pricing officer or a dedicated pricing function; (ii) investments to carry out specific pricing activities (Nagle and Holden, 2002), such as price promotions or price increases; (iii) investments in the pricing infrastructure, such as in IT systems related to pricing; and (iv) investments in the overall organizational transformation towards new pricing practices (Forbis and Mehta, 1981), such as CEO championing activities of pricing or value-based selling. All these activities have costs and are potentially subject to formal ROI calculations.

Pricing ROI is thus the incremental return from investments in the pricing organization, in pricing activities, in the pricing infrastructure, or in the overall organizational transformation related to pricing divided by the specific investment. The *effectiveness of pricing ROI measurement* is therefore the perceived ability to measure the return of the pricing function, pricing activities, the pricing infrastructure or the overall organizational transformation related to pricing. Figure 2 illustrates our core construct and lists pertinent literature.

Marketing has developed a plethora of measures: among these are market share, sales growth, customer satisfaction and price premium. Far less developed are attempts to measure the overall effectiveness of marketing activities. The CMO (Chief Marketing Officer) Council observes: 'Marketing – known more as art than science – has been the last of the corporate functions to formally develop and adopt processes and standards that can be tracked and measured quantitatively' (as cited in Stewart, 2009, p. 637).

Measuring the effectiveness of marketing and its components – we are interested, of course, in

pricing – is therefore a significant challenge, certainly also for marketing practitioners. To gain an understanding of the current state of practice on the measurement of marketing ROI, we summarize the relevant industry studies.

Marketing ROI measurement: The state of the practice

The CMO survey

The CMO survey, hosted by Duke University, has polled chief marketing officers of the 1000 largest, US-based companies semiannually since 2008 on various marketing-related issues. The 2013 survey results show that 65 per cent of companies are unable to prove the impact of marketing spend on business (Moorman, 2013). Similarly, about 70 per cent of companies do not evaluate the quality of marketing analytics, even though these same companies forecast increasing their investments in marketing analytics by about 50 per cent in the coming years. Finally, in those companies where marketing analytics is actually deployed, it is used first to inform decisions on customer acquisition/retention, digital marketing, and, to a fairly large degree, promotion and pricing.

The Forrester survey

Forrester, a market research agency, reports the results of a survey of 111 marketing executives of large and medium-sized US-based companies. These executives report that 'agreeing on a definition of marketing ROI' is the number-two item on a list of items related to the difficulties of improving marketing ROI – the top item is 'acting quickly to improve results' (Nail, 2005, p. 6). Other items, in order, include 'improving reporting systems', 'data comprehensiveness' and 'changing established practices' (Nail, 2005, p. 6). This study also suggests that definitions of marketing ROI vary widely within companies; however, the most common conceptualization of marketing ROI is 'incremental sales from marketing'. Finally, this study

EFFECTIVENESS OF PRICING ROI MEASUREMENT

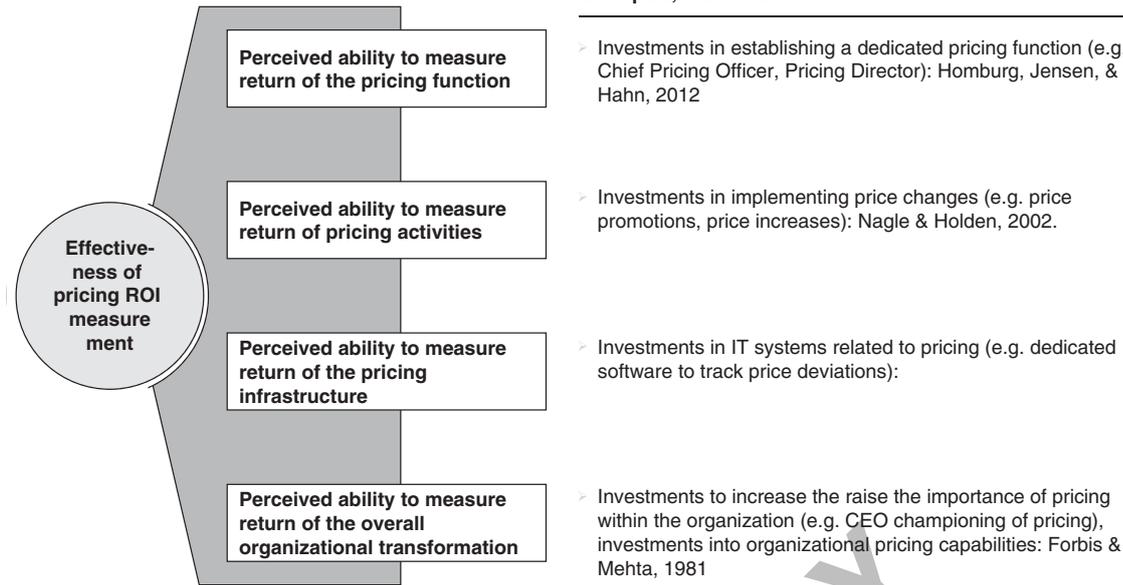


Figure 2: Effectiveness of pricing ROI measurement.

finds that the tools used today to measure marketing ROI are very simple (for example, response analysis) but that executives recognize that the use of marketing mix modeling will increase strongly in the future (Nail, 2005, p. 9).

The corporate executive board survey

On the basis of a survey of 27 marketing executives of mid-sized US companies, the results of this survey show, like previous surveys, a general dissatisfaction with the ability of respondents to measure marketing ROI (Corporate Executive Board, 2007). Interestingly, this study finds that pricing metrics are among the least used and also among the least effective of the available set of overall marketing metrics.

The McKinsey survey

In a poll of 587 senior executives McKinsey and Company (Doctorow *et al* 2009) finds that only about 14 per cent of companies employ quantitative, analytical marketing models.

In sum, in their diversity the findings of these surveys are remarkably consistent: (i) marketing ROI measurement and improvement are a priority for practicing executives, (ii) few companies measure marketing ROI effectively today and (iii) measuring the effectiveness of pricing activities in particular is especially difficult for practitioners.

Academic research on marketing ROI

The question of marketing efficiency has vexed researchers since the earliest days of marketing. In 1936, in the second issue of the newly launched *Journal of Marketing*, Cassels (1936, p. 129), professor at Harvard University, observes: 'The great central problem of marketing' ['marketing' during this period essentially refers to trade and distribution], 'the problem of carrying through efficiently... this final stage in the production process, has remained essentially the same since it was so intelligently discussed by Plato twenty-three hundred years ago'.

In the 1960s numerous authors propose the use of ROI analysis to guide marketing decisions. Dean (1966) suggests viewing advertising as an investment, not an expense. As such, it has to be capitalized on the balance sheet, and it should be optimized via ROI and discounted cash flow analysis. In this conceptual article Dean clearly recognizes the difficulties in forecasting expected returns from advertising. Scheuble (1969, p. 110) proposes a ‘new point of departure’ for analyzing the profitability of new product introductions: ROI and discounted cash flow analysis. This pioneering article is interesting: counterintuitively, it goes largely unnoticed – in over 40 years it is cited just three times. The article develops a practical framework allowing the modification of relevant elements of the marketing mix (volume, price, costs) to obtain a desired ROI from new product introductions. For researchers interested in pricing, too, this article is noteworthy: Scheuble (1969, p. 118) proposes, in full contrast to the then prevailing theory and practice, to take a ‘marketing price’ and to ‘work back to get a cost figure’ that meets the overall ROI goals. Interestingly, this article is probably one of the first to discuss target costing. It does not attract substantial attention. Probably also for this reason, researchers have struggled to make significant advances in measuring the impact of marketing.

In the following years, researchers repeatedly propose the application of financial measurements to marketing management (Kirpalani and Shapiro, 1973). Mossmann *et al* (1974) propose an early version of marketing ROI analysis. To evaluate the return on specific marketing activities, the authors suggest calculating the ‘net segment margin’ (p. 47), that is, the net income attributable to a specific customer or product segment, and dividing this margin by segment-specific assets to obtain the ROI. This proposal also goes largely unnoticed.

The concept of marketing ROI witnesses a dramatic surge in interest only several decades later, when Rust *et al* (2004) publish a seminal article highlighting the importance of marketing

ROI as a tool to guide and improve marketing effectiveness. As a result, the number of publications on marketing metrics and marketing ROI rises substantially thereafter.

Current research has, however, one caveat. Conceptual articles outnumber empirical studies by a large degree. These papers lament, essentially, the difficult state of affairs of marketing. Stewart (2009, p. 638), for example, flatly states: ‘Marketing in 2008 is where quality was 50 years ago’. Stewart implies that marketing researchers know much more about marketing costs than they do about marketing outcomes and that one reason for this ignorance is the lack of standards like those the quality movement, for example, has developed in recent decades (for example, ISO, Six Sigma).

In a survey in the high-technology sector, O’Sullivan and Abela (2007) find that companies with a high ability to measure marketing performance outperform their competitors, as reported by senior executives. Similarly, in a survey of 212 senior executives, Germann *et al* (2013) find that the deployment of marketing analytics is positively linked to firm performance. The authors find that top management team advocacy, an analytics culture, analytic skills and data/IT are key antecedents of effective marketing analytic deployment. Mintz and Currim (2013) similarly link marketing metric use to marketing mix performance and find a significant positive relationship. In sum: these empirical studies indicate that marketing performance measurement improves firm performance.

A number of mostly managerial studies, however, suggest precisely the opposite: Peters and Waterman (1982, p. 31), in their widely read book *In Search of Excellence*, warn against ‘paralysis by analysis’. Excellent companies cultivate a bias for action, and avoid complex analytical models. Similarly, Perot (1988, p. 48), after selling his company Electronic Data Systems to General Motors (GM), suggests that an overreliance on analysis is detrimental to performance: ‘I come from an environment where, if you see a snake, you kill it. At GM, if you see a snake, the first thing you do is go hire

a consultant on snakes. Then you get a committee on snakes, and then you discuss it for a couple of years'. Speed of action, even though the outcome may be less than an elusive concept of perfection, is itself a source of competitive advantage (Stalk, 1988). This stream of literature suggests: analysis can slow down, if not delay, action and lead to low performance.

In principle, the very act of measuring performance could either decrease or increase firm performance. It is therefore by no means obvious that improved measurement leads to improved performance. In a recent Marketing Science Institute report, Pauwels *et al* (2008, p. 29), proposing a research agenda on marketing performance measurement, ask, 'Are dashboards worth it?' At the moment we have no conclusive answers.

There are, to the best of our knowledge, no empirical studies specifically linking pricing ROI measurement to firm performance. This research thus aims to explore the consequences of effective pricing ROI measurement on firm performance.

Research on pricing capabilities

Research in the domain of pricing capabilities has witnessed a surge of interest recently: current studies, qualitative as well as quantitative, suggest that pricing capabilities are a key driver of firm performance (Dutta *et al*, 2003; Liozu and Hinterhuber, 2014). Pricing capabilities are a focal construct of the present study: Table 2 summarizes the relevant literature in this context.

HYPOTHESES DEVELOPMENT

Effectiveness of pricing ROI measurement and firm performance

Our central construct is the effectiveness of pricing ROI measurement (see Table 1 and Figure 2 for a definition). The extant literature, as discussed, offers mixed evidence on the

question of whether improvements in measurement lead to improvements in performance.

On the one hand, the marketing literature (Germann *et al*, 2013; Mintz and Currim, 2013) as well as research in strategy (Ouchi, 1979) and in total quality management (Juran, 1992) all suggest that measurement improves organizational performance: Measurement improves the quality and speed of organizational decision making, enables learning and feedback, and aligns diverse actors on a common set of standards. On the other hand, the qualitative studies cited earlier indicate that performance measurement requires adequate measurement systems, which come at a cost; in addition, performance measurement will require analysis and evaluation of both past and future actions, which is time consuming and could put the company at a disadvantage (Stalk, 1988). In sum: formal performance evaluation is costly. Intuitive decision making, by contrast, relies on a combination of past experience, pattern recognition and emotional perceptions and has one critical advantage: it is fast (Kahneman, 2011).

We suggest that a contingency model is able to reconcile these contrasting findings: whether an improvement in measurement abilities leads to superior performance or not depends on current capabilities. Formally:

Hypothesis 1 Pricing capabilities fully mediate the positive relationship between the effectiveness of pricing ROI measurement and firm performance, so that the positive relationship between effectiveness of pricing ROI measurement and firm performance is stronger under conditions of high pricing capabilities than under conditions of low pricing capabilities.

Our dependent variable is firm performance. In line with an extensive stream of research on pricing capabilities (Dutta *et al*, 2003; Hallberg, 2008; Andersson, 2013), we conjecture that higher pricing capabilities lead to higher firm performance.

Table 2: Research on pricing capabilities

<i>Construct</i>	<i>Definition</i>	<i>Authors and items</i>
Market-related capabilities – pricing	Pricing capabilities are part of seven distinct market-related capabilities: <ol style="list-style-type: none"> 1. Product development 2. Pricing 3. Channel management 4. Marketing communications 5. Selling 6. Market planning 7. Marketing implementation 	Morgan <i>et al</i> (2009) <ul style="list-style-type: none"> ● Using pricing skills and systems to respond quickly to market changes ● Knowledge of competitors' pricing tactics ● Doing an effective job at pricing products/services ● Monitoring competitors' prices and price changes
Premium pricing capability	The premium price capability reflects the ability to command superior prices. Customers are willing to pay premium prices for product innovation. Products that offer new features or products that are first in the market can command premium prices	Koufteros <i>et al</i> (2002) <ul style="list-style-type: none"> ● Capability of selling at price premium ● Capability of selling at prices above average ● Capability of selling at high prices that only a few firms can achieve
Pricing capabilities (qualitative research)	Pricing capabilities refer, on the one side, to the price-setting capability within a firm (identifying competitor prices, setting pricing strategy, translating from pricing strategy to price) and, on the other, to the price-setting capability <i>vis-à-vis</i> customers (convincing customers on the logic of price changes, negotiating price changes with major customers)	Dutta <i>et al</i> (2003) <ul style="list-style-type: none"> ● Translating pricing strategy to price ● Convincing customer on the price change logic ● Negotiating price changes within major customers ● Developing internal pricing management process ● Capturing value through price
Pricing capabilities (quantitative research)	Pricing capabilities can be measured with a 10-item scale (PRICECAP) that includes items related to internal pricing processes and skills, items related to understanding competitors, and items related to understanding customer needs and customer willingness to pay Pricing capabilities are positively linked to firm performance	Liozu and Hinterhuber (2014) <ul style="list-style-type: none"> ● Using pricing skills to respond quickly to market changes ● Knowledge of competitor pricing tactics ● Doing an effective job of pricing products/services ● Quantifying customer willingness to pay ● Measuring and quantifying differential economic value vs. competition ● Measuring and quantifying price elasticity of products/services ● Designing proprietary tools to support pricing decisions ● Conducting value-in-use analysis or total cost of ownership analysis ● Designing and conducting specific training programs ● Developing a proprietary internal price-management process

Table 3: Total sample characteristics (166 respondents)

<i>Firm nature</i>		<i>HQ location</i>	
Manufacturing	49%	Americas	45%
Service	35%	EMEA	50%
Distribution/Retail	16%	APAC	5%
	100%		100%

<i>Size of pricing teams</i>		<i>Number of employees</i>	
Less than 5 people	34%	Less than 500	18%
6–10 people	17%	501 to 1000	20%
11–20 people	12%	1001 to 5000	8%
21–50 people	16%	More than 5000	55%
Over 51 people	20%		100%
	100%		

Hypothesis 2 The higher the pricing capabilities, the higher the firm performance when controlling for firm size, firm nature, and geographical location.

METHODS

Data collection and sampling

We use a random extraction of members of the Professional Pricing Society (PPS) as the sample frame for this study. PPS is the world's largest professional organization dedicated to pricing. Members are marketing, pricing and general managers involved in pricing at mostly large global companies from around the world. The president of the PPS endorses our study through personal support and encourages recipients to respond to the survey. PPS distributes the survey instrument electronically in June 2013 to 10 000 members randomly extracted from its membership of 18 000. The unit of analysis is the individual respondent. We assure respondents of anonymity and give them the option to enter a raffle to win a branded tablet as inducement for participation. We receive 308 fully or partially completed questionnaires. After removing records that are either incomplete or that exhibit insufficient variation in responses,

we obtain 201 usable questionnaires. Since we are interested only in data from B2B companies, we extract 166 B2B self-declared respondents from the 201 usable questionnaires. This yields a response rate of 3 per cent. This response rate is certainly a concern; other large-scale surveys have response rates of between 5 and 20 per cent (Roth and Van Der Velda, 1991; Stock *et al*, 2000; Shah and Ward, 2003). One explanation for this comparatively low response rate is the nature of the survey: the state-of-practice surveys cited previously suggest that practicing managers today do not routinely perform marketing and pricing ROI calculations (Moorman, 2013). This may explain why a recent survey on the use of marketing metrics has a response rate of well below 1 per cent (Mintz and Currim, 2013). Our response rate reflects the exploratory nature of this research. The low response rate is clearly a limitation.

Table 3 summarizes the sample profile: respondents are mostly pricing managers from large, US-based companies.

Measure development and assessment

In our simple research model we use three constructs: perceived effectiveness of pricing ROI measurement, pricing capabilities and firm

performance. For the latter two constructs the literature provides available scales; for the construct ‘perceived effectiveness of pricing ROI measurement’ we develop indigenous items following rigorous established item-development procedures and guidelines (Churchill, 1979). We define these constructs in Table 1 and provide the scales, items and applicable sources in the Appendix. In summary:

- Pricing capabilities: 10-item scale from Liozu and Hinterhuber (2014).
- Effectiveness of pricing ROI measurement: New 4-item scale.
- Firm performance: 3-item scale, adapted from O’Sullivan and Abela (2007).

Our survey items measure perceptions, as opposed to objective data. This may be of concern particularly for the construct firm performance, a subjective performance measure: we measure the perceived performance relative to competitors on three items – absolute price levels, pricing power and operating profitability – on a 7-point scale (anchored at ‘much worse/lower’ and ‘much better/higher than competitors’, respectively). To mitigate the effect of annual fluctuations in firm performance, we collect subjective performance data for 2 years (2011 and 2012) and take the average value as the indicator of firm performance. We note that the two annual performance values are highly correlated (0.85).

The use of subjective performance measures warrants clarification. First, North American and European respondents dominate the sample. A multidimensional measure based on perceived firm performance facilitates comparisons across different regions with different accounting standards. Second, our sample includes many small and medium-sized companies (38 per cent have fewer than 1000 employees). For these companies, researchers express reservations about the use of objective performance data, since these data may be biased as a result of managerial manipulation for corporate and personal tax reasons (Sapienza *et al*, 1988). Third, recent studies show that perceptual performance measures tend to be highly correlated (80 per cent) with objective

performance indicators (Kumar *et al*, 2011). Subjective performance data are used widely in industrial marketing research (Merrilees *et al*, 2011; Park *et al*, 2012).

We pretest scale items with a panel of academics and pricing practitioners and then send a pilot-test survey to pricing and marketing professionals. We modify the survey iteratively to incorporate all relevant test results.

Firm-level control variables

We control for a number of likely determinants of performance by including demographic characteristics of the firm, such as firm type, geographical location and firm size (Amburgey and Rao, 1996).

Non-response bias

We follow the convention and estimate non-response bias by comparing early and late respondents on the study variables (Armstrong and Overton, 1977). One-way ANOVA tests, performed at the item level, indicate no significant differences in data derived from early versus late responders. Consequently, it appears that bias present from the time of response is due to chance.

Common method bias

We collect exogenous and endogenous variables at the same time using the same instrument – hence it is prudent to conduct a common method bias test. We use the common latent factor (CLF) method advocated by MacKenzie and Podsakoff (2012) when no theoretically driven marker variable is collected. Comparing the standardized regression weights before and after adding the CLF shows us to what extent the variables in our model share common variance. We find no significant difference for any variables. We therefore opt to remove the CLF for the remainder of the analyses, rather than using CLF-adjusted values. As further evidence of no method bias, we reassess the

Table 4: Construct reliability and validity results

<i>Factors</i>	<i>CR</i>	<i>AVE</i>	<i>MSV</i>	<i>ASV</i>	<i>Relative firm performance</i>	<i>Pricing capabilities</i>	<i>Perceived effectiveness of ROI calculation</i>
Relative firm performance	0.91	0.566	0.452	0.316	0.752	—	—
Pricing capabilities	0.933	0.541	0.452	0.388	0.672	0.735	—
Perceived effectiveness of ROI calculation	0.9	0.693	0.325	0.253	0.425	0.57	0.832

Bold italic number are square root of AVE.

validity and reliability of our measurement model with the CLF present. All criteria for discriminant and convergent validity, as well as reliability, are still met – despite the presence of the CLF. This suggests that common method variance has not biased our measures.

Measurement models

We conduct an exploratory factor analysis (EFA) on the sample dataset using principal axis factoring with Promax rotation. For all but one item, communalities exceed the minimal acceptable threshold of 0.50 (Hair *et al.*, 2010). In addition, both the Kaiser–Meyer–Olkin (KMO) value and Bartlett’s test of sphericity exceed the acceptable threshold levels, indicating the appropriateness of the data for factor analysis. The EFA yields three factors, consistent with our conceptual model as displayed in Figure 1. Each item significantly loads on its respective factor with a value greater than 0.40 and no cross-loadings of more than 0.20 (Igbaria *et al.*, 1995; Hair *et al.*, 2010). The total variance explained by these three factors is 55 per cent.

The final number of items represented by the four factors, after completion of the EFA analysis, is 24. In addition, the reliability of each of the final six factors is computed as shown in Table 4 and in most cases exceeds the minimum acceptable threshold of 0.70 (Nunnally, 1978). Table 4 provides the correlations between the factors. All of the average variance extracted

(AVE) (Davey *et al.*, 1998) values exceed the square of the correlation between the constructs, demonstrating discriminant validity.

We assess the psychometric properties of the four factors derived from the EFA using a confirmatory factor analysis (CFA) to validate the factor structure. The measurement model is constructed incorporating each construct and associated items. The model is further trimmed and appropriate covariance relationships added when theoretically justified (Byrne, 2009). The overall fit for the model is good: CMIN/DF = 1.587, CFI = 0.959, RMSEA = 0.040, PCLOSE = 0.999. The composite reliability (CR) for each construct is provided in Table 3. The CR values exceed the acceptable threshold level (>0.70), and the AVE values confirm the reliability of the indicators and demonstrate convergent validity. For discriminant validity we show that for all constructs the maximum shared variance (MSV) and average shared variance (ASV) are less than the AVE (Fornell and Larcker, 1981).

Invariance test

To establish that the model is not significantly affected by respondents’ region, we conduct configural and metric invariance tests (Steenkamp and Baumgartner, 1998) on the measurement model. Using the two-group model for both analyses, we observe adequate fit for the unconstrained measurement models. After constraining the models to be equal, we find the χ^2 difference test to be

Table 5: Structural model results

<i>Hyp</i>	<i>Hypothesized relationship</i>	<i>Direct β without mediation</i>	<i>Direct β with mediation</i>	<i>Indirect β</i>	<i>Type of mediation</i>
Hypothesis 1	Pricing capabilities fully mediate the positive effect of ROI calculation on relative firm performance	0.421**	0.06 (NS)	0.385*** ($P=0.006$)	Full
<i>Hyp</i>	<i>Hypothesized paths</i>	<i>Regression estimates</i>	<i>Critical ratio</i>	<i>Hypothesis supported</i>	
Hypothesis 2	The higher the pricing capabilities, the higher the relative firm performance	0.673***	7.696	Yes	
	R^2 Relative firm performance	0.47			
	R^2 pricing capabilities	0.33			

*** $P<0.01$; ** $P<0.05$; * $P<0.1$.

non-significant, and we find none of the regression paths to be significant at the 95 per cent confidence level. Therefore our measurement model meets criteria for metric and configural invariance across regions.

RESULTS

We test our hypotheses using structural equation modeling (SEM). SEM is particularly appropriate because it allows estimation of multiple associations, simultaneously incorporates observed and latent constructs in these associations, and accounts for the biasing effects of random measurement error in the latent constructs (Medsker *et al*, 1994).

The results are shown in Table 5. All hypothesized relationships are significant. The fit indices for the final structural model indicate that this model reaches an acceptable goodness of fit (CMIN/DF = 1583; GFI = 0.907; CFI = 0.959; RMSEA = 0.040; PCLOSE = 0.999).

We first perform a mediation analysis using causal and intervening variable methodology (Baron and Kenny, 1986; MacKinnon *et al*, 2002) and techniques described by Mathieu and Taylor (2006). We analyze the paths connecting our independent variable to our

dependent variable through our mediating variable to examine the direct, indirect and total effects. For the mediation hypothesis being tested, we run a model without the mediation paths (only direct effects). The result of our mediation analysis reveals the presence of full mediation, supporting Hypothesis 1. The direct effect of the effectiveness of ROI calculation on relative firm performance before adding pricing capabilities as a mediator is 0.421 ($P<0.001$). After we add the mediator, the direct effect drops to 0.06 (P value not significant). This finding is further supported by the drop in direct effect from our independent variable to our dependent variable after adding the mediator, as well as by the presence of the indirect effect ($b = 0.385$; $P = 0.006$).

Second, the hypothesized impact of pricing capabilities ($b = 0.67$, $P<0.01$) on relative firm performance is significant, providing support for Hypothesis 2.

We control for nature of the firm, geographical region of the firm's headquarters and firm size. Our analysis reveals a significant relationship between firm size and relative firm performance ($b = 0.12$, $P<0.01$). Our final statistical model with all significant relationships is in Figure 3.

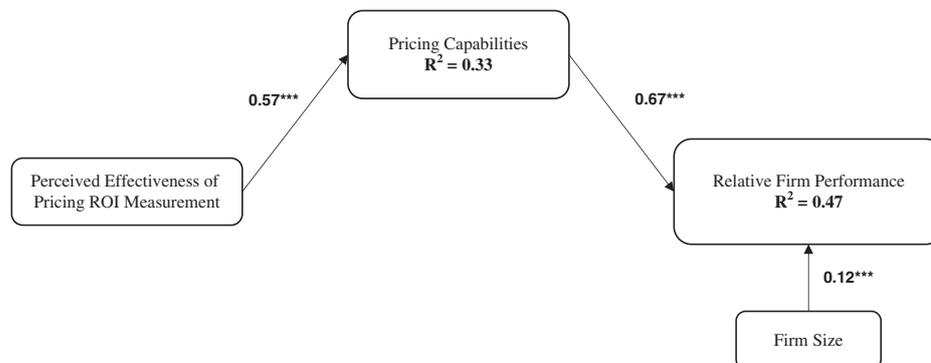


Figure 3: Final structural model.

DISCUSSION

Measuring marketing performance is a top priority (Commander *et al.*, 2007). It is also a challenge for marketing executives: many companies ‘prefer to fumble around in the dark. It’s easy to see why. Fumbling has a lot going for it ... You may not like what you see when the lights do go on’ (Ambler, 2003, p. 17). Other companies fall into the trap of measuring ‘what is easy to measure’ rather than what is ‘relevant’ (Ambler, 2003, p. 270). Ambler (2003) implies that many companies are either unable or, worse, unwilling to measure marketing performance. Marketing executives seem unconvinced that measuring performance will lead to better results. This study aims to resolve this important issue.

We find that measuring the effectiveness of pricing leads to superior firm performance only if pricing capabilities are high. The relationship between effectiveness of pricing ROI measurement and firm performance is not significant when pricing capabilities are low.

This research, based on responses from 166 pricing and marketing managers from B2B companies around the world, enables us to resolve the contrasting findings of the current literature on the relationship between measurement effectiveness and firm performance. As outlined, recent quantitative studies do suggest that performance measurement contributes to firm performance; earlier qualitative studies, however, suggest the contrary, highlighting that measurement is costly and can delay effective action.

To this ongoing debate this study essentially adds two substantial contributions. First, we show that the relationship between the effectiveness of pricing ROI measurement and firm performance is fully mediated by pricing capabilities. Measurement effectiveness, by itself, does not improve performance. Under conditions of high pricing capabilities, however, the effectiveness of pricing ROI measurement is strongly and positively related to firm performance. This finding suggests that investments in improving measurement effectiveness – for example, investments in pricing tools, in pricing analytics or in pricing software – contribute to firm performance only if current pricing capabilities are high. The development of routines could play a role in this process. Second, in this study we develop the construct *perceived effectiveness of pricing ROI measurement* – a construct that encompasses the ability to measure the returns from investment in the organization of pricing (for example, a dedicated pricing function), in pricing activities (for example, price promotions), in the infrastructure of pricing (for example, IT systems) and in the overall organizational transformation related to pricing (for example, CEO championing of pricing) – and we show that this construct acts as an antecedent to firm performance under certain conditions.

To the current literature on pricing capabilities, which documents a direct link to firm

performance, this study adds a further, complementary, perspective: pricing capabilities, as perceived by respondents, are an important mediator between the perceived effectiveness of pricing ROI measurement and firm performance.

Implications for B2B marketing practice are twofold. First, pricing is an activity which touches many business functions. This study shows that efforts to measure the returns from pricing activities need to reflect the broad impact of pricing on the organization and should include the following four domains: the organization of pricing, pricing activities, the pricing infrastructure and the overall organizational transformation related to pricing. Second, this study shows that the effectiveness of pricing ROI measurement drives firm performance only if pricing capabilities are well developed. This finding has important implications for industrial marketing managers and suppliers alike: industrial companies are investing substantial amounts in marketing analytics software, including pricing software. A survey by Ernst & Young of Fortune 1000 companies reports the following: 81 per cent of buyers say that they expect IT vendors to quantify the value proposition of their solutions, including ROI analysis (Cooper, 2002). As B2B suppliers, software vendors are increasingly asked to justify and document the incremental benefits of their products to customers. The simple contribution of this study to these findings is that an improved ability to measure the return from pricing activities via software, for example, is worthless unless firm-specific pricing capabilities are well developed in the first place: IT suppliers do and will claim an improved ability to measure performance as a result of software investments. We contend that this improved ability to measure the performance of pricing will lead to improved firm performance only after firms have developed their pricing capabilities. Investments in IT systems are thus misguided unless firms have already developed substantial pricing capabilities.

LIMITATIONS

This study has important limitations. First is the use of subjective performance measures and, more broadly, the use of perceptual survey items. Subjective performance measures are widely used in the strategy literature (Spanos and Lioukas, 2001; Gruber *et al*, 2010) as well as the marketing literature (Kohli and Jaworski, 1990; Narver and Slater, 1990). Nevertheless, subjective performance measurement is based on perceptions and is potentially biased. Future studies would benefit from measuring subjective and objective performance indicators simultaneously. Our other survey items measure respondent perceptions of, for example, pricing capabilities, pricing ROI dispersion, use of pricing tools and so forth: since our survey is self-administered, results may not reflect what respondents actually do when engaging in pricing activities. Babbie (2007, p. 276) writes: 'Surveys cannot measure social action: they can only collect self-reports of recalled past action or of prospective or hypothetical action'. In other words, to truly understand the factors that drive the perceived effectiveness of pricing ROI measurements in firms, it might be useful to augment our results with field observations and qualitative inquiry. Second is common method bias. We attempt to minimize common method bias through statistical analysis but cannot rule it out completely. Future studies would benefit from collecting multiple responses per firm. Third is causality. The directionality in our hypothesized research model is based on previous empirical research as well as on established theoretical frameworks. Nevertheless, we cannot entirely rule out reverse causality – that high performance leads respondents to rate pricing ROI effectiveness highly – as opposed to the causal path in our model. Future research should address this issue via the use of longitudinal data. The fourth and final limitation concerns the sample and response rate: we poll members of the PPS, an organization that includes an estimated 30 per cent of the Global Fortune 500 companies and a large number of medium-sized companies. There are reasons to

assume that the membership base is representative of the overall population of firms globally, but we cannot completely rule out a sample selection bias. The comparatively low response rate of 3 per cent may limit the ability to generalize findings from this study.

Our suggestions for future research include the following avenues. We would welcome further research that explores the causal paths linking formal pricing performance measurement systems with firm performance.

As indicated, a fruitful avenue for future research is the exploration of the effectiveness of intuitive decision-making processes for other elements of the marketing mix. While this study finds that the formal measurement of ROI is positively correlated to firm performance under the condition of high pricing capabilities for the domain of pricing, we are curious to learn whether intuitive decision-making processes improve firm performance for decisions related to product development, branding, advertising or distribution.

Future research is warranted also with regard to examining learning processes in pricing: How do individual actors learn, and how do pricing capabilities emerge? How does the interplay between individual learning and collective exposure to common environmental challenges facilitate (or obstruct) learning processes in pricing? Finally, we would welcome efforts to examine antecedents to effective pricing ROI measurement.

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APPENDIX

Table A1: Constructs and scales

<i>Measures</i>	<i>Items</i>	<i>Other comments</i>
Pricing capabilities	Please rate your organization relative to your major competitors in terms of its capabilities in the following areas: Using pricing skills and systems to respond quickly to market changes Knowledge of competitors' pricing tactics Doing an effective job of pricing products/services Monitoring competitors prices and price changes Sticking to price list and minimizing discounts Quantifying customers' willingness to pay Measuring and quantifying differential economic value versus competition Measuring and estimating price elasticity for products/services Designing proprietary tools to support pricing decisions Conducting value-in-use analysis or Total Cost of Ownership Designing and conducting specific pricing training programs Developing proprietary internal price-management process	12 items, 7-point scale (anchored at 'much worse than competitors' and 'much better than competitors') Scale is adapted from Liozu and Hinterhuber (2014)
Effectiveness of pricing ROI measurement	How well does your firm calculate the ROI of pricing for the pricing function (all dimensions of pricing function in the firm)? How well does your firm calculate the ROI of pricing for specific pricing initiatives and projects (for example, training, pricing tools, price increases)? How well does your firm calculate the ROI of pricing for pricing systems (for example, IT systems)? How well does your firm calculate the ROI of pricing for the overall pricing transformation (including programs outside of pricing)?	4 items, 7-point scale (anchored at 'very poorly' and 'very well') New scale
Firm performance	Please evaluate the performance of your major line of business in 2011 relative to your major competitors: Absolute price levels Pricing power in the market Operating profitability (EBIT/sales) Please evaluate the performance of your major line of business in 2012 relative to your major competitors: Absolute price levels Pricing power in the market Operating profitability (EBIT/sales)	3 items, 7-point scale (anchored at 'much worse/lower than competitors' and 'much better/higher than competitors') Firm performance is average of performance in 2011 and performance in 2012 Scale is adapted from O'Sullivan and Abela (2007)