Strategic Management Journal
Strat. Mgmt. J., **38**: 1193–1211 (2017)
Published online EarlyView 15 December 2016 in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/smj.2565
Received 10 June 2014; *Final revision received 4 January 2016*

MEASURING VALUE CREATION AND APPROPRIATION IN FIRMS: THE VCA MODEL

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Research summary: *Using a productivity technique (VCA model), we estimate the economic value created by a firm and appropriated by its stakeholders in two specific empirical contexts. In the first application, we use publicly available data from the U.S. airline industry to illustrate how the VCA model can be used with multiple stakeholder groups. In the second application, we provide estimates for three global automobile companies (GM, Toyota and Nissan), showing how the model can be reformulated using value added. In both industries we find substantial heterogeneity among firms in the creation and distribution of value. We discuss strengths and limitations of the VCA model and implications for strategic management research.*

Managerial summary: *Firms create value not only for shareholders, but also for other stakeholders, including employees, customers and suppliers. This article applies a method to quantify the "new" economic value created by a firm over an interval of time; the method also reveals the distribution of that value among the stakeholders. The proposed method gives managers some means to assess changes in the economic value created and distributed. We find that the creation and distribution of value has varied greatly among major U.S. airlines and global automakers in recent decades. Moreover, returns to shareholders typically accounted for only a small proportion of firms' total value creation and often had little relation to broader changes in the magnitude and distribution of value.*

INTRODUCTION

This article deals with value creation and appropriation in firms, a central topic in strategic management research that has been extensively studied from different perspectives (Bowman and Ambrosini, 2000; Brandenburger and Stuart, 1996; Castanias and Helfat, 1991; Coff, 1999; Lepak, Smith, and Taylor, 2007). Despite the many implications of value creation-appropriation dynamics for strategic management scholarship, one distinctive feature of this body of research is that most discussion has been at a theoretical level, often relying on conceptual arguments (Bowman and Ambrosini, 2000; Lepak *et al.,* 2007; Sirmon, Hitt, and Ireland, 2007) and formal modeling (e.g., Brandenburger and Stuart, 1996, 2007; Chatain and Zemsky, 2011; Lippman and Rumelt, 2003; MacDonald and Ryall, 2004). Although observations of value creation and appropriation across firms suggest that the patterns of value captured by stakeholder groups are highly heterogeneous, systematic empirical evidence remains limited.

Given the deficit of applied research in this area, important theoretical propositions remain untested. For example, Coff (2010) posits that stakeholder rent appropriation is a dynamic process that

Keywords: value creation; value appropriation; stakeholders; productivity; VCA model
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coevolves as capability emerges. To date, we only have ad-hoc evidence confirming that rent is captured by the stakeholders directly involved in creating a capability. More recently, Garcia-Castro and Aguilera (2015) introduce the notion of stakeholder value creation appropriation elasticity—*VCA elasticity*—which captures the relationship between *total* value created and value appropriated by each stakeholder group. They argue that this elasticity can be positive, negative or zero, varying significantly across firms, industries, and national systems. However, VCA elasticities have not been empirically investigated yet, and the conditions that determine such elasticities remain unexplored. In general, the measurement of value creation and stakeholder value appropriation appears as a Gordian knot in the strategic management field.

In parallel to the lack of empirical studies, a number of scholars argue that the term *value creation* has often been used incorrectly, when the intended meaning has really been *value capture* (Bowman and Ambrosini, 2000; Coff, 1999; Makadok and Coff, 2002; Priem, 2007). The confusion arises when the payments to shareholders are confounded with the total payments to the firm and all its stakeholders. Any rigorous analysis of value creation and appropriation must account for the fact that, by definition, the value created through a firm's activities, and the value distributed to the firm's stakeholders, must be equal.

In this article and a companion study (Lieberman, Balasubramanian, and Garcia-Castro, 2016), we present an approach to make research on value creation and appropriation more empirically grounded, thereby bringing a more applied dimension to this important topic. The starting point of our approach is a dynamic notion of economic value created—which we call "economic gain"—defined as the *change* in the *total* economic value created by a firm from one period to the next. Total economic value is the economic value created and appropriated by *all* the stakeholders of the firm. This notion of economic gain and the methodology that we detail below overcome some of the limitations associated with shareholder-centric measures, which capture only the economic value appropriated by the financial shareholders of the firm. Furthermore, by adopting a dynamic perspective on value creation, the method alleviates some of the common data constraints that affect estimation of economic value, including the difficulty of assessing the magnitude of "consumer surplus".

The lynchpin of this approach is a simple accounting identity that equates the revenues of a firm to the sum of all payments made to its stakeholders. Simple algebraic manipulation of this payment identity combined with some assumptions yields an equality, one side of which measures value creation and the other side of which measures value distribution to the various stakeholders. Within some limitations, the methodology not only helps quantify value creation but also sheds light on the distribution of new value created by the firm as well as any transfers of existing value among the stakeholders.

The theoretical basis for the method, and the relation between economic gain and more conventional shareholder-specific performance measures, are elaborated in Lieberman *et al.* (2016). In the present study, we apply the method, which we label the VCA model (for Value Creation and Appropriation), to provide quantitative estimates of value creation and appropriation in two industries, the U.S. airline industry and the global automotive industry, over recent decades. These industries, one in the services sector, the other in manufacturing, are economically important. At the same time, they share some characteristics that allow a meaningful application of the VCA model. Specifically, the rate of product improvement in these industries has been lower than in high-tech sectors such as computers, and most companies in these industries are relatively undiversified. Further, public data are available at a sufficient level of detail to apply the model to specific firms.

These two industry examples allow us to make several contributions to the strategic management literature. First, our applications illustrate the fairly general and flexible nature of the VCA methodology to estimate value creation and appropriation. By focusing on changes over time, the method captures a common notion of value creation that has generally been overlooked in the literature, while sidestepping the need for complex economic modeling to estimate the consumer surplus. The auto industry example demonstrates how the model can be applied using fairly standard Compustat-type data, whereas the airline industry example shows what is possible in certain sectors where more detailed information can be obtained. In the latter instance, we also illustrate how the basic VCA model can be extended to include other stakeholders

DOI: 10.1002/smj

such as different supplier groups, analyses not feasible in all industries.

Second, these illustrations go beyond the theoretical underpinnings of the VCA model and shed light on the nuances and limitations of the model's workings when applied to real-world data, which must be considered by scholars and practitioners who wish to replicate our findings or apply this model to their own research. Thus, the applications serve as empirical reality checks and highlight what is (and what is not) possible with the model.

Beyond these methodological contributions, this paper provides a novel analysis of value creation and appropriation in these two sectors. We offer what is perhaps the most detailed analysis to date of value creation and capture by firms in the U.S. airline industry. Our results demonstrate and quantify the inter-firm heterogeneity in the creation and distribution of value. Notwithstanding the substantial value creation by all the airlines in our sample, the gains to their shareholders were far lower, and negative in several cases. These results highlight the true reason for the "poor performance" of air carriers: it was not because they created no value but because all (or most of) the value created was appropriated by the other stakeholders in the firm, particularly customers. Though it is perhaps possible to reach these qualitative conclusions without using the VCA model, the advantage of the model lies in its quantitative and internally consistent treatment of the different stakeholders. By contrast, the poor performance of GM compared to Toyota in the automotive industry appears to be attributable to GM's dearth of value creation in the 1980s and 1990s, according to the VCA model estimates from our study.

THE BASIC VCA MODEL

We now sketch out the VCA model. (For a detailed discussion of the theoretical underpinnings of the model, see Lieberman *et al.,* 2016). Based on the literature on productivity (Harberger, 1998a, b; Hulten, 2001), the intuition underlying the VCA model for estimating a firm's economic value creation, and the distribution of that value among a set of stakeholders, is relatively straightforward. From one period to the next, a firm creates value or achieves an economic gain for its stakeholders if it produces more output quantity or better output quality (as reflected by a higher customer willingness to pay) using the same amount of resource inputs. Note that this definition covers value creation from both cost leadership and differentiation strategies (Porter, 1980). In particular, cost-reducing innovations would imply a greater quantity of output for the same amount of inputs or using fewer inputs for the same amount of outputs. Differentiation strategies imply introducing products or services that have a higher willingness to pay while keeping the amount of resource inputs constant.

To measure this gain, note that the payments received by a firm must always equal the payments made by the firm to resource (or factor) owners. This equality can be represented as $pY \equiv wL + rK + mM$, where Y is the amount of the firm's total output; p is the price of the firm's product; L is the quantity of labor (number of employees); w is the wage rate; K is the amount of capital employed by the firm; r is the rate of return on capital; M is the amount of materials and other purchased inputs and m is the price of purchased materials. Taking the total derivative, dividing by pY throughout, and re-arranging terms gives rise to the following basic VCA model:

$$\underbrace{(\Delta Y/Y) - s_L(\Delta L/L) - s_K(\Delta K/K) - s_M(\Delta M/M)}_{\Delta \text{ Total value created}} = \underbrace{s_L(\Delta w/w) + s_K(\Delta r/r) + s_M(\Delta m/m) - (\Delta p/p)}_{\Delta \text{ Stakeholder value appropriated}} \quad (1)$$

where the shares of employees, shareholders and capital providers and suppliers in the total revenues of the firm are $s_L = (wL/pY)$, $s_K = (rK/pY)$ and $s_M = (mM/pY)$, respectively.

Equation 1 denotes that the economic gain created by the firm must equal the incremental value distributed among stakeholders. The left hand side of Equation 1 represents the increase (decrease) in output (Y) that is not attributable to increases (decreases) in the quantities of inputs used and captures the economic gains (losses) made by the firm in one period.[1] At the same time, the right hand side of Equation 1 represents precisely the incremental changes in the payments to the input owners (i.e., stakeholders), that is, the distribution of these economic gains (losses) among the stakeholders. The first term on the right hand side represents the

[1] Under certain conditions, this is also equal to the gain in Total Factor Productivity of the firm.

DOI: 10.1002/smj

value appropriated by employees; the second term the value appropriated by shareholders and capital providers; the third term represents the value appropriated by suppliers; and the last term represents the value appropriated by consumers through price reductions. Interestingly, the VCA model allows for a re-distribution of value among stakeholders (i.e., non-zero terms on the right hand side of the equation) even when there is no net economic gain in the period (i.e., the left hand side is zero).

Next, we provide two empirical applications of the VCA model in two different contexts: the U.S. airline industry and the global auto industry.

VALUE CREATION AND APPROPRIATION IN THE U.S. AIRLINE INDUSTRY (1980–2010)

We analyze the U.S. airline industry over a period of three decades, from 1980 to 2010, focusing on seven major companies. The airlines sector is especially suitable for the VCA model because most of the data required to estimate Equation 1 are readily available from public sources. More specifically, airline companies present features such as relatively simple and readily available measures of output (Y) and inputs (M) used in the production process and, in general, low diversification. In addition, changes in customers' willingness to pay and stakeholders' opportunity costs are likely to be small compared to industries experiencing significant technological or quality change.

Data used and VCA estimation

All the parameters in Equation 1 can be estimated by using the following data items: revenues, costs of goods sold (COGS), selling, general and administrative expenses (SG&A), total output, amount of materials and services purchased, number of employees, wages and benefits, capital employed and income taxes. These data items can often be directly obtained from Compustat with two exceptions: total output (Y) and materials and services purchased (M).

Given that information on real output (Y) and the quantity of input (M) is seldom publicly available, one possibility is to use the value added instead of total output, as we will show for the auto industry. In the case of the U.S. airlines, however, we attempt to estimate Y and M directly. Air carriers report their revenue passenger miles (RPM) each year, that is, the number of (fare-paying) passengers carried times distance flown. Hence, the RPM captures the total level of output for a single company in a given year. Therefore, we use the RPM as an estimate of Y in the model. One can obtain the average RPM price (p) by dividing the firm's total revenues for the year by the RPM.[2] All prices are computed in real terms using the GDP deflator (base 1980) to ensure that inflationary issues do not affect our estimates. Thus, we measure gains accruing to the consumers beyond the GDP deflator.[3]

Likewise, estimating purchased quantities and purchasing costs is often difficult using secondary data. Fortunately, in the airline industry, annual data are available on each carrier's fuel inputs and costs.[4] Thus, we separate the fuel from other materials purchased from suppliers (M) and we add new terms in Equation 1 to incorporate the total amount of fuel consumed (F) by a carrier in a year and its average unit cost to the airline (f). Hence, we are able to isolate the most important input—fuel accounts for about 50 percent of a carrier's total purchased materials from suppliers (Grant, 2010).

In addition, airlines annually disclose the total number of seat miles that were available to passengers (ASM). The ASM is computed as the aircraft miles flown times the number of seats available for passenger use. The ASM is a rough proxy for the materials and services purchased (other than fuel) because the leasing of the aircraft, insurance, food and beverage and other transport-related expenses in a carrier tend to be a function of the number of seats flown during the year. Thus, we use the ASM to estimate the remaining inputs purchased (M). As such, M in Equation 2 only accounts for

[2] We are assuming that the "quality" of a revenue passenger mile does not change in the 1980–2010 period. In practice, if firms pack more seats into their aircraft or are able to operate at higher load factors, the increase in RPM is not entirely a productivity gain, as there is some reduction in the quality of the product as experienced by the consumer. Similarly, if the firm is able to upgrade its service and thereby support a higher average ticket price, this shows up in our analysis as a price increase when in fact it is an increase in product quality. When changes in quality are substantial, an alternative approach based on revenue (or value added), combined with price deflators that adjust for changes in quality (as illustrated in the automobile section below) should be used.

[3] In industries where average price cannot be obtained directly from company annual reports, government price indexes can be used as surrogates, as illustrated in the automobile case.

[4] http://www.transtats.bts.gov/fuel.asp (retrieved December 2011).

DOI: 10.1002/smj

the non-fuel purchased goods and services. The average (m) is computed by dividing the total cost of materials and services purchased, excluding fuel, (COGS + SG&A-fuel costs-wages and salaries) by the ASM. After adding the fuel component, Equation 1 is re-arranged as follows:

$$\begin{aligned}&(\Delta Y/Y) - s_L(\Delta L/L) - s_K(\Delta K/K) \\ &- s_F(\Delta F/F) - s_M(\Delta M/M) = s_L(\Delta w/w) \\ &+ s_K(\Delta r/r) + s_F(\Delta f/f) + s_M(\Delta m/m) \\ &- (\Delta p/p) \qquad (2)\end{aligned}$$

Airline company estimates

Table 1 present the VCA estimates of economic gains (VT) and stakeholder value appropriation (VL, VC, VF, VM and VK) for seven major U.S. carriers from 1980 to 2010.[5] To facilitate a comparison across years, all estimates in Table 1 and in the Appendix have been computed in real terms using 1980 dollars. The VCA estimates are shown as log differences in percentages.[6] The figures in the last column are simple averages across the seven airlines.

Total economic gains (VT)

All seven carriers managed to create economic gains within each decade, with the marginal exceptions of Alaska and US Airways in the 1980s. Moreover, the rate of gain has been increasing for virtually all the carriers over the three decade intervals distinguished in the table.

The period following the US Airline Deregulation Act of 1978 was characterized by a wave of new entrants and an upsurge in price competition. Total ASM in the industry—a measure of installed capacity—almost doubled from 433 to 733 billion from 1980 to 1990. As a result, most airlines incurred massive losses, causing widespread bankruptcy—150 air carriers went bust between 1978 and 1988 (Grant, 2010). Thus, overcapacity reduced airlines' efficiency, and the competitive pressure following deregulation squeezed profitability for those fortunate enough to survive. In general, it took some time for the airlines to fully understand the impact of deregulation, and how to respond to it. Compounding the problem, the U.S. economy fell into recession in the second half of 1990, undercutting airline resource utilization and industry productivity measured in that year. Therefore, in our calculations some of the post-deregulation gains achieved by the airlines may be shifted forward into the subsequent period (1990–2000).

The widespread economic gains of the most recent decade (2000–2010) can be attributed to a combination of technological changes (e.g., electronic tickets, more fuel-efficient planes), the adoption of lean, low-cost business models, and the increased shareholder pressures to restore profitability after years of poor performance. Indeed, the decline in travel following the 9/11 terrorist attacks, and subsequent hikes in oil prices, made the 2000–2010 period particularly difficult for many airlines. Significant restructuring took place, including numerous bankruptcies. Perhaps in response to these pressures, most airlines in this period achieved their highest economic gains of the three decades shown in the table. Even so, airline shareholders and employees saw little or no benefit in this period, given that about half of the total gain was captured by upstream firms in the supply chain for fuel.

Notwithstanding these industry-wide trends, there are noticeable differences across carriers, reflecting, in part, heterogeneity in business models. Perhaps surprisingly, the economic gains for Southwest (SWA) in the 1980–2010 period appear to be lower than those of legacy carriers such as AMR, Delta, or United. The main reason is that SWA's strong competitive advantage was built around its low-cost model which was firmly established in the 1970s; being a highly efficient air carrier in 1980, the space for further improvements in SWA was comparatively limited. (We provide supporting evidence in Garcia-Castro *et al.* [] and Lieberman *et al.* [2016].) Alaska and US Airways, laggards in the 1980s, subsequently achieved major gains. These two airlines recovered from initial problems in adapting to deregulation, but many rivals (omitted from Table 1 sample of survivors) were less fortunate. One major carrier, Eastern Airlines, eked out a small economic gain of two percent in

[5] Further details, including all the data used for the estimation as well as all the computations are detailed in the Appendix, using Southwest Airlines as a representative company.

[6] As is evident from Equations 1 and 2, both sides of these equations are ratios or percentages. However, these could be converted easily to real dollar gains. We illustrate this in the bottom half of Panel B in the Appendix, where we present real dollar gains for SWA, obtained by multiplying the percentage increases throughout by revenues.

Table 1. Value creation and appropriation: US Major Carriers by decade (log differences %).[a]

		SWA	AMR	Delta	United	Alaska	Cont	US Air	AVG
1980 to 1990									
VT	**Economic gains**	**5.8**	**13.3**	**22.2**	**5.7**	**−1.6**	**12.1**	**−1.3**	**8.0**
VL	Gains to employees	2.5	−9.7	7.3	−5.4	−3.3	−13.5	−11.4	−4.8
VC	Gains to customers	26.1	26.8	13.2	13.6	1.6	20.2	24.4	18.0
VF	Gains to fuel suppliers	−11.0	−12.0	−12.2	−11.9	−12.9	−11.7	−0.6	−10.3
VM	Gains to other suppliers	7.9	6.2	10.1	9.3	13.9	20.6	2.6	10.1
VK	Gains to capital (b/tax)	−19.7	2.0	3.8	0.1	−0.9	−3.4	−16.3	−4.9
1990 to 2000									
VT	**Economic gains**	**17.5**	**21.3**	**22.8**	**18.9**	**33.2**	**24.5**	**35.0**	**24.7**
VL	Gains to employees	4.0	9.6	2.7	11.0	1.7	2.7	8.1	5.7
VC	Gains to customers	8.1	12.5	17.9	14.6	36.9	21.6	25.1	19.5
VF	Gains to fuel suppliers	−3.0	−3.5	−2.0	−2.7	0.6	−9.8	−0.5	−3.0
VM	Gains to other suppliers	−3.0	−1.8	5.8	2.7	2.8	8.5	−8.8	0.9
VK	Gains to capital (b/tax)	11.4	4.6	−1.6	−6.7	−8.8	1.4	11.1	1.6
2000 to 2010									
VT	**Economic gains**	**26.5**	**31.0**	**33.7**	**35.9**	**45.3**	**26.8**	**30.4**	**32.8**
VL	Gains to employees	12.1	4.8	−1.7	2.8	9.6	6.1	−7.9	3.7
VC	Gains to customers	6.6	20.5	10.9	15.7	29.1	12.2	23.5	16.9
VF	Gains to fuel suppliers	19.2	16.7	17.6	14.8	10.2	17.5	14.0	15.7
VM	Gains to other suppliers	−3.2	−8.5	2.5	−13.3	−22.3	−2.4	−4.1	−7.3
VK	Gains to capital (b/tax)	−8.0	−2.4	4.5	16.0	18.7	−6.6	4.9	3.9

[a] The first line in bold (VT) equals the sum of the following five lines. Annual estimates for each air carrier are available from the authors on request.

the 1980s by our calculations, but facing strong pressure from labor unions, Eastern distributed an unsustainable gain of almost 40 percent to employees. (Eastern ceased operations in 1991.) Thus, given the sample selection on survival through 2010, the inter-firm heterogeneity shown in Table 1, while considerable, likely understates the full extent of differences among U.S. airlines.

Distribution of economic gains (VL + VC + VF + VM + VK)

We turn now to the distribution of the economic gains shown in Table 1. Several broad patterns are evident. As in most industries, most of the value created by the airlines flowed downstream to customers. The flow of gains to customers was fairly consistent across firms and over time, suggesting the impact of ongoing competitive forces within the airline industry. By comparison, the appropriation of value by upstream fuel suppliers fluctuated in parallel to the evolution of oil prices. Value capture by employees and shareholders tended to follow more idiosyncratic patterns by company. In general, the gains to external stakeholders (customers, fuel suppliers) appear relatively homogenous across firms in the same period (i.e., depend more on industry-wide factors) whereas the gains to internal stakeholders appear more heterogeneous across firms (i.e., depend more on firm-specific factors).

Below, we analyze each stakeholder group separately. Although we interpret Table 1 in light of firm and industry developments, it is important to recognize that the VCA computations are purely descriptive; we cannot make any claim of causality for our interpretations.

Customers. Customers benefited from intense industry rivalry and persistent excess capacity, which provoked substantial price cuts over the three decades. On average, the estimates in Table 1 show a fairly consistent gain to customers on the order of 18 percent per decade (or equivalently, a decline of about 2% per annum in real ticket prices). This gain to customers (VC) amounts to more than 80 percent of the incremental value created by the airlines (VT) over the sample period. Nevertheless, significant variation is evident by carrier. SWA, for example, emerged after deregulation as an interstate operator with low ticket prices, and the firm delivered higher than average gains to customers in the 1980s. More recently, though, SWA increased prices relative to competitors, and

DOI: 10.1002/smj

of the seven airlines in Table 1, SWA shows the smallest gains to customers in the period after 2000.

Fuel suppliers. Gains to fuel suppliers differ widely by decade. The negative values in the 1980–1990 and 1990–2000 periods coincide with a 20-year decline in oil prices following the abrupt rise provoked by the oil shock of 1979, which increased oil prices to $39 per barrel. Yet by the end of the 1990s oil prices were below $20 per barrel. In the next decade the trend reversed, and fuel suppliers appropriated approximately half of the total economic gains made by the airlines in the 00–10 period, as the U.S. average nominal price of a barrel of oil increased from $16.56 in 1999 to $71.21 in 2010.[7] While some of this value may have been captured by refiners, presumably most of it flowed further upstream as economic rents to primary oil producers.

These patterns are common to all the airlines, and it seems reasonable to conclude that the major U.S. carriers have only limited bargaining power against oil suppliers. The small differences across carriers in Table 1 may be attributed to different firm-level strategies in forward purchases and hedging against short-term oil price fluctuations or changes in the mix of fuel-efficient aircrafts (Grant, 2010: 518–533). These findings serve as a reminder that despite the emphasis in the strategic management literature on the role of bargaining power in determining value capture, basic market forces also have an important role. While the power of OPEC and the ability of airlines to negotiate hedging strategies may have had some impact, the diversion of value in the airline industry—away from fuel suppliers after 1979, and back toward them after 1999—was likely determined mostly by shifts in market price.

Other suppliers. Non-fuel suppliers include aircraft manufacturers (i.e., Boeing, Airbus, Embraer), aircraft leasing companies, and providers of a range of services, including maintenance and landing rights, food and beverages, advertising and promotion, and insurance. This rather heterogeneous stakeholder group, as a whole, captured incremental value in the 1980–1990 period but lost a significant share of the total value created in the last analyzed decade (2000–2010). The fierce competition for new orders between Boeing and Airbus during 2002–2005 (when their order book was low) and the entry of new players such as Embraer in the regional jet segment may partly explain why airlines have been able to recently contain and reduce these costs. Even so, given our assumption that non-fuel inputs are pegged to each airline's ASM, the estimates in Table 1 of gains to other suppliers are linked to the ratio, RPM/ASM, known in the industry as the load factor. Load factors generally fell in the 1980–1990 decade, given the growth of excess capacity following deregulation and the 1990 recession, and they rose sharply in the 2000–2010 period as airlines took strong action to reduce fuel consumption per passenger and minimize costs.

Employees. Employees as a group were able to appropriate only a small portion of the total incremental value generated by the airline companies. While SWA displays positive gains to employees over the entire three-decade period, employee gains in all other airlines show mixed signs. These findings suggest that differences across firms in the internal management of firm-unions relationships do matter. Real wages and salaries typically fell in the post-deregulation environment of the 1980s, reflecting airline efforts to rein-in costs as the industry became more competitive. Later, in the 2000–2010 period, three of the airlines in Table 1 (Delta, United and US Airways) declared bankruptcy to restructure their contracts; these airlines show the lowest gains to employees in that decade (as well as some of the highest gains to capital). Indeed, the two carriers that combined bankruptcy with takeovers (Delta, which merged with Northwest in 2008, and US Airways, which merged with America West in 2005) are the only airlines in that period with negative gains to employees (-1.7 and -7.9%, respectively). This is consistent with previous empirical research positing that takeovers create value for target firm' shareholders but are detrimental to other constituencies such as employees (Conyon *et al.,* 2001; Shleifer and Summers, 1988).

SWA has distributed more value among its employees and in a more consistent way year over year than any other major carrier. This finding is supported by previous research that highlights Southwest's idiosyncratic way of dealing with its employees (Gittell, 2005). It is interesting to note that Southwest, once a low-cost/low price discount

[7] http://inflationdata.com/inflation/inflation_rate/historical_oil_prices_table.asp

DOI: 10.1002/smj

carrier, has evolved to have the highest labor costs in the industry (Wall Street Journal, 2011).

Shareholders and other capital providers. Shareholders and other capital providers' gains have been quite small relative to the *total* value creation. We can get a rough sense of the distribution of the total gains, on average across the seven airlines over the three decades, by adding figures in the last column of Table 1 and dividing by the total economic gain. This exercise implies that 83 percent of the total gain went to customers, seven percent to employees, four percent to fuel suppliers, six percent to other suppliers, and less than one percent to capital providers. This distribution varies considerably by decade and across the individual carriers. Nevertheless, it raises the question: why did shareholders, the "residual claimants" of the firm, appropriate so little of the total gain?

As we have discussed, persistent excess capacity and relatively high fixed costs led to intense rivalry among airlines over the period of our sample, which promoted the flow of value to customers. Similarly, the bargaining power of employees and some outside suppliers promoted the flow of value to those stakeholders. In general, these customer and supplier gains can be explained by standard industry analysis (Bain, 1959; Porter, 1980; Tirole, 1988), including supply and demand conditions and market structure elements such as number of sellers and buyers, concentration, cost structures, product differentiation, and barriers to entry. Given the characteristics of the airline industry, it is well-known that industry profitability has been traditionally low (Grant, 2010: 67). In this sense, it is not surprising that little of the incremental value created in the airline industry has gone to capital providers.

More surprising, perhaps, are the negative gains to capital shown for SWA in 2000–2010, and particularly, 1980–1990, given that SWA is known to be a superior financial performer. How can SWA's gains to capital be negative? There are several explanations.

First, the VCA model measures *incremental gains*, not absolute levels. Interpretation of the results must be bound to the analysis of *changes* over time in value creation and capture. SWA enjoyed an unusually high financial return at the start of our sample: in 1980, SWA's net income/revenue was 13.4 percent, as compared with -2.0 percent for AMR and -0.3 percent for United. The negative gain to capital of -19.7 percent shown for SWA over the 80–90 period represents a drop from this initially-high base. (SWA's income/revenue fell to 4.0% in 1990, still better than most airlines in that recession year, recovering to 10.7% in 2000 and 3.8% in 2010.) Thus, despite SWA's negative gains to capital in Table 1, SWA continued to enjoy higher income/revenue than other airlines and was consistently profitable.

Second, SWA seems to have made a conscious decision to allocate more of its value creation to employees, perhaps at the expense of shareholders, particularly in the 2000–2010 period. SWA may have decided to invest in its employees for strategic reasons—e.g., voluntarily increasing employees' remuneration over their opportunity costs to boost morale and firm loyalty during a period of rapid expansion. There is some empirical evidence supporting this explanation (Gittell, Von Nordenflycht, and Kochan, 2004) and related theories.[8]

This raises a third point, that the figures in Table 1 are on a "per unit" (RPM) basis and thus ignore company growth. Shareholders may have captured less profit per unit of output, but more profit overall given the growth of the firm. As the data in Table 2 make clear, SWA achieved dramatic growth of 3,756 percent in 30 years, higher than any other major carrier.

Cross-sectional comparisons

The previous discussion demonstrates the importance of keeping in mind that the VCA model, as applied in Table 1, measures *incremental gains*. As we argue in Lieberman *et al.* (2016), a full analysis of value creation must take into account differences among firms in the base year, and potential value creation through growth of a superior firm. We sketch out some of these calculations here, focusing discussion on SWA.

[8] In recent years there have been a number of theoretical works in strategic management seeking to explain the split of value between the firm—i.e, its shareholders—and its employees (Blyler and Coff, 2003; Coff, 1999; Molloy and Barney, 2015). Coff (1999) argues that employee's value capture depends on (1) capacity for unified action, (2) access to key information, (3) replacement cost to the firm and (4) cost of exit. Molloy and Barney (2015) argue that the split depends on the type of human capital (general, required firm-specific, discretionary firm-specific or co-specialized) and the degree of competition in the labor market used to access the access the human capital. While testing such hypotheses is beyond the scope of the current paper, the VCA model presented here may offer a useful tool for empirical studies in this area.

Table 2. Comparison of RPM, RPM/employee and ROA (1980–2010)

	RPM (million)			RPM/employee			ROA		
	1980	2010	% increase	1980	2010	% increase	1980 (%)	2010 (%)	change (%)
SWA	2,024	78,047	3756	1.10	2.24	103	12.7	3.0	−9.7
AMR	28,178	134,298	377	0.66	1.72	162	−2.3	−1.9	0.4
Delta	26,171	193,169	638	0.71	2.42	242	4.6	1.4	−3.2
United	39,490	122,182	209	0.84	2.65	214	0.5	0.6	0.1
Alaska	871	22,800	2518	0.54	1.89	254	5.4	5.0	−0.4
Cont	8,117	79,824	883	0.76	1.93	153	1.2	−2.2	−3.4
US Air	11,156	69,593	524	0.74	1.94	161	8.4	6.4	−2.0

Source: *Compustat*.

We have explained above why SWA's negative incremental returns to capital make sense: given SWA's initially-high financial return, and the firm's rapid growth, SWA shareholders did well even though unit returns were falling over time. A similar explanation accounts for the fact that the total economic gains for SWA fall below the carrier averages in Table 1. Specifically, SWA was an extremely efficient airline in 1980, the start of the sample. Over subsequent decades, as the gap between SWA and other (surviving) airlines gradually diminished, SWA's incremental value creation was lower.

Data in Table 2 point to the superior efficiency of SWA in 1980, based on output (RPM) per employee. SWA's RPM/employee was 1.10 in 1980, a ratio much higher than any other competitor—e.g., AMR (0.66), Delta (0.71), United (0.84). The relatively larger economic gains subsequently obtained by other carriers reflects the fact that SWA's early competitive advantage was slowly matched by some of its rivals, who were able to imitate some aspects of SWA's successful low cost carrier (LCC) model. As such, our results are compatible with the observation that despite losing some of its competitive edge versus rivals (Wall Street Journal, 2011), SWA's three percent ROA in 2010 was still above the industry average.

In Lieberman *et al.* (2016) we take this analysis further by directly comparing SWA versus AMR, which we take as a benchmark legacy carrier. We adapt the VCA model to make cross-sectional comparisons between the two airlines in each decadal year, thereby estimating the (hypothetical) gains that could have been achieved if AMR were instantly transformed into an airline with the efficiency profile of SWA. These calculations provide details on the gradual closing of the efficiency gap between the two carriers, similar to what is roughly indicated in Table 2. Moreover, the calculations allow us to estimate the economic gain achieved through the rapid growth of SWA, assuming that SWA grew at the expense of less efficient carriers, represented by AMR. Although sensitive to assumptions, this "replication" gain is of similar magnitude to the economic gain shown in Table 1 for SWA. In other words, SWA created about as much economic value by expanding and displacing less efficient airlines, as it did through the incremental innovations and improvements captured in the calculations summarized in Table 1.

U.S. AND JAPANESE AUTOMOTIVE COMPANIES

In this second illustration, we focus on the international automotive sector, using Toyota, GM, and Nissan as representative companies. Public financial data on these firms are available over many years, and government price indexes provide a way to gauge output price changes. The automotive companies have also been relatively undiversified, producing motor vehicles almost exclusively. (Their diversification across international borders adds a degree of complexity, which we resolve for Toyota and Nissan by limiting our analysis to operations within Japan.) Although supplier firms are critical to the success of the automotive companies, the standard financial information available on the automotive sector does not include supplier prices and quantities needed to estimate the full VCA model. (This limitation applies in most industries.)

Reformulation of the VCA model using value added

To allow application of the VCA model using the available financial data on the automotive

DOI: 10.1002/smj

companies, we reformulated the model without materials suppliers, by using 'value added' in lieu of company revenue. Value added is defined as revenue minus the cost of purchased inputs. If the total cost of these inputs is known, value added is obtained by netting out this amount from total revenue. Value added can also be computed from a firm's accounting statements by summing up the following payments: total labor compensation, depreciation and amortization, rental payments, net income after taxes, and all tax payments. Given the lack of information on purchased inputs, we follow the latter approach, reformulating the model so that revenue (pY) is replaced by nominal value added (pV).[9]

Thus, the estimated model consists of the following equation for economic gain:

$$(\Delta V/V) - s_L(\Delta L/L) - s_K(\Delta K/K) = s_L(\Delta w/w) + s_K(\Delta r/r) - (\Delta p/p) \quad (3)$$

where Δr is the change in before-tax return to capital and s_L and s_K are the labor and pre-tax capital shares of value added ($s_L + s_K = 1$) and V is value added computed in real terms.

This reformulation enables us to assess value creation and its subsequent distribution among customers, employees and shareholders. In our automotive analysis, we also add government as a stakeholder by deducting the change in tax payments over the period of analysis from the gains to shareholders.[10] (Unlike the airline industry, where tax payments were minimal for most companies given their low profitability, tax payments in the auto industry were substantial, particularly in Japan.)

Data used and VCA estimation

We applied the VCA model represented by Equation 3 to historical data on Japanese and U.S. auto companies. V and L are obtained from the annual reports, K is computed as the sum of net plant, property, equipment, raw material, and work-in-process inventories in the case of GM, and as the sum of tangible fixed assets, raw material, and work-in-process inventories for the Japanese companies. Labor share (s_L) is computed by dividing total labor compensation (excluding stock options) by value added. Capital share is computed as a residual, $1 - s_L$.

In the airline industry, we were able to utilize RPM as a measure of the firm's (real) output, obtaining the firm's price of output by dividing revenue by RPM. In the automotive industry, as in most industries where output is not homogeneous, we do not have any direct measure of output quantity. As a proxy, we divide the firm's value added, V, by an industry-specific price index, utilizing publicly available data on Producer Price Indexes (PPI) for motor vehicles and GDP deflators in Japan and the United States. We set all price indexes at 1.00 for the starting year in our computations (1978). For subsequent years, we compute the output price index to be the ratio of the PPI for motor vehicles to the GDP deflator. Hence, we assume that general inflation in the economy follows the GDP deflator, but changes in the firm's (quality-adjusted) output prices follow the motor vehicle PPI. Accordingly, we convert wages, capital stock and tax payments from nominal to real values using the GDP deflator; we convert value added from nominal to real using the motor vehicle PPI. Later in the paper we discuss these assumptions in greater detail.

For each of the auto companies, we applied the left-hand side of Equation 3 to estimate the incremental value created by the firm from one period to the next. We then computed the value distribution among the stakeholders denoted by the right-hand side of the equation, including the gains appropriated by labor and by customers. The balance of the value created was assigned as gains to capital before tax. We computed the gains to government as the increase in taxes from the beginning of the time period to the end of the time period.

Results and analysis

Table 3 provides our estimates of value creation and distribution for Toyota, GM, and Nissan,

[9] Lieberman and Chacar (1997) describe the computation of value added from company financial statements. One assumption of the reformulation is that the output price, p, also applies to value added; i.e., differential changes in materials input prices are small and can be ignored.

[10] More specifically, we replace the original pre-tax return to capital (rK) with r*K + trK, where r* is the after-tax rate of return and t is the tax rate. Other taxes can also be incorporated in the model such as labor-related taxes, but we focus solely on income taxes. There are several ways to estimate trK and r*K. In this article we estimate in a first stage trK, independently from Equation 3. We compute trK simply as the increase in total taxes from one period to the next. Then, in a second stage we use Equation 3 to estimate rK. Finally, we deduct the increase in taxes paid to government (trK) from the economic gains to capital before taxes (rK) to compute the economic gains to capital after taxes (r*K), so that r*K = rK – trK.

DOI: 10.1002/smj

Table 3. Value creation and appropriation: Toyota, Nissan and GM (log differences %)[a]

		1978–1988			1988–1998		
		Toyota	Nissan	GM	Toyota	Nissan	GM
VT	**Economic gains**	**34.8**	**24.5**	**−7.2**	**35.1**	**16.0**	**4.5**
VL	Gains to employees	12.5	14.6	4.5	14.8	12.5	29.6
VC	Gains to customers	18.8	18.8	5.8	28.9	28.9	6.3
	Gains to capital (before-tax)	3.5	−9.0	−17.5	−8.6	−25.4	−31.3
VK	*Gains to capital (after-tax)*	*−36.4*	*−5.4*	*−10.3*	*−2.9*	*−14.8*	*−30.3*
VG	*Gains to government (tax)*	*39.9*	*−3.6*	*−7.2*	*−5.7*	*−10.6*	*−1.1*

[a] Annual estimates for each company are available from the authors on request.

respectively, over two time periods: 1978–1988 and 1988–1998. We selected these periods because they span across decades from comparable points in the business cycle. Given the reporting of our financial data, all figures for Toyota and Nissan are limited to operations in Japan, whereas data for GM pertain to worldwide operations.

Over 1978–1998, Toyota grew rapidly and created substantial economic value through productivity gains. Based on the VCA estimates, this gain for Toyota during each of the two decades was about 35 percent. By comparison, GM's economic gains were the lowest of the three companies during this 20-year period with negative gains (-7.2%) in 1978–1988 and only marginally positive gains (4.5%) in 1988–1998.[11] Nissan's gains were intermediate between those of GM and Toyota in both periods—about 25 percent in 1978–1988 and 16 percent in 1988–1998. The data on Nissan also rule out the possibility that the difference between Toyota and GM are due to differences between Japan and the United States.

We used Equation 3 to estimate how these gains were distributed. All of the stakeholders in our analysis except shareholders (labor, government and consumers) received part of the gains made by Toyota from 1978–1988, and all but the government gained during 1988–1998. Interestingly, the largest benefits during 1978–1988 went to government. Total tax payments by Toyota were substantial, rising from 27 percent of the firm's value added in 1978 to 32 percent of value added in 1988, an amount that was nearly as large as the firm's total labor compensation in that year. Thus, the Japanese government was a major beneficiary of Toyota's remarkable success. Capital owners did not fare very well; their returns fell as the government's rose.[12] Finally, labor and consumers benefited from higher wages and lower car prices.

The pattern of value creation and distribution at GM contrasts sharply with the pattern at Toyota. GM's shareholders were particularly hard hit; they gave up even more than GM's overall economic loss. After-tax gains to capital fell by 10 percent in the first decade and 30 percent in the second. The gains captured by the government in the form of tax payments also declined. Despite the overall net destruction of value by GM, some stakeholders gained. One beneficiary was the consumer, who benefited from the decline in the real price of motor vehicles produced by GM. Another beneficiary group consisted of the employees of GM, who gained through higher wages and benefits. The positive values for these groups contrast with the sharply negative values shown for returns to capital, particularly over the 1988–1998 decade. In effect, GM created no incremental economic value but transferred substantial value from its shareholders to the firm's employees and customers.

The gains of Nissan's employees and customers were similar to those of Toyota's. Given our reliance on industry price indices to measure gains to consumers, the gains flowing from Nissan to consumers, viewed in percentage terms, are identical to those shown for Toyota. Reflecting the competition between Nissan and Toyota in the labor market, the benefits to labor, in percentages, are similar for

[11] A "cross-sectional" comparison of GM and Toyota in 1978 (similar to the comparison of AMR and SWA described above) suggests that GM was slightly more efficient than Toyota in 1978, but this differential is small. Hence, the large divergence in value creation between Toyota and GM (Table 3) cannot be attributed to initial differences between the two firms.

[12] The tax computations are sensitive to the choice of the method for incorporating tax payments. Using an alternate approach resulted in somewhat higher gains to capital. In both cases, the gains to government were higher than the gains to capital.

DOI: 10.1002/smj

both companies. Interestingly, the gains to workers at GM over the 1988–1998 period were more than twice as large as those shown for employees of the two Japanese automakers. Potentially, market forces were the main determinant of value capture by employees at Toyota and Nissan, whereas bargaining between management and labor accounted for the large employee gains at GM, despite the firm's poor overall performance.

Thus, we have illustrated how the VCA model can be applied in a diverse pair of industries, airlines and autos. To provide greater perspective on the model, we now consider its limitations as well as its broader potential for use in strategic management research.

LIMITATIONS OF THE MODEL

Notwithstanding the general and flexible nature of the VCA model, it has limitations that must be carefully understood. First, the value creation indicated by the model as applied in this article is the incremental change from the prior period. Hence, the VCA estimates represent the amount of "new" economic value created and appropriated. More specifically, the calculations quantify the value creation arising from improvements and innovations made by the firm over time. In our related study (Lieberman *et al.,* 2016) we distinguish between such incremental value creation and the more standard economic concept of value as the sum of consumer and producer surplus within a given time period (e.g., one year). We also consider the dynamic value created when a superior firm displaces less efficient rivals, and we argue that a large proportion of the economic value created by SWA after 1980 was of this latter type.

Second, a variety of data limitations must be considered in applying the model and interpreting results. As our airline and automotive examples indicate, the estimates are based upon imperfect proxies, particularly those for output (Y) and input (M). In the airline industry, RPM, and, to a lesser extent, ASM, might be relatively accurate proxies, but finding valid proxies in other industries can be difficult. We have discussed the need to use value added in lieu of output in most industries, given the lack of complete data on inputs. Computation of value added at the firm level requires information on total employment, wages, salaries and benefits, which often go unreported in the United States (although they are standard accounting items in many other countries). In addition, multiple measures of Y and M are needed to apply the model to highly diversified firms with two or more major business units, rendering the method impractical for application to most such firms.

Furthermore, drawbacks and limitations of standard corporate accounting data have been widely discussed elsewhere, particularly with respect to profitability measures (e.g., Fisher and McGowan, 1983). Beyond the problems of measuring external inputs, the VCA calculations require that labor and capital be consistently measured over time (and across firms, if the model is applied in cross-section). Changes in firms' subcontracting practices or depreciation methods can violate these assumptions.

A third point relates to the difficulty of dealing with quality change, particularly in the measurement of output. In the airline industry, we assume that the quality of a passenger mile remained constant from 1980 to 2010. Although one can debate this assumption (e.g., more densely packed aircraft reduced the quality of passenger experience, whereas better entertainment systems increased it), there clearly have been no order-of-magnitude changes. In the automotive industry, where quality change has been more substantial, we deal with the issue by incorporating product-specific price deflators issued by national governments. We assume that such deflators have been calibrated to reflect a constant level of quality, based on standard economic methods such as hedonic models. (Through such calibration, price deflators convert quality changes into quantity changes.) Similar methods can be directly applied by researchers to develop firm-specific measures of quality change. Even so, the data and effort required can be substantial. As a practical matter, the VCA model seems most useful in contexts where the issue of quality change can reasonably be dealt with in the manner of our two industry case studies.

Within an industry, moreover, innovative firms may introduce superior new products that are highly valued by consumers, increasing their willingness to pay. Although the VCA model can capture this in the form or higher real output (Y) (or value added), there might be some consumer surplus enjoyed by infra-marginal buyers that the model does not capture.

Fourth, the economic gains shown in this article are *estimates* of stakeholder value appropriation.

DOI: 10.1002/smj

Several sources of error can create a wedge between the actual economic gain and what is measured by the VCA model. An accompanying technical note (available on request) presents detailed comparisons of the true and measured values for several theoretically possible cases. Given our interest in identifying broad trends, we applied the model over relatively long intervals, avoiding the impact of year-to-year fluctuations in the data. Estimation errors (due to data imperfections and the fact that the calculations are strictly valid only for small changes) may arise when applying the VCA model to such a longitudinal panel. Computing the estimates as logarithmic changes helps to minimize this distortion, but the calculated values remain sensitive to the choice of the starting and ending year. To fit standard decades, we took 1990 as the first endpoint in our airline analysis even though the U.S. recession in that year is likely to have reduced the gains estimated for 1980–1990 and increased them for 1990–2000. A further source of error may arise from mergers and acquisitions. These can distort the VCA estimates, over- or understating economic gains from one period to the next. The calculations in Table 1 are based on data reported for the named airline in each year. An alternative approach is to consolidate the data for merging firms in the years prior to their merger.

Fifth, the VCA in its current form focuses on primary stakeholders. Yet, the model can potentially be extended to include secondary stakeholders (e.g., environmental groups) that may appropriate some economic value in its interaction with the firm. However, broad inclusion of external economies and diseconomies, such as pollution, is beyond the scope of the model.

Sixth, "spillovers" are another reason why our approach will tend to understate the extent of value creation by innovative firms. Our approach measures only the value creation that goes to the firm's own stakeholders. However, a given firm's innovations can "spill over" to other firms and their stakeholders. For instance, many auto companies have now adopted key features of the "Toyota production system" and have greatly improved their efficiency and product quality as a result. Such gains from dissemination of Toyota's production methods have gone to stakeholders of Toyota's competitors, with customers likely being the major beneficiaries. These spillovers, though fundamentally attributable to Toyota's efforts, are excluded from our estimates of Toyota's value creation because they are not reflected within Toyota's accounting statements.

Seventh, stakeholders may capture "out of the balance sheet" economic gains such as stock market returns obtained via stock options. In some cases, these can be estimated separately from the VCA model. As such, the model only refers to economic gains reflected in the income statement and balance sheet of companies and that can be identified by the items used in the estimation. Although out of the balance sheet items can be included in ad-hoc analyses, how to incorporate them systematically in the VCA remains a challenge for future research.

Eighth, the VCA model as applied in this study captures the economic gain that arises from improvements and innovations within a firm, but it does not directly reflect the value created by growth or replication of a superior firm. In Lieberman *et al.* (2016) we show how this additional source of value creation can be estimated.

Ninth, the model treats each stakeholder group as a homogeneous class. In practice, a stakeholder group may be comprised of several heterogeneous sub-groups whose value appropriation patterns may differ. This limitation can be overcome using disaggregated data as needed—e.g., by separating managers from rank and file employees.[13] However, even with such disaggregation, employees are treated as a group, which will likely not comprise the same individuals over time. Hence, we cannot ascribe value appropriation to specific individuals or sets of individuals.

Finally, there can be other limitations derived from the reformulation of the basic model to particular contexts. For instance, our use of an industry-specific output price index in the auto industry application assumes that the quality-adjusted prices of all domestic competitors are identical. Product market competition ensures that such equality is approximately met, but deviations may arise. For example, firms may undercut the prices of competitors in an effort to gain market share (or may lose share if they lag the price cuts of rivals). In this case, information on changes in market share, combined with assumptions about the elasticity linking market share and relative price, may allow the firm's price of output to be more correctly identified. Further potential adjustments relate to the firm's international domain of

[13] Upon request, we can provide these calculations for airlines in the years after 1995, when such data are available.

DOI: 10.1002/smj

operations. A full analysis of value creation must include their global operations. But doing so adds complexity; e.g., price deflators should be taken as a blend of national indexes, adjusted for exchange rates.

Despite such limitations, an imperfect estimate of value appropriation is better than no measure at all. The two industries considered in this article—airlines and autos—allow us to address or alleviate many of the limitations discussed above. These limitations rule out application of the model in many industry contexts, and they imply that one must be careful in implementing the method. Nevertheless, the approach is likely to be applicable in many industries beyond the two we have illustrated.

DISCUSSION AND CONCLUSION

We close by positioning the VCA model within the broader debate of value creation and appropriation in firms. The model treats these two distinct, yet linked, processes using a consistent analytical framework. To date, much of the extant discussion of value creation and appropriation has been limited to a theoretical level. The VCA model provides a path for moving the research agenda forward by generating quantitative insights into these processes, which heretofore have been elusive.

One advantage of the model is that the data needed for estimation (quantities and prices of inputs and outputs) are available in many instances. Further, the model does not require that markets be perfectly competitive or that they be in some form of equilibrium. The payment identity holds true in all circumstances. Thus, the model is applicable to many firms and industries, subject to the caveats described in the previous section.

Additional stakeholders can be incorporated into the VCA model, should data on them be available. One simple extension is to decompose "labor" into various components, e.g., by separating out the CEO and other top management as a factor of production, or distinguishing between different supplier groups as we did for the airlines industry. Similarly, governments can be included as a stakeholder through their tax receipts, as we show in the automotive example.

With respect to validation, the estimates for the airline and automotive companies appear reasonable and in line with other estimates on component elements, which we are able to integrate into a unified framework. Our findings for the airlines are consistent with previous academic research on these carriers (Gittell, 2005; Gittell *et al.,* 2004) as well as business press accounts, lending some general validity to the methodology. Similarly, our findings on the contrast between General Motors, Toyota and Nissan confirm some commonly held notions about value creation in the auto industry and highlight the large degree of historical heterogeneity among these rival firms. The differences observed between U.S. and Japanese auto makers also hint at corporate governance cross-national heterogeneity explaining VCA variations (Aguilera and Jackson, 2003; Jacoby, 2005; La Porta *et al.,* 1998).

In both industries, our analyses strongly suggest that shareholders capture only a small fraction of the value created by a firm, with other stakeholders capturing most of the gains. Indeed, our estimates indicate that in many cases these other stakeholders were able to appropriate all of the gain at the expense of shareholders. As such, a shareholder-centric approach to studying value creation and appropriation, though insightful, is very likely to miss substantial parts of these processes (Blair, 1995).

Comparison with alternative methods

The VCA model complements previous efforts to measure consumer driven value creation and consumer surplus (e.g., Priem, 2007), and more generally, stakeholder value capture (Charreaux and Desbrières, 2001; Davis and Kay, 1990). Alternative methods to estimate stakeholder value capture can be roughly divided in three main groups. First, studies in industrial organization, economics and marketing seek to estimate consumer surplus or consumer benefits in different forms (Besanko *et al.,* 2012: 330; Brynjolfsson, Yu, and Smith, 2003; Cattin and Wittink, 1982; Grennan, 2014; Pakes, 2003). These studies rely on various econometric techniques (e.g., reservation price method, hedonic pricing analysis, or conjoint analysis). These methods, while they provide a more precise analysis of customers' willingness to pay, require additional micro-data far beyond what can be found in annual financial reports.

Second, there are methods that, similar to the VCA model, rely on annual reports to estimate stakeholder value. Davis and Kay (1990) propose using added value to break out the components of

DOI: 10.1002/smj

corporate output, distinguishing between purchased inputs, labor costs and capital. Luffman, Witt, and Lister (1982) estimate the various inputs and outputs attributable to the firm's different stakeholders. Charreaux and Desbrières (2001) posit an enlarged definition of value—stakeholder value—and its associated measures. While these previous works have points in common with the VCA model, they are more limited than the VCA model because they typically refer to a particular company (e.g., Luffman *et al.,* 1982), are static (e.g., Davis and Kay, 1990), or require additional information beyond that typically in Compustat and similar databases (e.g., Charreaux and Desbrières, 2001). More recently, Brea-Solís, Casadesus-Masanell, and Grifell-Tatjé (2015) use index number and productivity theory to decompose profitability into activity effect and productivity change effect but, unlike the VCA model, they do not provide a general method to compute the gains captured by each stakeholder group.

Lastly, several authors rely on ad-hoc data to study patterns in value appropriation. For instance, Gittell *et al.* (2004) use detailed data from U.S. air carriers to study the evolution of employee wages and salaries, and shareholder economic gains. Blair (1995, 1998) also provides some analysis of employees' economic value captured using aggregate data on wages and salaries. One main problem with ad-hoc studies is the difficulty to compare the results obtained with other industries or firms.

Dynamic value appropriation

One distinctive feature of the VCA model is that it provides incremental gains estimates. In this way, it allows a deeper exploration of the *dynamics* of value creation and capture. In a dynamic setting, value capture and capability development has been argued to *coevolve* because the knowledge asymmetry needed to create rent grants the owner of the resource bargaining power (Blyler and Coff, 2003; Coff, 2010). Coff (2010) identifies three distinctive stages—founding capability, capability development and maturity stage—of capability generation and value capture, arguing that the regime of value appropriation is affected by these stages. Consider again the case of SWA, whose point-to-point LCC business model relies extensively on its highly productive and engaged workforce: SWA's labor productivity in the 90s was much higher than legacy carriers (Table 2) as a result of some unique capabilities to execute lean operations, maintain low costs, keep high aircraft utilization, etc. Because SWA employees' contribution to co-generate and co-develop these capabilities was critical, they were able to capture over time a higher fraction of value than employees of competing firms (Table 1). A more dynamic perspective evidences that SWA employees' value appropriation has accelerated over time (Table 1). SWA employees' gains increased by a scant 2.5 percent from 1980–1990, four percent from 1990–2000, and 12.1 percent from 2000–2010. This increasing pattern is consistent with Coff's (2010) argument that key stakeholders push for more favorable contracts as the value creation potential of a capability becomes more apparent. By the early 1990s, the superiority of SWA's business model was well established, and the value created by this carrier blossomed, leading to a higher fraction of value flowing to employees.

A different dynamic story can be seen at GM, where employees appropriated many times more than the total incremental value created by the company during 1988–1998 (29.6% gain to employees compared to 4.5% total gain). This employee gain was also much higher compared to the previous decade (4.5% in 1978–1988). Surprisingly, this large transfer to employees occurred during a period when GM's market share declined in the United States (46% in 1978, 35% in 1988, and 29% in 1998 according to Wards Auto data). A likely explanation lies in the near-zero increase (~0.25% per year) in average real wage from 1978 to 1991, which was a result of GM's response to loss of market share precipitated by the entry of Japanese auto manufacturers. This long period of wage-stagnation, combined with the turnaround after the 1991–1992 recession, perhaps motivated the UAW in the mid and late 1990s to demand a greater share of economic gain (e.g., there was a 54-day UAW strike against GM in 1998). GM's low total value creation meant that the large gain to labor came at the expense of shareholders. This, in turn, may have impeded future capital investment, contributing to the firm's decline into bankruptcy in 2009. GM's case is similar to that of Eastern Airlines, where a large appropriation of value by unionized employees in a firm with little incremental value creation led to bankruptcy.

Another dynamic effect in value capture is to be found in changes in factor markets. The reduction in international oil prices due to geopolitical factors led to a generalized decrease of -10 percent on average in value captured by fuel suppliers to the airlines in 1980–1990, versus an average increase of 16 percent in 2000–2010. Unlike employees' value capture, the patterns of value appropriation by fuel suppliers are similar across all airlines in our panel, indicating that market factors prevail over bilateral bargaining in this case.

While our discussion of dynamic value creation and capture is exploratory, the examples provided illustrate how future theory building efforts may benefit from the VCA estimates. In addition to sketching out possible connections between capability development and the appropriation of value, we have emphasized the separate effects of market forces and bargaining. These have played out in the determination of value capture by factors internal (labor) and external (fuel) to the firm. Theoretical work in strategy, which has tended to emphasize bargaining processes, might address in more depth the role of market forces. At the same time, empirical work can explore the importance of the two in determining value capture in different contexts.

Stakeholder view of strategy and VCA model

Beyond the study of dynamic effects, the use of the VCA model may help bring new quantitative insights into the discussion of value creation and appropriation at a time when recent theoretical developments have begun to revitalize and inform this topic, central to strategic management (Lepak *et al.,* 2007).

The stakeholder view of strategy has produced a number of theoretical propositions connecting stakeholder value capture to *property rights* (Asher, Mahoney, and Mahoney, 2005; Foss and Foss, 2005; Kim and Mahoney, 2002), *stakeholder bargaining power* (Coff, 1999, 2010) *stakeholder management strategies* (Bosse, Phillips, and Harrison, 2009; Donaldson and Preston, 1995; Freeman, 1984; Harrison, Bosse, and Phillips, 2010) that can potentially be empirically tested with the aid of the VCA model estimates. Consider, for example, stakeholder bargaining power. Everything else equal, a stakeholder group will be in a better position to capture value if (1) it has capacity for unified action; (2) it has access to key information; (3) it has a high replacement cost to the firm, and (4) the costs of exit to the stakeholder are low (Coff, 1999). Let us analyze employees. In both industries (airlines and autos), employees own a certain degree of specialization (e.g., pilots in airlines and workers of specialized industrial equipment in an auto assembly plant) which increase their replacement cost to the firm. Also, unionization is intense in both industries. These two factors likely explain the persistent high share of value captured by employees (compared to shareholders) in the two illustrations (Tables 1 and 3), even when total economic gains were modest or even negative as in the case of GM from 1978 to 1988.

In addition to the stakeholder-specific role in value creation (Coff, 1999), cooperative game theory views value capture as a function of the value created by competing coalitions of stakeholders, where the value finally captured by a stakeholder is bounded by some minimum and maximum thresholds determined by the value that could be generated in alternative competing coalitions (Brandenburger and Stuart, 2007; Lippman and Rumelt, 2003; MacDonald and Ryall, 2004). The VCA model speaks to this literature as well, providing a vehicle to assess the extent to which competing coalitions guarantee some minimum value appropriation for a single stakeholder group. As we have suggested above, if gains are distributed similarly across stakeholders in an industry, they are likely attributable to basic market forces (e.g., increases in oil prices), whereas if the gains are heterogeneous across firms, they are likely attributable to firm-specific differences in bargaining.

Lastly, firm-specific stakeholder management strategies (Coff, 1999; Freeman, 1984; Harrison *et al.,* 2010) have been claimed to be levers of value creation. However, the question of how much value and for whom has not yet been addressed in large-scale empirical studies. Industry characteristics are also likely to influence how the value created is distributed among the various stakeholders, since stakeholder bargaining power can be largely determined by industry factors (Porter, 1980). At a higher level, cross-national differences in corporate governance likewise affect how much value a stakeholder will be able to appropriate, for example due to national differences in property rights regimes (Asher *et al.,* 2005).

The VCA model itself is purely descriptive and focuses solely on measurement—it is agnostic about why the firm performs well or poorly, how value is created and why some stakeholders capture more value than others. Nevertheless, it provides an empirical tool to examine some of these questions, specifically by generating quantitative measures of

DOI: 10.1002/smj

value creation and distribution, which can then be analyzed. In this article, we have offered interpretations of the measures obtained for the airline and automotive industries but have not attempted to test these interpretations in any rigorous or statistical fashion. Thus, additional work is needed to more fully develop the model's applicability to the strategic management field. As a start, however, the two illustrations in this article demonstrate that VCA empirical estimates can be obtained from public data and may be able to inform theoretical advancements in this field of inquiry in coming years.

ACKNOWLEDGEMENTS

The second author is indebted to the Spanish Ministry of Economy and Competitiveness (ECO2012-33018) for providing financial support. Natarajan Balasubramanian acknowledges summer funding from the Whitman School. We are grateful for the constructive and thoughtful comments provided by Editor Richard Bettis and two anonymous reviewers. We thank seminar participants at NYU, Wharton, University of Michigan, and University of Washington for helpful comments.

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APPENDIX: VCA Computations (Southwest Airlines 1980–2010).

Panel A: Basic data	**1980**	**1990**	**2000**	**2010**
Price indices				
GDP deflator (index, U.S.)	1.00	1.47	1.79	2.21
Company data (nominal): Compustat				
Revenues	213	1,187	5,649	12,104
COGS	152	1,025	4,310	10,488
Total output (million RPM)	2,024	9,958	42,215	78,046
Materials purchased (million ASM)	2,969	16,411	59,909	98,437
Fuel consumed (million gallons)	74	282	1,013	1,437
Cost per gallon fuel ($)	0.84	0.78	0.79	2.40
Employment (number of employees)	1,839	8,620	29,274	34,901
Capital employed	196	1,326	5,899	10,821
Wages and benefits	48	357	1,683	3,704

All numbers are in $ million, unless otherwise indicated.

Panel B: Value creation analysis

Change over decade ending:		1990	2000	2010	Comments
VT	**Economic gains**	**5.9**	**17.5**	**26.5**	$R = (\Delta Y/Y) - s_L(\Delta L/L) - s_K(\Delta K/K) - s_F(\Delta F/F) - s_M(\Delta M/M)$
VL	Gains to employees	2.5	4.0	12.2	$s_L\ (\Delta w/w)$
VC	Gains to customers	26.1	8.1	6.3	$-(\Delta p/p)$
VF	Gains to fuel suppliers	−11.0	−3.0	19.2	$s_F\ (\Delta f/f)$
VM	Gains to suppliers	7.9	−3.0	−3.1	$s_M\ (\Delta m/m)$
VK	Gains to capital (b/tax)	−19.7	11.4	−8.1	$s_K(\Delta r/r) = R - s_L(\Delta w/w) + (\Delta p/p) - s_F(\Delta f/f) - s_M(\Delta m/m)$
Value creation (destruction) 1980 $ million					
VL	Gains to employees	5.25	32.26	383.47	
VC	Gains to customers	55.58	65.40	199.61	
VF	Gains to fuel suppliers	−23.41	−24.13	606.10	
VM	Gains to suppliers	16.91	−24.60	−99.19	
VK	Gains to capital (b/tax)	−41.88	92.17	−254.21	
VT	**Total value creation (destruction)**	**12.54**	**141.19**	**836.36**	$VT = VL + VC + VF + VM + VK$

DOI: 10.1002/smj