

RESEARCH ARTICLE

Virtuous or vicious cycles? The role of divestitures as a complementary Penrose effect within resource-based theory

Elena Vidal¹  | Will Mitchell²

¹Narendra P. Loomba Department of Management, Baruch College–CUNY, Zicklin School of Business, New York, New York

²Strategic Management Department, Rotman School of Management, University of Toronto, Toronto, Ontario, Canada

Correspondence

Elena Vidal, Narendra P. Loomba Department of Management, Zicklin School of Business, Baruch College, The City University of New York, One Baruch Way, New York, NY 10010.

Email: elena.vidal@baruch.cuny.edu

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Research summary: Studies of how divestitures affect firm performance offer mixed results. This paper unpacks relationships between divestitures and subsequent performance, focusing first on the moderating role of prior performance and then on mechanisms through which divestitures by higher- and lower-performing firms affect performance. The study suggests that divestitures can exacerbate weakness and reinforce strength: divestitures by lower performers improve profits but inhibit sales growth and tend to speed the firms' exits as independent actors; by contrast, higher-performing divestitures invest in support of existing assets and gain new growth, while avoiding becoming acquisition targets. Most generally, divestitures help reduce constraints to changing a firm's resource base, which we refer to as a complementary Penrose effect.

Managerial summary: Divestitures help both struggling firms and high performers free financial and managerial resources that they can reinvest in more productive uses. In doing so, divestitures reinforce the strength of high performers but may exacerbate weaknesses of struggling firms. Divestitures by lower performers improve their profits but inhibit their sales growth and increase the chances that the firms will be acquired. By contrast, higher-performing divestitures gain new growth by investing in support of existing and recently acquired assets and, by doing so, are less likely to become targets of acquirers who seek their productive assets. Thus, divestiture is part of a downward cycle for struggling firms but supports a virtuous cycle for superior firms.

KEYWORDS

complementary Penrose effect, divestitures, firm performance, performance feedback, resource-based theory

1 | INTRODUCTION

Strategy scholars have long been interested in the mechanisms through which firms shape their performance. Resource-based theory posits that ongoing changes to resource bases via addition, deletion, and/or recombination of components (Karim, 2006; Karim & Capron, 2015) can both help firms address low performance and create new competitive advantages for high performers (Helfat & Eisenhardt, 2004; Helfat et al., 2007; Moliterno & Wiersema, 2007). Traditional arguments highlight the idea that improvements to performance, such as profitability and growth, are bounded by the availability of a firm's financial and managerial resources (Penrose, 1959); however, we have only begun to investigate the mechanisms by which firms engage in activities to free up resources and seek profitable growth opportunities. This paper focuses on divestitures, exploring (a) how the performance of low and high-performing firms changes following divestitures, (b) which resources divestitures free, (c) where firms reinvest freed resources, and (d) how the investments affect firms' ongoing survival. In doing so, we develop the idea that divestitures help free resources; this idea complements the traditional Penrosian view on resource-based growth.

Our exploratory study draws from and contributes to resource-based theory (Wernerfelt, 1984; Barney, 1991) and its related dynamic capabilities arguments (Helfat et al., 2007) to shed light on how divestitures shape subsequent performance and new investment. We build on Penrose's argument that firms can generate profitable growth by drawing on their resource base, with constraints arising from limits to financial resources and managerial capacity (Penrose, 1959, pp. 142–144). What this argument has not fully addressed is the idea that firms can seek to create additional financial and managerial capacity. We extend the traditional argument to suggest that divestitures are part of a complementary Penrose effect, in which firms eliminate existing resources and reinvest money and attention in higher potential opportunities for growth. These opportunities allow low performing firms to address their low performance and high-performing firms to invest in areas that maintain their superiority.

The idea of a complementary Penrose effect provides relevant concepts to frame our investigation of how firms might invest resources freed by divestitures to support future performance. However, this perspective does not yet offer sufficiently fine-grained logic to motivate precise hypotheses concerning the effects of the investments, particularly regarding possible differences in diverse aspects of strategic activity when firms divest from positions of higher or lower performance. Rather than attempting to build hypotheses that rely on logical arguments that would inevitably contain substantial ambiguity, we develop research questions concerning divestitures, subsequent performance, and investments that may link divestitures to the observed subsequent performance. The empirical exploration provides a base for further conceptual development, including a focal set of propositions.

The analysis has four aspects. First, we investigate how prior performance moderates how divestitures affect subsequent profitability (based on return on assets) and sales growth (Research Question 1: RQ1). Although studies traditionally emphasize the idea that firms that engage in divestitures often are low performers trying to address prior strategic mistakes (e.g., Markides & Singh, 1997; Porter, 1987), a few studies report that high performers also engage in divestitures – albeit for different reasons (Kaul, 2012; Vidal & Mitchell, 2015). Thus, we start our exploration from the baseline idea that prior performance may play a moderating role in the effect that divestitures have on subsequent performance. Second, we investigate what resources divestitures make available (RQ2). Third, we examine the underpinnings of the observed changes in post-divestiture financial performance by looking at how the resources that divesting makes available are reinvested (RQ3). Fourth, we show how divestiture activity by prior high- and low-performing firms relates to their subsequent survival (RQ4), linking these results back to the earlier analyses. We apply the study in the context of more than 400 firms operating in the global pharmaceutical industry between 1978 and 2012.

This work contributes to our understanding of divestitures and has more general implications to performance feedback and resource-based theories. The study highlights the role divestitures play for both high- and low-performing firms, by showing different ways divestitures are used by low performing firms to survive and correct prior mistakes while helping high performers maintain their superiority. More generally, for resource-based theory, the work sheds light on how changes in resource bases—a core tenet of the theory (Karim & Capron, 2015)—affects subsequent performance, while identifying divestiture as a mechanism through which the effects occur. In doing so, we extend Penrose's (1959) traditional argument concerning resources and growth to argue that firms can use divestitures to free financial and managerial resources that can be reinvested in the firm, thereby either helping low performing firms improve and high-performing firms maintain their strength. The investigation helps clarify the role of divestitures in resource-based theory: how high- and low-performing firms engage in divestitures, how the resources that divestitures free are redeployed inside the firm, and how this affects subsequent financial performance and survival.

The paper, given its exploratory nature, flows as follows. The first section develops baseline arguments and the logic for the first research question, concerning how firm strength moderates the impact of divestiture activity on subsequent performance. We next describe the data and report results concerning RQ1. We then delve more deeply into questions concerning the mechanisms, focusing on how firms invest freed resources and how the activity contributes to firm survival or exit. The final section discusses the implications of the results and develops three sets of propositions relevant for divestiture studies and for resource-based theory.

2 | RESOURCES, DIVESTITURES, AND PERFORMANCE

Resource-based theory suggests that possession of superior resources helps firms achieve competitive advantages that can lead to above-average performance (Barney, 1991; Penrose, 1959; Wernerfelt, 1984). The related dynamic capabilities lens suggests that firms can change their resource base in efforts to maintain or renew competitive advantages (Helfat et al., 2007; Makadok, 2001; Teece, Pisano, & Shuen, 1997). Together, these arguments suggest that ongoing changes in the resource base can both help firms address low performance and create new competitive advantages (Helfat & Eisenhardt, 2004; Karim and Capron, 2015; Moliterno & Wiersema, 2007). The dynamic capabilities literature has examined how performance is affected by different modes of change, including acquisitions (Capron & Mitchell, 2009; Hennart & Park, 1993; Karim & Mitchell, 2000; Moatti, Ren, Anand, & Dussauge, 2015), internal development (Capron & Mitchell, 2009; Karim &

Mitchell, 2004), alliances (Anand & Khanna, 2000; Castañer, Mulotte, Garrette, & Dussauge, 2014; Das & Teng, 2000; Dussauge, Garrette, & Mitchell, 2000; Kale, Dyer, & Singh, 2002; Kale & Singh, 2007), and – to a lesser extent – divestitures (e.g., Capron, Mitchell, and Swaminathan, 2001).

Divestitures – which include the sale, spinoff, or liquidation of resources by an ongoing corporation – offer a mechanism by which firms can reorient their resource base and, in turn, will influence subsequent performance. Several studies have examined the relationship between divestitures and subsequent firm performance. Multiple studies have found that divestiture activity leads to improved accounting returns (Hoskisson & Johnson, 1992) and market performance (Alexander, Benson, & Kampmeyer, 1984; Hite & Owers, 1983; Jain, 1985; Mulherin & Boone, 2000). Other studies, though, have found opposite relationships, with divestitures leading to decreased subsequent market performance (Wright & Ferris, 1997), accounting returns (Bergh, 1995), and takeovers (Powell & Yawson, 2012). Studies have considered contingencies that may influence this relationship, such as timing of the event (Chang, 1996) and relatedness of the divested resource (Bergh, 1998). Table 1 summarizes relevant studies and their findings. A meta-analysis by Lee and Madhavan (2010) finds that the majority of studies report benefits of divestitures, but that key differences remain to be explained. This study will focus on prior performance as a conceptually relevant contingency.

Part of the literature has studied how prior performance drives divestiture activity (e.g., Berry, 2010; Duhaime & Baird, 1987; Hopkins, 1991; Hoskisson & Johnson, 1992; Vidal and Mitchell, 2015). The most common view has been that low performing firms conduct divestitures in efforts to reduce excess capacity and/or free up resources (Chakrabarti, Vidal, & Mitchell, 2011; Villalonga, 2004). Divestitures can help low performers repay debt (Brown, James, & Mooradian, 1994) and free up financial and managerial resources to reinvest in new avenues that may drive future growth (Haynes, Thompson, & Wright, 2003). More recent studies suggest that high-performing firms also use divestitures to free up resources that can be reinvested in new opportunities (Kaul, 2012). Building on discussions of performance feedback (e.g., Gaba & Joseph, 2013; Greve, 1998), Vidal and Mitchell (2015) view this as a response to pressure for higher-performance firms to maintain their superiority, complementing performance feedback based on low performance (Moliterno & Wiersema, 2007). Thus, both low- and high-performing firms can use divestitures to free resources, but we have only limited understanding of how divestitures by low- and high-performing firms might affect subsequent performance.

As a starting point, it is likely that divestitures tend to have different relationships with subsequent performance for low- and high-performing firms. Some studies at least indirectly suggest that low performers may divest lower-performing units (e.g., Duhaime & Grant, 1984; Markides & Singh, 1997; Porter, 1987), which would improve average profitability of the remaining resources. In addition, by freeing financial and managerial resources, firms can focus on other, stronger, activities in the company. Hence, low-performance firms would improve both because they eliminate poorly performing units and because they build on remaining strengths. For instance, Elan Pharmaceuticals in the U.S. had negative return-on-assets in 2001 and 2002; in their efforts to recover, the firm undertook several divestitures totaling \$550 billion (30% of 2001 sales). In 2003, the company's sales fell 63% but profitability improved, although still remaining negative. This example illustrates the idea that divestitures may help low performers improve. Appendix 1 describes this example and the following Abbott example in more detail.

By contrast, high-performing firms tend to undertake divestitures for different reasons. Divestitures allow them to free financial and managerial resources for strategic initiatives that have greater potential for growth (Kaul, 2012). Unlike low-performance firms, high performers can take the time

TABLE 1 Summary of multiple studies linking divestitures to performance

Authors	Performance measure	Divestiture effect on performance	Contingency
Abor, Graham, and Yawson (2011)	Accounting (ROE)	+	Divesting acquirers vs. non-divesting acquirers
Bergh (1998)	Accounting (ROA)	+	Unrelatedness of unit
Chang (1996)	Accounting (ROA)	+	Human resource profile similarity
Cho and Cohen (1997)	Accounting (Cash flow returns)	+	Focal and other units' performance
Dawley, Hofmann, and Lamont (2002)	Accounting	+	Strategic options & environmental constraints post-bankruptcy
Haynes, Thompson, and Wright, (2002)	Accounting (ROCE)	+	Diversification, governance
Hoskisson and Johnson (1992)	Accounting (ROA relative to competitors)	+	Internal governance
Markides (1995)	Accounting (ROA, ROS, ROE)	+	Proactive vs. reactive divesters
Pashley and Philippatos (1990)	Accounting (factor analysis)	+	Firm life-cycle stage
Alexander, Benson, and Kampmeyer (1984)	Market (CAR)	+	Prior abnormal negative returns
Depecik, Van Everdingen, and Van Bruggen (2014)	Market (CAR)	+	Relatedness and geographic scope
Dittmar and Shivdasani (2003)	Market (CAR)	+	Corporate refocusing
Hite and Owers (1983)	Market (CAR)	+	Divestiture to facilitate mergers, to separate diverse units
Jain (1985)	Market (CAR)	+	Prior abnormal negative returns
Markides (1992)	Market (CAR)	+	Degree of diversification (overdiversification)
Mulherin and Boone (2000)	Market (CAR)	+	Size of divestiture
Owen, Shi, and Yawson (2010)	Market (CAR)	+	Main effect only
Powell and Yawson (2012)	Firm survival (Acquisition)	-	Firm strength [financial distress]
Ioannou (2013)	Firm survival	+	Increasing corporate coherence
Lee and Madhavan (2010)	Meta-analysis	+	Performance measure, transaction format, transaction intent, and firm's resource level
Montgomery and Thomas (1988)	Accounting (ROA)	-	Divesting firms' performance improves post-divestitures, but lower than non-divesting firms
Bergh (1995)	Accounting (ROA)	-	Un-relatedness of unit
Feldman (2014)	Accounting (ROS)	-	Legacy business
Wright and Ferris (1997)	Market (CAR)	-	Non-economic pressures

Note. ROE = return on equity; ROA = return on assets; ROCE = return on capital employed; ROS = return on sales; CAR = cumulative abnormal returns.

to address longer term strategy and may be less likely to dispose of resources with a primary goal of raising financial resources to ensure survival. For example, Abbott Pharmaceuticals was profitable in 2000 and 2001; in 2002 they engaged in divestitures totaling over \$300 million (2% of the firm's revenue). Abbott's changes were aimed at fine-tuning their portfolio of businesses and reinvesting in new areas. Although accounting performance fell slightly in the following year, the company's sales grew by almost \$2 billion. This example highlights how high-performing firms can use divestitures to free up resources that can be reinvested in opportunities that help them maintain high performance.

Hence, poor performers need to put their house in order, while high performers can undertake divestitures for a wider range of strategic reasons. It is possible, then, that divestitures by low-performing firms may achieve quicker payoffs of improved profitability, while divestitures by high performers may take longer to achieve profitability gains. In parallel, divestitures by higher performers may be less likely to inhibit short term sales growth because they can selectively divest resources with less effect on immediate sales, such as divesting partial rather than full business units

(Vidal & Mitchell, 2015). This idea provides initial suggestions for mixed results in studies of the relationship between divestiture and subsequent performance.

The argument so far leads to our first research question, which provides a baseline for subsequent exploration that teases out the role of performance in greater nuance: How does prior firm performance moderate the impact of divestitures on subsequent performance (RQ1)?

In examining RQ1, we will focus on two aspects of subsequent performance: profitability and sales growth. Firms need to attain profitability to be viable. They also benefit by finding ongoing sources of growth; indeed, even profitable firms that stagnate in terms of sales growth commonly become targets for acquisition.

In turn, it is important to investigate the mechanisms by which firms achieve the performance. For low-performing firms, we need to know whether improvements in profitability primarily stem from eliminating under-performing resources or whether improvements arise from using freed resources to invest in new opportunities. In the former case, divestitures would have only a limited role as a complementary Penrose effect for low performers; the benefits would arise mainly from reducing resources. In the latter case, by contrast, divestitures would be part of a broader complementary Penrose strategy for low performers, by also creating opportunities for more encompassing investments.

For high performers, meanwhile, we need to investigate patterns in the types of investments the firms pursue with the newly available resources. While the complementary Penrose effect will be highly pertinent for high-performance firms, we have little understanding of what paths are most common for applying freed resources to new opportunities. After addressing RQ1, therefore, we will consider different investment routes that high- and low-performing firms might take to gaining subsequent performance benefits.

3 | DATA AND METHODS

We explore the research questions with a sample of 414 firms operating in the global pharmaceutical industry between 1978 and 2012. Two archival sources provide most data. Firm level data on company financials comes from COMPUSTAT, as does data on the segments for each of these companies. SDC Platinum identified the divestitures, as well as acquisitions. We supplemented these sources with archival searches for information about the firms and via discussions with industry personnel. The pharmaceutical industry is relevant to explore this question because the sector has firms operating in the full spectrum of firm performance, as well as a wide range of activity with regards to acquisitions and divestitures.

The initial dependent variables are accounting profitability and sales growth. Consistent with the most common treatment in prior studies of diversification performance, we measure profitability as *return on assets* (ROA), during year $t + 1$. *Sales growth* is the difference in sales from year t to year $t + 1$. Later in the analysis, we also include dependent variables for other aspects of performance, firms' post-divestiture strategic behavior, and firm survival at year $t + 1$ relative to exit via dissolution or via acquisition.

There are two primary explanatory variables: Prior performance and divestitures. *Firm prior performance* is the firm's past ROA during year $t - 1$. *Divestitures* are the number of divestitures during year t . Number of divestitures indicates how actively firms are seeking to eliminate existing resources (Vidal & Mitchell, 2015); sensitivity analysis also explores divestiture value. The lag in this variable allows us to see how divesting relates to outcomes that do not include the divested unit in the subsequent accounting measures. The timing of the variable definitions creates a temporal

sequence from prior performance (ROA_{t-1}), to Divestitures_{*t*}, to subsequent performance (ROA_{t+1}), which avoids simultaneity in the analyses (Appendix 2 depicts the temporal sequence of the key variables). The sample includes all firms, divestors as well as non-divestors, thus avoiding potential sample selection issues. Multiple controls address alternative explanations. Tables 2 and 3 provide variable definitions and descriptive statistics, including control variables.

4 | RESULTS AND FURTHER RESEARCH QUESTIONS

4.1 | Research question 1 (RQ1): Impact of divestitures on performance

Models 1a and 1b in Table 4 report the results for RQ1. The analysis uses paneled ordinary least square regression with random effects (the dependent variables are continuous; a Hausman test comparing random and fixed effects was insignificant, suggesting that the estimators are consistent). Below the coefficients and standard errors, the models also report p-values, which help interpret the significance of the results.

Model 1a examines post-divestiture performance in terms of profitability (ROA). Firms with high prior performance have higher subsequent profitability (Performance: $\beta = 0.436$, $p < .001$). Divestiture activity by itself has no significant effect on ROA (Divestitures: $\beta = 0.005$, $p = .247$). However, high-performing firms that undertake many divestitures have lower subsequent ROA (Performance \times Divestitures: $\beta = -0.061$, $p = .027$). The negative interaction effect suggests that low-performing firms that actively divest gain benefits for subsequent ROA; we will return to this point later when we investigate reasons for the increased ROA.

The results are material. Based on calculating the aggregate impact of the two main effects (performance and divestitures) and their interaction coefficient, a firm with ROA one standard deviation below the sample mean (which we will call a low-performing firm) that conducts one divestiture has subsequent ROA 16% higher than a low-performing firm with no divestitures (-0.190 v. -0.226). By contrast, a firm with ROA one standard deviation above the sample mean (which we will call a high performing firm) that undertakes one divestiture has subsequent ROA 9% lower than a high-performance firm with no divestitures (0.092 v. 0.101).

Model 1b examines sales growth. Firm prior performance continues to have a positive main effect (Performance: $\beta = 51.365$, $p = .039$). Firms with more divestitures achieve greater sales growth, particularly those with higher prior performance (Performance \times Divestitures: $\beta = 224.572$, $p = .041$). Again the results are materially relevant: a low-performing firm that conducts one divestiture has 1.37 times lower sales growth than a low performer with no divestitures ($-\$36.6$ v. $-\$26.7$; the lower growth occurs because low-performing firms have negative ROA, which multiplied by the positive coefficient for ROA in Model 1b produces a negative impact on growth), while a high-performance divestor has more than 14 times the growth of a high-performance firm with no divestitures ($\$170.3$ million vs. $\$11.9$ million). The initial takeaway is that divestiture appears to be part of a complementary Penrose effect that contributes to sales growth, with greatest impact for high performers.

Figure 1a and b illustrate the aggregate effect of performance, divestitures, and the interaction effect for subsequent ROA and sales growth, based on the estimates in Models 1a and 1b. Figure 1a shows that greater divestiture activity has little impact on subsequent ROA for high-performance firms, but leads to substantial improvements in ROA for low-performing firms. Figure 1b, meanwhile, shows that sales growth increases strongly with the number of divestitures for high-performance firms, while having little change for low-performing firms.

TABLE 2 Variable definitions

Variable	Units	Type	Operationalization (balance sheet items measured at year end) ¹	Source
Performance: return on assets (ROA)	%	DV	ROA: Net income/total assets	Compustat
Percentage change in assets	%	DV	% change in total assets between t and $t + 1$	Compustat
Percentage change in net income	%	DV	% change in net income between t and $t + 1$	Compustat
Performance: sales growth	\$ million	DV, control	Difference in total revenue between t and $t + 1$ ($t - 2, t - 1$ for control)	Compustat
M&A deals	#	DV, control	Number of completed acquisitions, year $t + 1$ (year t for control)	SDC Platinum
Research and development expense	\$ million	DV, control	R&D expenses, year $t + 1$ (year t for control)	Compustat
Operational expenses: selling, general and administrative (SG&A) expense	\$ million	DV, control	SG&A expenses, year $t + 1$ (year t for control)	Compustat
Financial resources: cash and short-term investments	\$ million	DV, control	Amount in cash reserves, year $t + 1$ (year t for control)	Compustat
Financial resources: long-term debt	\$ million	DV, control	Amount on long-term liabilities, year $t + 1$ (year t for control)	Compustat
Managerial capacity: top management team (TMT)	#	DV, control	Number of executives who are members of the top management team, year $t + 1$ (year t for control)	Annual reports
Survival: continue operating	0–1	DV	Firm continued operating, year $t + 1$	Public sources
Survival: acquired	0–1	DV	Firm was acquired, year $t + 1$	Public sources
Survival: dissolution	0–1	DV	Firm shut down, year $t + 1$	Public sources
Divestiture count	#	Predictor	Number of divestitures finalized, year t	SDC platinum
Firm prior performance	%	Predictor	ROA, year $t - 1$	Compustat
Diversification dummy	0–1	Control	Diversification = 1 if firm operates in segments beyond pharmaceuticals; 0 if firm operated only in pharmaceuticals, year t (pharmaceutical firms may report one or more relevant segments, e.g., branded and generic drugs)	Compustat
Related divestor dummy	0–1	Control	Related = 1 if divestor is not diversified (operates only in the pharmaceutical segment), based on the “Diversification dummy”	Public sources
Count of segments	#	Control	Number of segments in which the company competes, year t	Compustat
Industry performance (ROA)	%	Control	Mean ROA of the industry in a given year, year t	Compustat
Firm sales	\$ million	Control	Total sales, year t	Compustat
Financial slack	%	Control	Quick ratio (cash and cash equivalents/current liabilities), year t	Compustat
Firm age	Year	Control	Founding year	Public sources
Failed acquisitions	#	Control	Number of announced acquisitions that were not completed in a given year, year t	SDC platinum
U.S. headquarters dummy	0–1	Control	Value of 1 if firm is headquartered in the US, 0 if elsewhere	Annual report

^a Similar results, though sometimes with lower significance, held when we measured balance sheet items at the beginning of the year. The year-end measurement we use in the analysis assumes the presence of an adjustment period following the announcement of activities such as divestitures.

To assess robustness, we also examined the raw data, focusing on firm-year observations with both high prior performance and high divestitures. Compared to the other combinations of prior performance and divestiture activity, high-high cases had below average post-period ROA (consistent with Model 1a) and above average post-period growth (consistent with Model 1b).

So far, we have shown that divestitures relate to subsequent performance, with greater sales growth for high-performing firms and higher accounting profitability (ROA) for low performers. The low performer result is consistent with performance feedback arguments and most studies on divestitures, which suggest that low performers use divestitures in their efforts to retrench and recover, gaining short-term benefits in their accounting performance. The high-performer result suggests that, by divesting, high-performance firms can free up resources that they can reinvest in more profitable areas. This high-performer result has an implication for performance feedback theory, suggesting that high-performing firms have incentives to engage in risky activities such as divestitures in support of their continued efforts to sustain growth.

The results indicate that high-performing firms that pursue divestitures may face lower subsequent accounting profitability, even as they enjoy greater growth. The lower profits may reflect short-term costs needed to underwrite the higher growth and/or might occur if the asset base is growing more rapidly than net revenues, at least initially. Hence, we have only initial understanding of the role of the complementary Penrose effect for higher-performance firms.

To go further, we need to explore what resources firms free up and how they use them. In the next parts of the analysis, we will investigate the mechanisms, assessing what resources become available and how the firms reinvest them.

4.2 | Research question 2 (RQ2): What resources do divestitures free up?

Divestitures allow firms to free two forms of resources that are at least partially locked to their current uses. First, firms can trade-in the value of their past investments, thus freeing financial resources that can be used to pay down debt or pursue new opportunities (Lee & Madhavan, 2010). Second, divestiture affects a key resource that also constrains growth—managerial capacity (Ocasio, 1997; Penrose, 1959). Divestiture has a potentially two-edged impact on managerial capacity. Firms may lose members of their top management team with the divested unit, thereby losing managerial capacity. Alternatively, divesters may be able to retain and/or replace members of top management team, thereby improving the corporate headquarters' ability to focus attention on other areas that offer growth and profitability opportunities. Understanding if there are differences in the financial and/or managerial resources that high- and low-performing firms free up can help us assess the mixed results in studies of subsequent performance and to tease out elements of the complementary Penrose effect on the resource base.

We address RQ2 by regressing divestiture activity on subsequent cash, long-term debt, and the size of the top management team, based on the sample from RQ1. Cash and debt are financial resources; divestitures might provide extra cash and/or allow firms to pay down their debt, thereby reducing interest payments and/or facilitating new external investment. The size of the top management team, meanwhile, reflects a firm's senior managerial capacity. As we noted above, it is possible that divesting firms tend to reduce the size of their top management team or, instead, may be able to retain or replace senior managers who can focus on new opportunities. We note that we focus our attention on the top management team rather than middle management. We recognize middle managers play key roles in firms, but their impact commonly is tied to the particular units and business activity that they are part of. By contrast, managerial capacity that may constrain substantial changes tends to be reflected in the corporate level.

TABLE 3 Descriptive statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	
(1) Performance: return on assets (ROA)	1																								
(2) Total assets	0.17	1																							
(3) Net income	0.21	0.86	1																						
(4) Sales growth	0.11	0.45	0.37	1																					
(5) Count of acquisitions	0.22	0.52	0.50	0.22	1																				
(6) R&D expense	0.19	0.93	0.87	0.47	0.51	1																			
(7) SG&A expense	0.21	0.92	0.91	0.48	0.55	0.97	1																		
(8) Cash and short-term investments	0.17	0.88	0.83	0.36	0.45	0.86	0.87	1																	
(9) Long-term debt - total	0.14	0.83	0.66	0.34	0.40	0.78	0.75	0.73	1																
(10) TMT size - count of executives	0.17	0.08	0.12	0.02	0.18	0.10	0.11	0.05	0.07	1															
(11) Survival: exit via acquisition	0.03	-0.02	-0.03	-0.01	0.00	-0.02	-0.02	-0.02	-0.02	-0.03	1														
(12) Survival: exit via dissolution	-0.13	-0.03	-0.03	-0.02	-0.02	-0.03	-0.03	-0.03	-0.02	0.00	-0.02	1													
(13) Survival: continue operating	0.03	0.03	0.04	0.01	0.01	0.03	0.03	0.03	0.03	0.03	-0.9	-0.43	1												
(14) Divestiture count	0.17	0.56	0.51	0.27	0.51	0.55	0.57	0.52	0.45	0.07	0.01	-0.03	0.00	1											
(15) Divestiture value	0.13	0.29	0.27	0.12	0.34	0.29	0.30	0.23	0.27	0.08	0.03	-0.02	-0.01	0.44	1										
(16) Diversification dummy	0.27	0.13	0.12	0.07	0.13	0.14	0.15	0.12	0.11	0.08	0.0	-0.03	0.02	0.11	0.08	1									
(17) Related divester dummy	0.02	0.00	0.02	0.01	0.05	0.01	0.01	0.00	-0.01	0.02	0.0	-0.01	0.00	0.16	0.05	-0.52	1								
(18) Count of segments	0.28	0.33	0.27	0.16	0.33	0.31	0.36	0.29	0.32	0.26	-0.03	-0.04	0.04	0.26	0.17	0.29	-0.06	1							
(19) Industry performance (ROA)	0.19	-0.10	-0.09	-0.04	-0.09	-0.12	-0.10	-0.11	-0.09	-0.03	-0.04	-0.01	0.04	-0.11	-0.05	0.11	-0.04	0.09	1						
(20) Firm sales	0.21	0.92	0.93	0.36	0.56	0.94	0.97	0.85	0.77	0.11	-0.03	-0.03	0.04	0.56	0.31	0.15	0.01	0.38	-0.08	1					
(21) Financial slack	-0.20	-0.09	-0.09	-0.05	-0.10	-0.09	-0.10	-0.07	-0.07	-0.19	0.02	-0.02	-0.01	-0.08	-0.06	-0.16	0.05	-0.17	-0.08	-0.11	1				
(22) Firm age (founding year)	-0.32	-0.28	-0.34	-0.18	-0.28	-0.32	-0.38	-0.27	-0.27	-0.27	0.03	0.04	-0.05	-0.23	-0.18	-0.23	-0.03	-0.36	-0.38	-0.39	0.16	1			
(23) Failed acquisitions	0.16	0.45	0.39	0.17	0.50	0.43	0.45	0.35	0.44	0.20	0.0	-0.02	0.01	0.32	0.33	0.08	0.01	0.26	-0.07	0.45	-0.08	-0.17	1		
(24) Headquarters dummy	-0.10	-0.14	-0.13	-0.07	-0.11	-0.15	-0.15	-0.12	-0.13	0.00	0.02	0.03	-0.03	-0.15	-0.06	0.08	-0.06	-0.07	0.15	-0.14	0.04	-0.19	-0.12	1	
Mean	-0.14	382.4	365.0	194.8	0.44	339.7	1078.5	629.7	551.9	5.85	0.04	0.01	0.95	0.28	23.98	0.78	0.02	1.85	-0.17	2.25	2.99	1977	0.17	0.8	
Standard deviation	0.37	1381.1	1405.1	1130.4	1.12	1132.6	3312.4	2366.0	2281.6	1.31	0.2	0.1	0.22	0.83	110.13	0.41	0.13	1.44	0.12	6.94	7.03	33.42	0.57	0.4	
Minimum	-1	0	-3615	-29304	0	-0.47	0.02	0	0	2	0	0	0	0	0	0	0	0	-0.34	0	0	1830	0	0	
Maximum	1	212949	19337	18558.7	13	12183	29067	32261	43193	10	1	1	1	10	1826.4	1	1	10	0.09	67.79	142.9	2009	10	1	

We use random-effects paneled OLS regression for the analysis of cash and long term debt. We use negative binomial regression for the top management team, which is a count variable. Models 2a to 2c in Table 4 report the results.

The key result in Models 2a to 2c is that neither the main effect of divestitures nor the interaction of divestitures with performance is significant in any of the models. These insignificant results are important. Finding no support for the idea that divesting firms systematically add to their pools of financial resources suggests that firms commonly use the money they gain from divestitures to invest in new areas of growth. In parallel, the fact that the top management team typically does not shrink suggests that divesters often retain and/or replace senior executives so that they continue to have managerial capacity that they can apply to new opportunities. Hence, the null results provide important information.

This brings us to the third question. How do the resources that firms free up by divesting contribute to their subsequent performance?

4.3 | Research question 3 (RQ3): How do resources from divestitures influence performance?

In RQ1 we saw that divestitures help low-performing firms improve their ROA while supporting high-performing firms' sales growth. In RQ2 we found a null relationship of divestitures by low- and high-performing firms with subsequent changes in cash and managerial capacity, suggesting that firms may reinvest these resources. We explore this further by seeking to understand where the reinvestment might take place.

We first assess the sources of changes in ROA that we earlier observed in Model 1a. ROA can increase in two ways: an increase in net income (numerator) and/or a reduction in assets (denominator). Disentangling the elements that lead to improvement or decline is important because it sheds light on how divestitures influence performance, and helps us understand how firms are reshaping themselves operationally.

We use paneled OLS regression for this analysis. The dependent variables are percentage change in total assets and net income, each from period t to $t + 1$ (these periods align with the periods for the profitability calculations in Model 1a). The variables have a wide range of values and are close to normally distributed in our data, making OLS suitable.

We begin with a possible denominator effect. Divesters might improve ROA by eliminating under-performing assets, with less impact on net income, thereby increasing next period profitability. Model 3a addresses this possibility, with intriguing implications.

First consider the main effect of prior performance on asset growth, which is negative ($\beta = -0.763$ $p < .001$). This suggests that, independent of any divestiture activity, high performers tend to have less growth in assets during any given year than do low performers. Indeed, as Figure 2 below shows, high performers with or without divestitures tend to have no asset growth or even small reductions in assets (such non-divestiture reductions could occur through mechanisms such as write-offs and shut downs of unnecessary facilities). When coupled with the null relationship between prior performance and subsequent growth in net income that we discuss below for Model 3b, this result demonstrates that the positive relationship between higher prior performance and subsequent ROA (Model 1a) derives from achieving greater efficiency in the asset base (denominator), even without divestitures. By contrast, other things being equal, low performers appear to find it difficult to eliminate assets, contributing to their lower ROA.

Now consider the relationship between divestitures and percentage in assets. Actively divesting firms have lower growth in their asset base (Divestitures: $\beta = -0.062$, $p < .001$). In turn, low-

TABLE 4 Relationships of divestitures with subsequent performance, resource change, investments, and firm survival^a

Dependent variables: (year $t + 1$ or % change from t to $t + 1$)	1a ROA	1b Sales growth	2a Cash	2b Debt	2c TMT	3a Assets (% change)	3b RQ3 Net income (% change)	3c RQ3 M&A deals	3d RQ3 R&D	3e RQ3 SG&A	4a RQ4 Dissolved v. Survival	4b RQ4 Acquired v. Survival
Prior performance (ROA _{$t-1$})	0.436 (0.024)	51.365 (24.831)	35.948 (15.614)	-16.691 (21.751)	0.068 (0.058)	-0.763 (0.149)	0.412 (1.295)	1.533 (0.190)	25.789 (8.839)	42.496 (19.476)	-0.739 (0.534)	0.450 (0.230)
Divestitures _{t}	0.005 (0.005)	106.562 (64.698)	28.585 (50.492)	10.168 (41.827)	-0.000 (0.008)	-0.062 (0.017)	0.317 (0.816)	0.106 (0.042)	25.964 (15.685)	42.224 (27.342)	-1.469 (1.934)	0.196 (0.134)
Performance _{$t-1$} × divestitures _{t}	-0.061 (0.027)	224.572 (109.639)	30.874 (75.532)	-35.414 (68.128)	-0.039 (0.046)	0.347 (0.092)	-1.800 (2.324)	-0.471 (0.214)	11.859 (25.376)	128.691 (59.631)	-1.252 (1.633)	-0.721 (0.284)
Sale growth (1-year lag)	0.000 (0.000)	0.008 (0.052)	0.683 (0.025)	0.603 (0.047)	0.400 (0.000)	0.000 (0.000)	0.439 (0.000)	0.028 (0.000)	0.031 (0.011)	0.028 (0.013)	0.443 (0.003)	0.011 (0.000)
Diversification dummy	0.005 (0.026)	-46.480 (89.214)	-56.757 (49.830)	-30.948 (29.669)	-0.012 (0.072)	-0.667 (0.411)	-0.134 (0.562)	-0.284 (0.174)	-1.295 (12.063)	-42.712 (83.475)	2.362 (0.556)	0.580 (0.599)
Related divester dummy	-0.022 (0.051)	-75.275 (142.444)	-133.678 (82.228)	-147.745 (94.903)	0.054 (0.076)	-0.697 (0.322)	1.249 (1.471)	-0.495 (0.286)	-21.013 (14.029)	-75.803 (86.597)	3.566 (1.365)	0.563 (0.731)
R&D expenses (1-year lag)	0.000 (0.000)	0.533 (0.242)	0.231 (0.194)	0.437 (0.165)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.733 (0.081)	0.051 (0.064)	-0.015 (0.018)	0.001 (0.000)
Count of segments (1-year lag)	0.490 (0.004)	0.028 (26.512)	0.234 (12.331)	0.008 (0.645)	0.936 (0.005)	0.471 (0.017)	0.806 (0.369)	0.257 (0.035)	0.000 (6.953)	0.424 (10.779)	0.412 (0.222)	0.008 (0.066)
Firm sales (1-year lag)	0.000 (0.001)	-34.819 (40.835)	35.667 (28.892)	24.859 (21.486)	-0.001 (0.001)	0.006 (0.006)	-0.005 (0.081)	0.026 (0.011)	49.661 (14.268)	-0.913 (17.199)	-6.620 (3.705)	-0.156 (0.054)
Financial slack (1-year lag)	-0.002 (0.001)	-0.454 (0.518)	-0.196 (0.328)	1.065 (0.645)	0.002 (0.002)	-0.028 (0.006)	0.121 (0.077)	-0.033 (0.014)	0.065 (0.161)	-0.378 (0.345)	-0.171 (0.074)	-0.030 (0.015)
US headquarters dummy	-0.112 (0.019)	-62.507 (36.137)	47.527 (33.742)	16.035 (41.927)	0.402 (0.000)	-0.121 (0.182)	0.977 (1.213)	-0.395 (0.139)	-16.783 (9.942)	-43.576 (26.675)	0.684 (0.784)	0.424 (0.267)
Firm age	-0.002 (0.000)	-2.963 (1.555)	0.159 (0.784)	0.702 (1.295)	-0.000 (0.000)	0.508 (0.002)	0.421 (0.010)	0.005 (0.002)	0.091 (0.437)	0.102 (0.668)	0.383 (0.027)	0.112 (0.005)
	0.000	0.057	0.463	0.747	0.076	0.005	0.999	0.000	0.989	0.050	0.047	0.671

TABLE 4 (Continued)

Dependent variables: (year $t + 1$ or % change from t to $t + 1$)	1a RQ1	1b RQ1	2a RQ2	2b RQ2	2c RQ2	3a RQ3	3b RQ3	3c RQ3	3d RQ3	3e RQ3	4a RQ4	4b RQ4
ROA	Sales growth	Cash	Debt	TMT	Assets (%) change)	Net income (%) change)	M&A deals	R&D	SG&A	Dissolved v. Survival	Acquired v. Survival	
Acquisitions (#) (1-year lag)	0.014 (0.004)	-2.333 (40.071)	-22.402 (28.319)	-60.365 (53.321)	0.008 (0.005)	-0.014 (0.012)	0.534 (0.470)	0.306 (0.048)	-19.628 (7.940)	-18.613 (20.331)	0.261 (0.316)	0.086 (0.098)
Failed acquisitions (1-year lag)	0.001 -0.004 (0.007)	0.954 -26.376 (47.386)	0.429 -114.023 (36.466)	0.258 352.361 (211.448)	0.159 0.019 (0.012)	0.247 0.214 (0.085)	0.255 0.214 (0.085)	0.000 0.214 (0.085)	0.013 14.702 (22.200)	0.360 29.138 (31.154)	0.409 0.478 (0.536)	0.378 0.119 (0.210)
Industry ROA (1-year lag)	0.552 -4.723 (2.915)	0.578 -2,634.145 (1,903.206)	0.002 -3,241.651 (1,517.197)	0.096 -269.025 (2,173.599)	0.124 0.656 (0.473)	-4.440 (4.998)	185.281 (183.349)	-16.247 (8.808)	0.508 -289.243 (398.091)	0.350 -2,130.876 (1,649.863)	0.373 0.874 (2.425)	0.571 -2,440 (0.842)
Cash (1-year lag)	0.105	0.166	0.033 0.852 (0.032)	0.901	0.166	0.374	0.312	0.065	0.467	0.197	0.718	0.004
Long term debt (1-year lag)			0.764 (0.061)	0.000								
TMT size (1-year lag)				0.088 (0.008)								
SG&A expenses (1-year lag)				0.000						1.029 (0.059)		
Constant	3.199 (0.747)	5524.0 (3029.9)	615.01 (1529.6)	-892.61 (2595.19)	1.783 (0.330)	-10.455 (3.971)	39.344 (26.465)	12.520 (3.390)	-11.570 (877.55)	2262.8 (1253.2)	-113.245 (53.425)	-8.209 (9.352)
N (firm-years)	0.000	0.068	0.688	0.731	0.000	0.008	0.137	0.000	0.989	0.071	0.034	0.380
Number of firms	4127	4142	4141	4112	659	4140	4140	4142	4117	2614	4119	4119
log Likelihood X^2	414	414	414	414	67	414	414	414	412	306	412	412
Pseudo R ²	0.457	0.177	0.923	0.834	1245	0.060	0.0076	1121	0.935	0.983	0.053	0.053

Robust standard errors in parentheses, clustered by firm; p -values reported under standard errors. ROA = return of assets.

^a Methods: paneled OLS with random effects (Models 1a, 1b, 2a, 2b, 3a, 3b, 3c, 3e, 3f); negative binomial (Models 2c, 3d); multinomial logit (Models 4a, 4b).

performing divesters show even lower asset growth (Performance \times Divestitures: $\beta = 0.347$, $p < .001$). The results are material; a low-performing firm as we defined above with one divestiture has a 61.1% lower growth in assets than a low-performing firm with no divestitures. This denominator effect contributes to the ROA gains for low-performing divesters that we observed in Model 1a.¹

Figure 2 illustrates the effects. On the left side of the figure, low performers (solid line) with no divestitures have increased assets, while high performers (dotted line) have no increase or even a small reduction. The right side of the figure then shows that low-performing divesters have less growth in assets than those that do not divest, while there is little or no change for high-performing divesters. Thus, low performers appear to use the coarser route of divestitures to achieve the refinement of the asset base that higher performers undertake as an ongoing activity. To be clear, these results do not mean that high performers avoid divestitures; instead, as subsequent models suggest, high performers use resources that their divestitures free to reinforce operating activities and thereby contribute to the sales growth that we observed in Model 1b.

Model 3b turns to changes in net income, which is the numerator in the calculation of ROA. As we noted above, the effects are not significant, which has meaningful implications. Divestiture is not associated with significant percentage changes in net income, either as a main effect or in combination with prior performance. Hence, because net income typically does not change significantly following divestitures, low performing divesters tend to improve ROA (Model 1a) by reducing their asset base.

Now consider the sources of sales growth that we observed in Model 1b. Sales growth can occur by purchasing new assets via acquisitions or by building on existing assets such as investments in R&D and sales. Models 3c to 3e explore these possibilities.

Model 3c uses a negative binomial specification to examine post-divestiture M&As. Strategy scholars are increasingly interested in the relationship between divestitures and acquisitions (e.g., Moschieri & Mair, 2012). M&As are a relevant form of changing a resource base because they allow the firm to bring in external resources inside the firm. Our results show that divesting firms undertake more acquisitions (Divestitures: $\beta = 0.106$, $p = .012$), with low-performing divesters being particularly active (the negative coefficient on Performance \times Divestitures: $\beta = -0.471$, $p = .028$). Low performers with one divestiture are 42% more likely to engage in an acquisition than low performers with no divestitures, while high performers with one divestiture are equally likely to do so as high performers with no divestitures. Because Model 3c is based on non-linear analysis, it is important to examine the results involving interaction terms graphically. Figure 3a illustrates the differences.

Thus, low performers sometimes appear to use the resources that they gain from divesting assets to seek new external growth. A possible reason is that the firms' executives believe that the weakness in their existing internal operations will not support a return to profitability even with additional internal investment, at least within the time horizons needed to meet the demands that stakeholders are placing on them. Hence, they seek to eliminate underperforming resources and use the financial resources to replace them quickly by acquiring new resources externally.

At the same time, it is important to recognize that higher-performing firms engage in more acquisition deals, independent of their divestiture activity (Performance: $\beta = 1.533$, $p < .001$, in Model 3c). The key point here is that the resources that become available to low performers due to

¹Complementary analyses examined whether divestitures were followed by (a) change in goodwill/intangibles or (b) change in dividends from t to $t + 1$, in case divestitures systematically led to write offs of over-valued assets (goodwill/intangibles) or payouts to shareholders (dividends). For both goodwill and dividends as dependent variables, the results for Divestitures and for Divestitures \times Performance were insignificant.

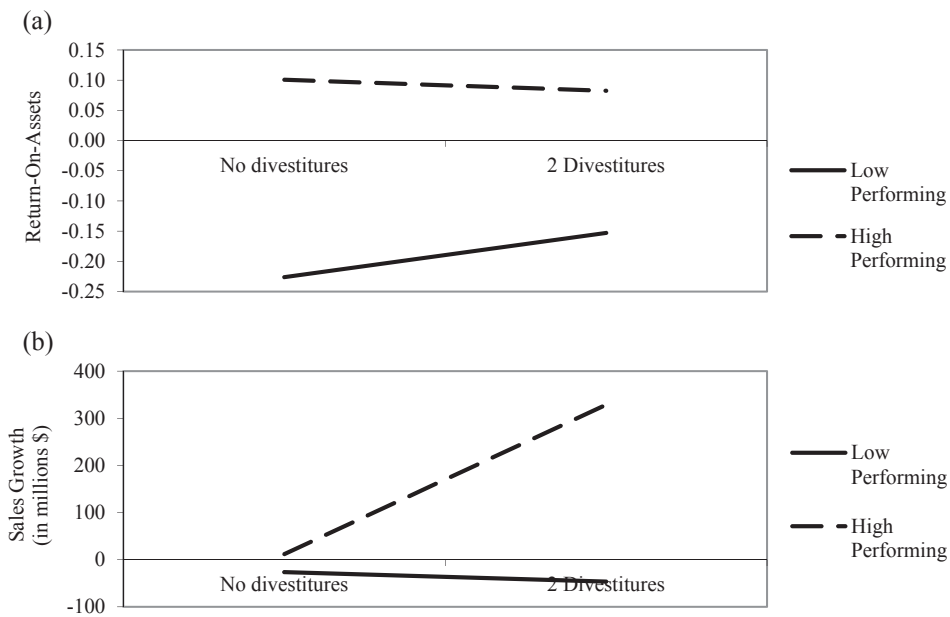


FIGURE 1 (a) Relationship of divestitures with subsequent ROA by low- and high-performing firms (Model 1a). (The plots of net effects of performance \times divestitures consider high-performing firms to be one standard deviation above the sample mean of ROA, and low performing firms to be one standard deviation below mean ROA.) (b) Relationship of divestitures with subsequent sales growth by low- and high-performing firms (Model 1b)

their divestiture activity provides an offset to the inherent advantage that high performers have in pursuing acquisitions.

Models 3d and e examine investments in two forms of internal activity: R&D expenditures and sales and other operating activities (SG&A). Changes in both of these types of activities are relevant forms of changes in resources. R&D expenditures are important investments in search of growth opportunities, whether exploratory investigation of new domains or investment that seeks to exploit further opportunities from existing resources. Investment in SG&A, meanwhile, provides opportunities to expand sales based on existing resources as well as to open new markets. Both types of investments are important in many industries and are highly relevant in our empirical setting, where they receive close attention by internal and external stakeholders of pharmaceutical firms. We used a paneled OLS regression.

The results for R&D and SG&A differ. Divestiture has at best a limited impact on R&D investment, whether for the main effect or the interaction with performance (Model 3d). As with R&D, divestiture has an insignificant main effect for SG&A (Model 3e). In contrast to R&D, however, there is a significant effect of high-performance divestitures on increases in SG&A (Performance \times Divestitures: $\beta = 128.691$, $p = .031$). Overall, low performers with one divestiture reduce their SGA by about 2.1 times compared to low performers with no divestitures, while high performers with one divestiture increase their SGA by about 8.3 times compared to high performers with no divestitures. Here, again, the Performance \times Divestitures effect augments the positive main effect of performance (Performance: $\beta = 42.496$, $p = .029$, in Model 3e).

Thus, high-performance firms appear particularly likely to use resources that they free via divestiture to invest in their remaining business, as well as in any acquisitions that they undertake. Figure 3b shows the materiality and striking differences for low and high performers. These

investments, which augment investments that arise from superior profitability, will contribute to the sales growth that we observed for high-performance divesters in Model 1b.

This stage of the analysis has demonstrated strikingly different patterns in the post-divestiture behavior of high- and low-performing firms. Low-performing divesters tend to eliminate portions of their asset base, thereby improving short-term ROA, while sometimes investing the resources from the divestitures in M&A deals, hoping to gain quick recoveries. High-performing divesters, meanwhile, invest in operating activity (SG&A), which in turn will lead to sales growth. These patterns provide a nuanced understanding of the complementary Penrose effect by which firms can use divestitures to free up resources necessary to ensure subsequent profitability and growth.

In addition to their impact on immediate performance, differences in post-divestiture investment are likely to shape a firm's long-term viability. We now turn to post-divestiture fates.

4.4 | Research question 4: How do divestitures influence business survival?

Firms in most modern economies face strong selection pressures. Highly unsuccessful firms are likely to shut down. Companies with valuable assets that are struggling—including profitable firms that are not finding growth opportunities—are often taken over by buyers that believe they can use the assets more effectively. Survival provides a meaningful indicator of how divestitures influence long-term performance, which is difficult to determine from studies of multi-year profitability and growth owing to the complex set of causal influences that will occur across years. Models 4a and 4b assess relationships between corporate survival, including both dissolution and acquisition. We use multinomial logit for this analysis, comparing the likelihood of each type of exit to the base case of survival (i.e., continuing to operate).

The results are intriguing. Stronger performance has a negative but insignificant effect on the likelihood of shutting down (Model 4a; Performance: $\beta = -0.739$, $p = .166$). By contrast, higher profitability firms face greater chance of being acquired (Model 4b; Performance: $\beta = 0.450$, $p = .050$), likely by firms that are attracted by the assets that are contributing to the superior profits. Divestiture has no main effect on dissolution or on the chance of being acquired. Nonetheless, though, low-performing firms that engage in more divestitures have a higher chance of becoming a target for acquisition; equivalently, high performers that engage in divestitures are less likely to be acquired (Model 4b; Performance \times Divestitures: $\beta = -0.721$, $p = .011$). Thus, divestitures position struggling firms to become targets for acquisition while helping high performers avoid becoming targets. Figure 4 illustrates the patterns.²

Overall, the empirical patterns are striking. Divestiture activity can support the ability of high-performing firms to remain profitable and sufficiently dynamic to merit remaining independent, by providing resources for investments in new assets and operating activities that translate into future performance. By contrast, divestiture activity by low performers appears to produce short-term tightening of the asset base, along with some attempts for quick fixes based on using the newly available resources to acquire other firms, which often simply positions the firms to become acquisition targets. The exits will sometimes arise when low-performing firms use divestitures as part of a strategy to position themselves to be bought, while other times will reflect ongoing low performance that makes them targets for deals. Overall, at least in settings with active markets for corporate control (most industries in almost all modern economies), divestiture activity is part of a downward cycle for low-performance competitors, but supports a virtuous cycle for high-performance firms—in which

²Graphical comparison is particularly useful for interpreting interaction terms in nonlinear models such as logit (Greene, 2010; Hoetker, 2007).

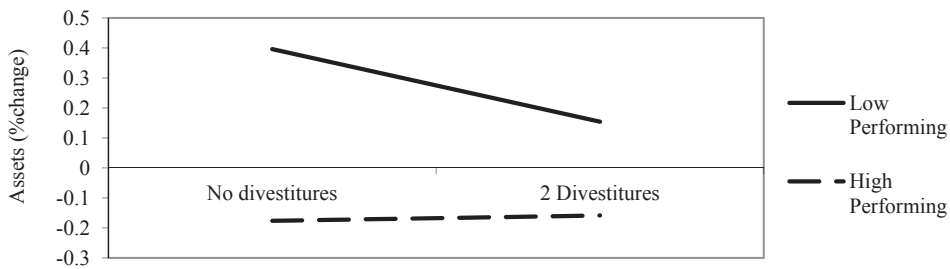


FIGURE 2 Relationship of divestitures with subsequent percentage change of assets by low- and high-performing firms (Model 3a)

by eliminating resources firms create space to engage managerial capacity to take advantage of new opportunities.

4.5 | Sensitivity analyses

Several sensitivity analyses explored the results further. First, we examined divestiture value rather than divestiture count. This reduced the sample size substantially, as firms are not required to disclose the value of divested assets (within the available data, there was a positive correlation between the number and value of annual divestitures). The majority of the results using value have the same direction as count, though sometimes with lower significance.

Second, we distinguished between divestiture of full and partial business units for the years 1999–2009. The results were similar to those we report for all divestitures, though full divestitures tended to align more commonly with the significant results for all divestitures; hence, full divestitures appear to have a somewhat greater impact on immediate performance and strategy, likely because they typically release more assets. Nonetheless, one salient result arose for partial divestitures by lower performing firms, which had equally significant positive contributions to subsequent ROA as did full divestitures. Hence, low performers do not appear to achieve ROA gains solely by paring away full units that substantially reduce their asset base; in addition, low performers also gain by more fine-grained elimination of partial units. This result supports the idea that divestitures play a more nuanced complementary Penrose role for struggling firms than simply providing gains by eliminating easier to divest full units.

Third, alternative measures assessed the reliability of the results. (a) We used earnings before interests, taxes, depreciation, and amortization (EBITDA) as a measure of net income; this excludes financial expenses such as write-offs of goodwill that often follow divestitures and so reflects how divestitures affect immediate operating activities, without adjustments to historical accounting artifacts. Results with EBITDA are consistent with those with net income (Models 1a and 3b). (b) To assess reliability of the diversification control, we also coded whether the firms operated in a “specialty pharmaceutical” niche or if they were “big pharma,” with the latter being more diversified. Including this measure reinforced the core results; we chose to present the more conservative results. (c) We added total employees as a control but found that the measure correlated highly with sales; the results were robust to adding the employee variable or substituting it for sales.

Fourth, we assessed alternative model specifications, in two ways. (a) We split the sample into above and below mean performance firms and compared the effects of divestitures for the two subsamples; the results were similar to the interaction models. (b) We estimated a selection model with divestitures as the dependent variable (dummy) in the first stage and then introduced the estimated inverse Mills ratio into the second stage regressions (using industry median ROS as an exogenous

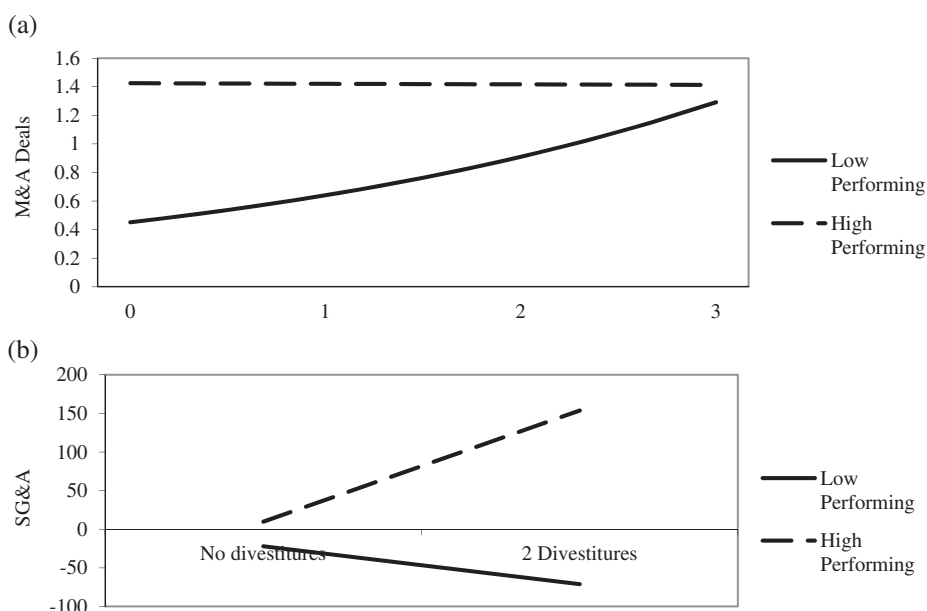


FIGURE 3 (a) Relationship of divestitures with subsequent percentage change of M&A deals by low- and high-performing firms (Model 3c). (b) Relationship of divestitures with subsequent percentage change of SG&A by low- and high-performing firms (Model 3e)

instrument in the first stage, similar to Feldman's (2016) use of industry sales growth as an instrument); the results were consistent with those in the paper.

Fifth, we tested a longer time span between divestiture and subsequent ROA, using a 3-year window. In most cases the interaction term of performance \times divestiture becomes less significant, likely driven by confounding effects that take place in longer time periods. Nonetheless, the M&A finding was highly robust in the longer period; low-performing divestors tend to be more active in M&A activity than their non-divestor counterparts, even after 3 years.

4.6 | Summary of results

The results suggest strikingly different patterns for how divestitures affect low- and high-performing firms. For low-performing firms, divesting allows them to improve their accounting performance; these improvements arise primarily from a reduction of their asset base, thus increasing their ROA. The resources that low-performing firms raise by divesting are reinvested quickly, often for acquisitions; this choice suggests that they are seeking external resources in efforts to quickly fix their operations. At the same time, though, by divesting they increase the chances they will become a target for being acquired themselves.

Our analysis of high-performing firms suggests a different outcome. Contrary to low-performing firms, high-performing firms that engage in divestiture do not see improvements in their next period accounting profitability but do gain greater sales growth. This outcome suggests that they use the freed resources to strengthen their operations and market position. These improvements appear to stem from reinvesting freed resources into the internal operations of the company (SG&A expenses) in efforts to support their higher level of M&A activity. Moreover, the divestitures and subsequent investments in new resources help high-performing firms avoid becoming take-over targets of acquirers that seek their successful resource base.

5 | DISCUSSION AND CONCLUSION

This research had two goals. First, we sought to help reconcile conflicting evidence concerning how divestitures affect subsequent firm performance; we assess prior performance as a key contingency and then investigate mechanisms by which prior performance in combination with divestitures affects subsequent performance. Second, we sought to extend the conceptual recognition of divestitures as key mechanisms within resource-based theory, focusing on the idea of a complementary Penrose effect. We believe that the results speak to both goals.

5.1 | Divestiture and subsequent performance

Prior studies have found mixed results in how divestitures affect subsequent performance, both within the same dimensions of performance and across different types of performance (see Lee & Madhavan, 2010). The mixed results highlight the need to investigate contingencies that shape the relationship. Building on recent suggestions concerning the conceptual relevance of performance feedback (e.g., Moliterno & Wiersema, 2007; Vidal & Mitchell, 2015), we focus on prior firm performance as a key contingency.

Investigating the contingent role of prior performance in substantially greater depth and richness than in previous work, we find patterns that help reconcile the literature. We demonstrate that high versus low prior performance conditions how divestitures affect two key measures of performance. Low-performance divestitures gain more in profitability (ROA), while high-performing divestitures gain more in sales growth.

In examining the mechanisms that lead to the changes in performance, the results eliminate some candidates and highlight others. Divestitures do not simply lead to larger cash reserves, reduced debt, or changes in managerial capacity as reflected in the size of the top management team, for either high- or low-performing firms. Instead, the impact on profitability for low-performing firms arises as a denominator effect (reductions in assets). Moreover, for high-performing divestitures, the impact on sales growth appears to stem from increased investment in support of operating activities (SG&A).

Divestiture also shapes growth via M&A. With or without divestitures, high performers are more likely to undertake acquisitions. Low performers, though, can use resources from divestitures to at least partially catch up to the high-performer M&A growth advantage.

These patterns are both intriguing and material. The examples in Appendix S1 illustrate these ideas and help demonstrate their empirical relevance.

In turn, divestitures influence firm fate. Low performers that actively engage in divestitures often are on a downward spiral toward becoming targets. Conversely, high performers that would become acquisition targets if they became overly stable can avoid becoming targets by using divestitures as part of a strategy of changing their resource base.

Causality in the exit result undoubtedly is multidimensional. For low performers, it is unlikely that the divestitures themselves are the only or even the primary cause of being acquired. Instead, divestitures will be part of the attempts of struggling firms to stave off failure and, in part, to position themselves for recovering at least part of their investment by becoming targets. Divestitures help clean up a struggling firm that is seeking buyers.

In parallel, though, there also is a potential causal path between divestitures and exit. Low-profitability firms that divest assets signal that they have little confidence in their ability to build on their existing resource base, making them highly visible takeover targets for firms that believe they

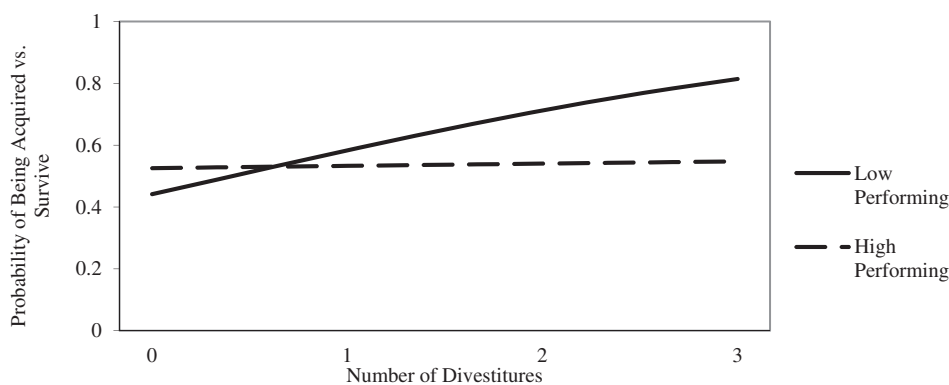


FIGURE 4 Relationship of divestitures with subsequent odds of being acquired vs. survival by low- and high-performing firms (Model 4b)

will be better able to use the firms' assets. Hence, the relationship between resource divestiture and firm exit is rich and nuanced--our work begins to tease out the patterns.

5.2 | Implications for performance feedback theory

These results also have implications for performance feedback theory. Recent performance feedback arguments suggest that firms performing either below or above aspirations have incentives to engage in risky changes such as divestitures (Vidal & Mitchell, 2015). This paper extends those arguments by assessing the differential impact of the changes on the performance of the low and high performers.

The results highlight different pressures for low and high performers to continue to change in future periods. The fact that subsequent performance (based on ROA) moves toward the mid-range most strikingly for low-performing divestitures (Figure 1a) means that they will face less pressure to change in the next period. By contrast, the lesser regression to the mid-range ROA for higher-performing divestitures means that performance feedback continues to create pressures to change and, in turn, sustain their superiority. These contrasting performance feedback pressures reinforce sustained differences between high- and low-performing firms, helping explain why low performers find it difficult to join the upper ranks of their industries.

5.3 | A complementary Penrose view in resource-based theory

By focusing on divestitures, the paper contributes to the resource-based view of the firm and its related dynamic capabilities arguments. The RBV has built on Penrose's (1959) insight that firms can gain advantages by extending their existing resource base, particularly by giving focus to scarce managerial capacity. As we noted when we developed the baseline arguments, multiple studies of dynamic capabilities have examined how firms seek to achieve these benefits by using different mechanisms, including internal development, alliances, and acquisitions. A smaller body of work has brought divestitures within this realm. Recently, Vidal and Mitchell (2015) articulated the idea of a complementary Penrose effect, in which firms eliminate resources in order to create financial and managerial space to engage with problems or take advantage of new opportunities.

This paper extends the idea of the complementary Penrose effect in two ways. First, we demonstrate that divestitures do not systematically lead to either increased cash or reduced managerial capacity, as reflected in the size of top management teams. The implication is that divestitures rapidly

reinvest the freed financial resources, while using the sustained executive talent to shape the use of the new investments in their firms.

Second, and most strikingly, the results suggest that divestitures create different forms of investment opportunities for lower- and higher-performance firms. Low-performing firms appear to circle their wagons around existing assets, while sometimes using the newly obtained resources in search of immediate new opportunities via acquisitions to help keep pace with the M&A activity of their higher-performance competitors. By contrast, high-performance firms appear to use divestitures as opportunities to invest in their existing strong resource base. Higher performers also commonly engage in acquisitions (indeed, there is a positive correlation between profitability and acquisitions); the acquired assets will tend to benefit from the operating investments that high-performing divesters undertake. These patterns mark substantially different paths to changing resource bases and to the ultimate fate of the firms. Hence, the complementary Penrose effect operates in systematically different ways for high- and low-performing divesters.

5.4 | Propositions: divestitures, performance, and the complementary Penrose effect

The following propositions reflect key aspects of the patterns in the study, together with logic that would explain the patterns. As such, the propositions offer directions for future research to explore both the robustness of the patterns and the relevance of the explanations.

Proposition 1a Resource reinvestment–Operating activity: *High-performing divesters tend to use freed resources to invest in operating activities that support their existing internal strength and/or newly acquired resources.*

Proposition 1b Resource reinvestment–M&A activity: *Low-performing divesters tend to use freed resources to invest in M&A activity to help maintain pace with that of the high-performing competitors.*

Proposition 2a Survival—low-performance firms: *Low-performance firms that undertake divestitures are more likely to become acquisition targets, either because they are positioning themselves for exit or because their reduced size makes them more vulnerable to takeover.*

Proposition 2b Survival—high-performance firms: *Divestitures by high-performance firms help counteract the risk of becoming a target, which otherwise increases with firm performance.*

Proposition 3 Sustained performance differences: *The complementary Penrose effect that occurs via divestiture reinforces the sustained superiority of high-performing firms, while creating only shorter-term improvements for low-performing firms.*

These propositions offer a framework for developing the role of the complementary Penrose effect within resource-based theory. For high-performing firms, the complementary Penrose effect helps eliminate resources with lower future value that would create financial and managerial constraints to maintaining superior performance, feeding immediate sales growth, while helping avoid the risk of becoming an acquisition target faced by more static profitable firms. For low-performing firms, meanwhile, the complementary Penrose effect provides resources for firms that face constraints to growth owing to operational shortcomings. The freed up financial and managerial

resources can be invested in attempts to address the shortcomings, contributing to short-term ROA and supporting acquisition activity, while also making the struggling firm more desirable as a target.

5.5 | Looking forward

We took an exploratory approach to this research, built on a combination of conceptually– and empirically–inspired research questions, because of the multidimensional and intertwined aspects of the outcomes, influences, and moderating factors that we investigate. Attempting to develop a set of tightly argued hypotheses in this context would be ambiguous, at best. Instead, we believe that the richness of the phenomenon and its conceptual implications merits the exploratory approach, guided and framed by prior work.

Beyond the suggestions for future research that we note above, this study has three limitations that provide avenues for ongoing investigation. First, the study explores the pharmaceutical industry; future work can assess generalizability of the results. Second, this paper explores an important but limited set of mechanisms that play a role in the relationship between divestitures and subsequent performance; further studies can expand our understanding by looking more in-depth at the nature of the resources divested, including the relatedness of their relationship with other resources in the firm, as well as the nature of the reinvestment of resources within the firm. Third, studies should continue teasing out the causal connections between divestitures and subsequent performance, as well as divestitures and their relationship with other resource mechanisms. For instance, our investigation of acquisitions focuses on post-divestiture deals; it is possible that concurrent divestiture and acquisition deals also influence performance, which will require careful attention to temporal patterns.

Overall, this exploratory study demonstrates the importance of divestiture activity as a key mechanism by which both high- and low-performing firms free resources and as a relevant concept within performance feedback and resource-based theories. The study highlights how firm performance shapes the way that divesting affects profitability and growth, while shedding light on the mechanisms by which divestiture affects subsequent performance and, ultimately, firm fate. The results provide a base for studies of the dynamic processes of resource change and subsequent performance.

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ORCID

Elena Vidal  <http://orcid.org/0000-0002-5361-2284>

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