

# Segmentally aware: know when to merge and when to purge

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## Abstract

**Purpose** – The purpose of this paper is to hone in on the degree of segment-level integration relative to corporate post-merger performance.

**Design/methodology/approach** – The sample consists of 89 segments in 29 combined companies resulting from large mergers and acquisitions (M&A) transactions between 2001 and 2014 in the pharmaceutical and chemical industries worldwide. The authors track the change through M&A in performance of segments with different integration forms as well as performance of entire companies with different integration levels.

**Findings** – The authors find that integrating the segments from the target significantly improves the acquirer's overall performance, as well as the concerned segments' performance, following an M&A transaction. Whereas the segments from the target company, when left unintegrated, not only exhibit subpar performance among all the segments, but also appear responsible for the worsening corporate performance. Various possible reasons for this contrast are discussed.

**Originality/value** – This paper raises awareness of the significance of segment-level analyses, and contributes to the post-merger integration (PMI) research by examining the influence of structural integration on operating segments. To the best of our knowledge, this paper is the first to investigate integration forms and the post-merger financial performance of various segments within companies.

**Keywords** Mergers and acquisitions, Post-merger integration, Operating segment, Post-merger performance, Segment performance

**Paper type** Research paper

## Introduction and theoretical background

Mergers and acquisitions (M&A) change the market position, innovation capabilities, as well as the financial performance of the combined company, and also have a strong effect on management and employees internally (Graebner *et al.*, 2017). A common goal of M&A is to create a sum greater than its parts through synergies between the acquirer and the target. Operating synergies can be realized with cost savings through economies of scale and scope, innovations and access to new markets. Financial synergies include potential tax savings and lower cost of capital (Bower, 2001; Graebner *et al.*, 2017).

With the full realization of these synergies, companies' performance is expected to improve. However, empirical evidence shows that M&As sometimes have negative financial impact on both the acquirer (Graebner *et al.*, 2017) and the target (Barkema and Schijven, 2008). Many of the challenges or even failures stem from poor post-merger integration (PMI) (Graebner *et al.*, 2017; Schweizer, 2005).

The existing literature provides dichotomous views on the effect of PMI. Cording *et al.* (2008) suggest that integration in functions such as human resources management, production, marketing programs, and strategic planning systems has a positive influence on company performance, such as higher stock returns (Cording *et al.*, 2008; Zollo and Reuer, 2010), increased profitability (Zollo and Reuer, 2010), and smoother knowledge transfer (Cording *et al.*, 2008; Puranam *et al.*, 2006; Puranam and Srikanth, 2007). On the flip side, high integration



implies the removal of autonomy, which could disrupt the target’s operations (Paruchuri *et al.*, 2006; Zaheer *et al.*, 2013) or hinder further innovation (Puranam and Srikanth, 2007).

This paper intends to unveil whether – and under what conditions – companies financially benefit from M&As. The overarching research question is how post-merger financial performance is associated with various forms of PMI. With regard to financial performance, we investigate both the segment and the company level.

For segment-level analyses, we study operating segments. An operating segment is defined as “a component of an entity engaging in business activities from which it may earn revenues and incur expenses, and whose operating results are reviewed regularly by the entity’s chief operating decision maker” (IFRS, 2006). Operating segments are usually characterized by their specialized products and services, which is known as business units, such as healthcare, crop science or material science; or sometimes characterized by geographical market, such as the USA and Europe. Those segments are operated separately (Karim, 2006) and required by the International Financial Reporting Standards (IFRS) to report separate financial results[1].

For each segment acquired from the target, the acquirer decides whether or not to integrate it into its own existing segment. Affected by the acquisition and integration to varying degrees, individual segments’ performance differs (Karim, 2006). Such differences in individual segments’ performance are masked by the aggregated company-level performance. Thus, there is a need to break down the corporate body into segments for more profound scrutinization. This paper investigates the influence of integration form on corporate post-merger performance through segment-level analysis (Figure 1).

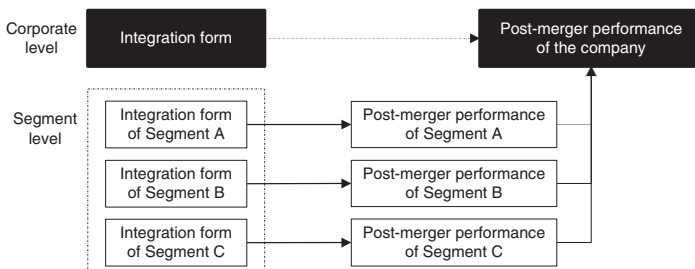
Prior literature focuses on integration at the corporate level, and there is a dearth of research observing segment-level performance upon integration. This paper contributes to the PMI research by analyzing the influence of structural integration on operating segments. To the best of our knowledge, this paper is the first to investigate the impact of various forms of segment-level PMI on financial performance (Table I).

In line with Karim (2006), we distinguish the origin of segments between acquirer and target. Based on the pre-acquisition ownership, segments can be classified into three categories: integrated segment, unintegrated target segment, and unintegrated acquirer segment (Figure 2).

*Integrated segment*

An integrated segment is formed when a target’s segment is integrated with an acquirer’s segment. Since the two segments are then operated as an integrated whole, it is possible to generate operating synergies, such as cost savings through economies of scale and scope, innovations, and access to new markets. Segment integration enables rotation of R&D personnel and joint development activities, which can optimize resource utilization (Barney, 1991; Karim, 2006) and enhance knowledge transfer (Puranam and Srikanth, 2007).

However, integration can also bring about challenges. For example, integration could incur lay-off and brain drain, resulting in human costs (Babić *et al.*, 2014; Buono, 2003).



**Figure 1.**  
The relationship  
between integration  
form and post-merger  
performance through  
the segments

Moreover, when the top management is unversed in the business of the target (Krug *et al.*, 2014) or unqualified to manage an enlarged part of the company (Shaver and Mezas, 2009), it must devote additional time and attention.

In sum, segment integration can be both advantageous and disadvantageous. We are thus agnostic about its effect on financial performance.

*Unintegrated target segment*

An unintegrated target segment is taken over from the target by the acquirer, yet continues to operate separately from the acquirer’s existing segments with little-to-no integration. An unintegrated target segment would retain its autonomy and operate in an uninterrupted manner (Puranam and Srikanth, 2007; Paruchuri *et al.*, 2006).

Therefore, we conjecture that the post-merger performance of unintegrated target segments should not differ significantly from the pre-merger one.

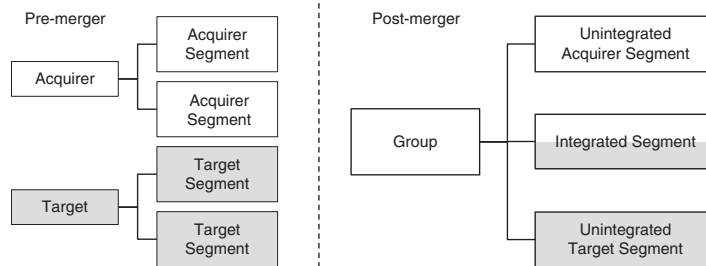
*Unintegrated acquirer segment*

An unintegrated acquirer segment is a segment of the acquirer not involved in the acquisition. Operated as pre-merger, the unintegrated acquirer segment is expected to perform as well as before, provided there are no adverse exogenous incidents. However, even an unintegrated segment may perform slightly better due to the sheer size of a company. For example, an enhanced international reputation may lead to attraction of more customers.

Thus, we hypothesize that the post-merger performance of unintegrated acquirer segments should be no worse than the pre-merger one.

**Table I.**  
Overview of post-merger performance studies in the PMI literature and the contribution of this paper

	Research subject	
	Corporate-level performance	Segment-level performance
<i>Post-merger performance</i>		
Financial		
Accounting-based	Zollo and Reuer (2010) Ellis <i>et al.</i> (2011)	This paper
Stock market-based	Cording <i>et al.</i> (2008) Zollo and Reuer (2010)	na
Non-financial		
Acquisition survival	Bergh (2001)	Karim (2006)
Intermediate goal achievement (such as knowledge transfer and innovation)	Puranam <i>et al.</i> (2006) Puranam and Srikanth (2007) Reus <i>et al.</i> (2016)	na
Surveys	Bauer and Matzler (2014)	na



**Figure 2.**  
Segments classified by pre-merger ownership

## Data and methodology

### *Sample selection*

Our sample encompasses the universe of recorded M&As worldwide in the pharmaceutical and chemicals industry with a transaction value exceeding \$1bn that occurred between 2001 and 2014 (see Table AIII in Appendix for SIC codes considered). In total, we identify 29 historical deals, which involve 89 segments. According to our taxonomy described in the previous section (Figure 2), our sample entails 44 unintegrated acquirer segments, 37 integrated segments and 8 unintegrated target segments. The acquirers in our sample are all publicly listed companies. The list of companies and their operating segments can be found in Table AIV.

In this paper, we do not distinguish between mergers and acquisitions. For each M&A transaction, we define the acquirer as the party who publishes the consolidated financial reports. We compare the acquirer's post-merger consolidated financial reports with the pre-merger reports, to identify the newly added operating segments, which we define as unintegrated target segments. We identify integrated segments through notes to financial statements. We gather data from firsthand reports of the acquirers, including M&A announcements, conference calls, company presentations (acquisition and strategy related) and annual reports (10-K). Acquisition-related information, such as transaction size and expected synergies, are sourced from M&A announcements and conference calls. Financial results are collected from annual reports, with a particular focus on segment-level information.

Data analyses performed involve mixed methods: we apply descriptive and comparative statistics and additionally conduct ordinary least squares (OLS) regression for corroboration purposes. We investigate the relationship between integration forms and post-merger financial performance at the segment level (first level of analysis) and company level (second level of analysis).

### *Measurement of post-merger performance*

This paper measures companies' financial performance by return on sales (ROS), also known as the operating margin, which reveals the profitability related to operations. Return on assets (ROA) is another indicator of profitability, used more frequently to measure post-merger performance in the existing literature (Cording *et al.*, 2010). The two financial performance measures can be expressed as:

$$\text{ROS} = \frac{\text{Operating profit}}{\text{Sales}},$$

$$\text{ROA} = \frac{\text{Net income}}{\text{Total assets}}.$$

ROA is greatly influenced by the closing date of an M&A deal. For example, if an acquisition is closed at the mid-term of a financial year, only the half-year net income of the target is counted in ROA, and if the acquisition is closed at the beginning of the year, the full-year net income of the target is counted; whereas the denominator of the indicator, total assets, does not vary proportionately to the net income. ROS, on the other hand, is less influenced by the closing date, since both the operating profits and revenues measure the same period of performance (see Figure A1).

Post-merger performance  $\Delta\text{ROS}$  is measured by the change of ROS three years after the acquisition relative to one year prior the acquisition:

$$\Delta\text{ROS} = \text{ROS}_{T_3} - \text{ROS}_{T_{-1}}.$$

This paper uses the closing date as the reference point, denoted by  $T_0$ , when the integration begins and financial consolidation starts. We observe the post-merger performance for

three years, and compare the third-year performance to the pre-acquisition year. This time horizon is widely applied in PMI research (see e.g. Ellis *et al.*, 2011) since three years are considered sufficient for companies to fully realize the expected operating synergies (Cording *et al.*, 2008). From content analysis on M&A announcements, we find companies expect synergies to be fully realized in 2.25 years on average (Table AIV).

Since the transactions took place between 2001 and 2014, the financial performance change before and after the acquisition might be partially explained by the trend of the industry in these years. The results of ROS change of our sample are thus adjusted by subtracting ROS change of industry over the same period.

Formally, post-merger relative performance can be expressed as:

$$\begin{aligned} \Delta ROS^{Adj} &= \Delta ROS - \Delta ROS^{Industry} \\ &= (ROS_{T_3} - ROS_{T_{-1}}) - (ROS_{T_3}^{Industry} - ROS_{T_{-1}}^{Industry}). \end{aligned}$$

Similarly, the post-merger performance of a specific year is adjusted by subtracting the difference between the industry ROS in that year and the average industry ROS over the whole research period (2000-2017), expressed as:

$$ROS_t^{Adj} = ROS_t - (ROS_t^{Industry} - \overline{ROS^{Industry}}),$$

where:

$$\overline{ROS^{Industry}} \equiv 19.63\%.$$

$\overline{ROS^{Industry}}$  is obtained from Wharton Research Data Services (WRDS) Industry Financial Ratio, and we take the results of “Drugs” and “Chemicals”, as shown in Figure A2.

## Results

### Segment performance

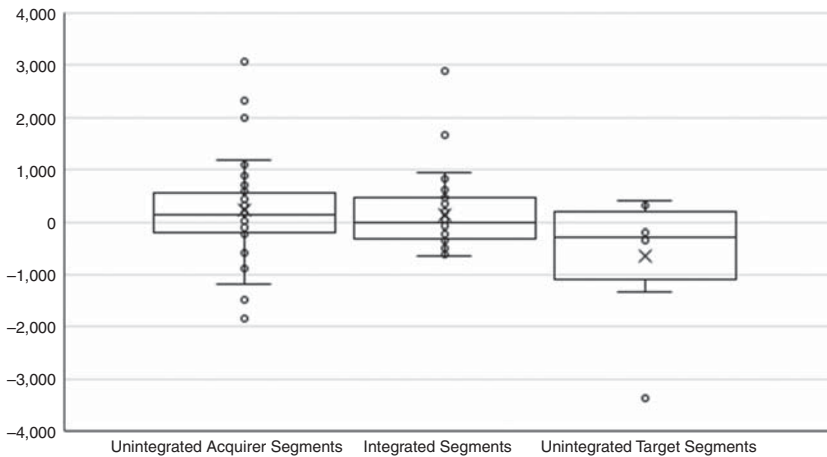
Table II presents the descriptive statistics of segment-level post-merger performance  $\Delta ROS^{Adj}$  and Figure 3 illustrates the statistics. The post-merger performance of integrated segments and unintegrated acquirer segments increase significantly by 146.82 bps and 237.15 bps, respectively. Unintegrated target segments witnessed a significant decrease by 632.13 bps on average.

Post-merger performance is a joint outcome of benefits and costs from integration. For integrated segments, M&A synergies and other integration benefits are realized within

**Table II.**  
Post-merger  
performance  
( $\Delta ROS^{Adj}$ ) of  
segments by  
integration form

$\Delta ROS^{Adj}$ (in bps)	Unintegrated acquirer segment	Integrated segment	Unintegrated target segment
Count	44	37	8
Mean	237.15** (0.0493)	146.82* (0.0970)	-632.13* (0.0945)
Median	128.29	-6.42	-280.96
SD	931.47	675.46	1,228.93
Skewness	0.87	2.19	-1.94
Minimum	1,834.17	-656.60	-3,377.50
Maximum	3,073.89	2,887.05	394.03

**Notes:** *p*-value in parentheses as the results from one-sided *t*-tests compared to 0. The significance of results: \**p* < 0.1; \*\**p* < 0.05; \*\*\**p* < 0.01

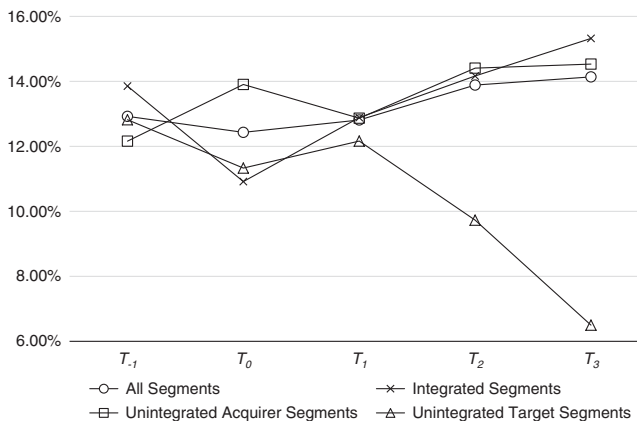


**Notes:** The box plot shows the quartiles of the distribution of the  $\Delta ROS^{Adj}$  in basis points (bps). The mean of the distribution is marked as X. The upper border of the box marks the first quartile, the lower border the third quartile, and the middle line in the box the median. The upper and lower line out of the box is 1.5 IQR (interquartile range). Points falling outside the IQR are considered outliers

**Figure 3.** Box plots of segments post-merger performance ( $\Delta ROS^{Adj}$ ) by integration form

three years and supersede high integration costs. Unintegrated target segments suffer acquisition-related costs, but gain limited benefits without proper integration. Unintegrated acquirer segments gain indirect benefits from the acquisition, and do not suffer from the acquisition. OLS regression provides similar results (see Table AI).

PMI is a long-term process. Integration costs are incurred at the beginning of the integration, while the benefits are earned back gradually. Figure 4 shows the dynamic of segments' post-merger performance over time. In the year of closing, integrated segments and unintegrated target segments experience a slump in  $ROS_t^{Adj}$ , as a consequence of the significant costs related to acquisition and/or integration. After that, the  $ROS_t^{Adj}$  of integrated segments increases gradually and exceeds the pre-acquisition performance



**Figure 4.** Financial performance ( $ROS_t^{Adj}$ ) of segments by integration form

from  $T_2$ . The performance of unintegrated target segments recovers in  $T_1$ , but decreases again afterwards.

*Company performance*

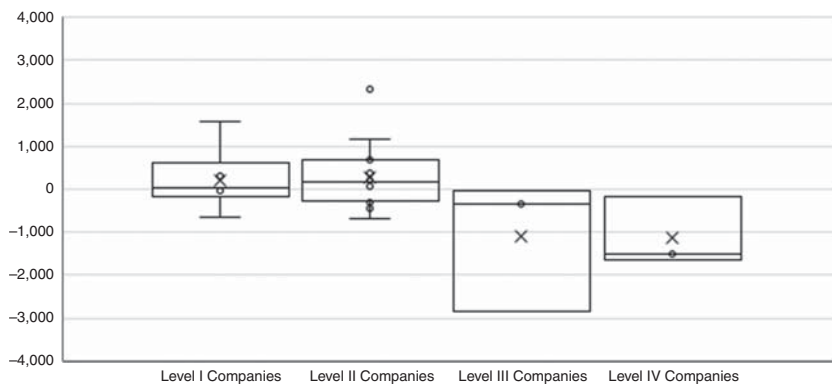
Based on a company's composition of its segment types, we distinguish four patterns of companies by level of integration: Level I companies consisting of only integrated segments; Level II companies consisting of integrated segments and unintegrated acquirer segments; Level III companies consisting of integrated segments, unintegrated target segments and unintegrated acquirer segments; and Level IV companies consisting of unintegrated target segments and unintegrated acquirer segments.

Table III presents the descriptive statistics of company-level post-merger performance  $\Delta ROS^{Adj}$ , and Figure 5 illustrates the statistics. Integration Level I and II companies perform better post acquisition, with ROS change of 211.56 and 261.73 bps, respectively,

$\Delta ROS^{Adj}$ (in bps)	I	II	III	IV
Count	6	17	3	3
Mean	211.56 (0.26)	261.73* (0.08)	-1,083.62 (0.17)	-1,116.52* (0.07)
Median	29.34	155.26	-349.05	-1,514.79
SD	304.46	175.18	889.94	470.28
Skewness	1.36	1.51	-1.66	1.67
Minimum	-663.57	-692.80	-2,854.93	-1,655.30
Maximum	1,582.31	2,330.13	-46.90	-179.48

**Table III.** Post-merger performance ( $\Delta ROS^{Adj}$ ) of companies by integration level

**Notes:** I: companies consisting of integrated segments; II: companies consisting of integrated segments and unintegrated acquirer segments; III: companies consisting of integrated segments, unintegrated target segments and unintegrated acquirer segments; IV: companies consisting of unintegrated target segments and unintegrated acquirer segments. *p*-value in parentheses as the results from one-sided *t*-tests compared to 0. The significance of results: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$



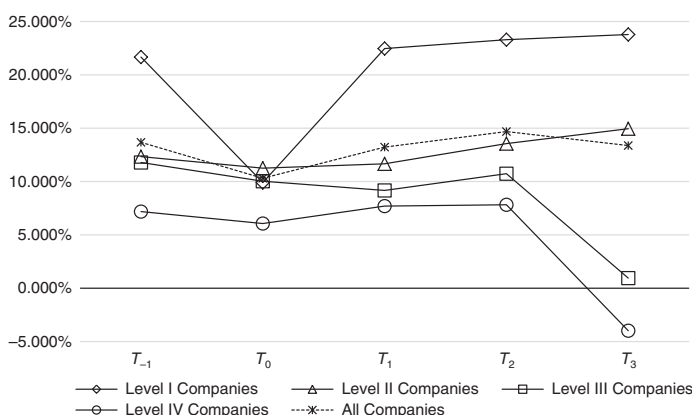
**Figure 5.** Box plots of companies' post-merger performance ( $\Delta ROS^{Adj}$ ) by integration level

**Notes:** The box plot shows the quartiles of the distribution of the  $\Delta ROS^{Adj}$  in basis points (bps). The mean of the distribution is marked as X. The upper border of the box marks the first quartile, the lower border the third quartile, and the middle line in the box the median. The upper and lower line out of the box is 1.5 IQR, (interquartile range). Points falling outside the IQR are considered outliers

while integration Level III and IV companies underperform, with decreases of 1083.62 and 1116.52 bps, respectively. The OLS regression shows similar results (see Table AII).

Figure 6 shows the dynamic of companies' post-merger performance over time. The higher integration level leads to higher integration costs at the year of closing, which may lower the ROS at  $T_0$ . Integration Level I and II companies keep improving gradually after the acquisition, benefiting from the integration, while Level III and IV companies experience a slump in ROS at  $T_3$ .

Table IV shows the sources of company-level ROS change, broken down into segments. The integrated segments in higher integration-level companies benefit more, and the unintegrated target segments in higher integration-level companies suffer less. The unintegrated acquirer segments also contribute to the post-merger performance of the combined company, and within the companies of various integration levels, such segments perform differently. Within Level II companies, both integrated segments and unintegrated acquirer segments experience an improvement, and the latter realize an even higher increase, which means not only the integrated segments but also the unintegrated acquirer segments benefit from a high level of integration. Within Level III companies, where some of the segments are integrated while others remain separate, all segments perform worse. Within Level IV companies, the deterioration in performance of the



**Figure 6.** Financial performance (ROS<sub>t</sub><sup>Adj</sup>) of companies by integration level

	Unintegrated acquirer segments (n = 44)	Integrated segments (n = 37)	Unintegrated target segments (n = 8)	Company-level performance (n = 29)
Company I (n = 6)		220.3		211.6
integration II (n = 17)	358.6	186.6		261.7
level III (n = 3)	-156.4	-148.1	-92.9	-1083.6
IV (n = 3)	68.5		-1171.3	-1116.5
All Companies (n = 29)	237.2	146.8	-623.1	-30.4

**Notes:** Numbers report  $\Delta ROS^{Adj}$  (in bps). Sample size in parentheses. I: companies consisting of integrated segments; II: companies consisting of integrated segments and unintegrated acquirer segments; III: companies consisting of integrated segments, unintegrated target segments and unintegrated acquirer segments; IV: companies consisting of unintegrated target segments and unintegrated acquirer segments. The difference between the company-level figure and the aggregated segment-level figure comes from the non-operating segment's results, such as headquarter administrative expenses, which appear only at the corporate level

**Table IV.** Segments' post-merger performance change within companies of different integration level

unintegrated target segments cannot be sufficiently offset by the betterment of the unintegrated acquirer segments, leading to a negative average performance change.

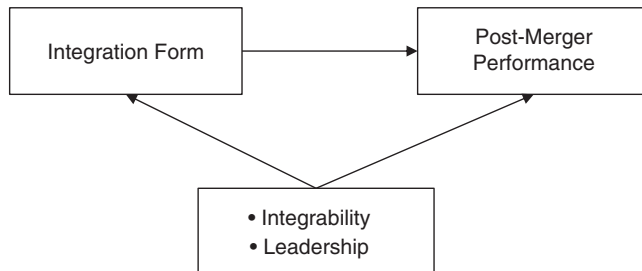
**Discussion**

Post M&A, we observe a significant performance improvement in unintegrated acquirer segments, an improvement to a lesser extent in integrated segments, but a performance decline in unintegrated target segments. There are several ways to interpret these outcomes (Figure 7).

First, the form of integration might directly affect financial performance. Our research results suggest that having target segments integrated with the acquirer segment would yield a better performance than leaving them unintegrated. Various synergies of M&A are expected to be realized more efficiently through integration. Integrating two segments into one makes it possible to reduce operating costs through the elimination of redundant corporate functions, such as human resources and finance departments. Technologies and experience are expected to be better shared within a segment than between segments, where the rotation of R&D personnel and joint development activities are possible (Puranam and Srikanth, 2007). As the management teams of the acquirer and the target work more closely together, cross-selling opportunities and other potential synergies can be explored and realized.

Second, the correlation between integration forms and financial performance may result from endogenous factors such as integrability of segments and leadership. The integrability of a target segment can be mirrored by, for example, the degree of similarity and complementarity between the acquired segment and any existing acquirer segment. Therefore, an integrated segment might have ended up in such a form because there were foreseeable synergies between the segments in the first place, whereas a target segment might remain unintegrated exactly because it was not economically feasible or opportune to integrate. In this case, we suggest an acquirer carry out a thorough assessment on the integrability of target segments before making M&A decisions. The acquirer should conduct careful due diligence and understand the businesses, operation and culture of the target company, which contributes to the success of PMI (Ai and Tan, 2017). A pre-merger engagement, such as joint business development and joint tendering, in compliance with competition laws, might help counterparties assess integrability better and pave the way for a more successful integration.

Integration forms and financial performance might also be simultaneously influenced by company leadership. Due to the complex nature of integration, a high integration level suggests a competent leadership, which is an enabling condition of improved financial performance. It is recommended to leave target segments unintegrated when the acquirer's management team is less experienced and the diseconomies of managing occurs



**Figure 7.**  
Association between  
integration form and  
post-merger  
performance

(Shaver and Mezas, 2009). Besides competence, management incentives can also affect integration forms and financial performance. For example, the management of an acquirer may decide to purchase the target simply because of a coveted patent or a desire for empire building. In this case, integration might be neglected and the management would not be engaged in the acquired segments. This could partially explain the subpar performance of unintegrated target segments. Besides, when the management has to manage more segments after the acquisition, the overload of work and improper time allocation can lead to continuous errors and omissions (Seshadri and Shapira, 2001), which result in poor integration and worse segment performance.

Based on our findings, acquirers with all target segments integrated demonstrate superior financial performance. Although integration may be costly and time-consuming, the company and its segments benefit from the integration, and the realized synergies offset the costs. We suggest that management beware of the adverse impact of unintegrated segments on the entire company's financial performance. When the feasibility of target integration is low, we recommend an acquirer be wary of the transaction, since empirical evidence shows a weaker post-merger performance of the unintegrated target segment. Alternatively, companies can also consider building a partnership, such as a joint venture or strategic alliance.

## Conclusion

This paper investigates the association between integration form and both segment- and corporate-level post-merger performance. Based on the sample of large M&A transactions in the pharmaceutical and chemical industry, our segment-level analysis shows that the post-merger performance of integrated segments and unintegrated acquirer segments improves, while unintegrated target segments perform worse after acquisition. Regarding the company-level analysis, we find companies with a higher integration level perform better, and that the segments within experience improvement. We suggest acquirers consider integrability when making M&A decisions. Upon M&A, acquirers would benefit from integrating all target segments instead of letting them operate separately.

Our results at the company level partially corroborate the findings in past literature that structural integration has positive correlation to post-merger performance (Bauer and Matzler, 2014; Cording *et al.*, 2008; Zollo and Reuer, 2010) with a specific focus on segment integration forms. We build our theory of segment analysis on Karim (2006), who compares the performance of different segments within a company.

Our research raises the awareness that each segment within a company is operated separately and performs differently after acquisition. Existing research on M&A and PMI lacks insights in segment-level operation and performance. This is the first paper in the research area of PMI measuring segment post-merger performance by segment-level financial figures, and considering our limitations, we expect future research studies to address the following issues.

First, due to the scarcity of large M&A transactions in the pharmaceutical and chemical industry, we arrive at a small sample size and thus refrain from considering excessive control variables. Within the time span of three years, various other events and activities affecting company performance might have occurred. To control for additional factors, researchers may populate a larger sample by lowering the transaction size threshold, and/or considering more industry sectors.

Second, we are concerned about the reliability of the accounting-based measurement, since accounting returns can be manipulated (Cording *et al.*, 2008). Other research has used stock market performance, but unfortunately this measure cannot be obtained for segments,

because the traded entity is the whole company. Non-financial measurements for segment performance can be explored. For example, intermediate goal achievement which measures unmonetized improvement such as resource optimization and knowledge transfer (Cording *et al.*, 2008), is another important performance indicator worth investigating.

Last, our research considers only structural integration at the segment level. Further research could, through case study methods, examine integration processes, and the contrast between a formal, explicit integration form and a de facto, implicit type.

#### Note

1. Information on an operating segment should be separately reported if: reported revenue (external and inter-segment) is 10 percent or more of the combined revenue of all operating segments (IFRS, 2006).

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**ROS**

In terms of International Financial Reporting Standards (IFRS), the consolidation of financial statements is regulated in IFRS 3 “business combination” and IFRS 10 “consolidation of financial statements”. In brief, all the assets and liabilities of the target are consolidated at acquisition-date fair value (IFRS 3.18), while the revenues, profits and losses of the target are consolidated into the consolidated financial statements from the date the acquirer gains control (IFRS 10: B88) (see Figure A1).

**OLS regression**

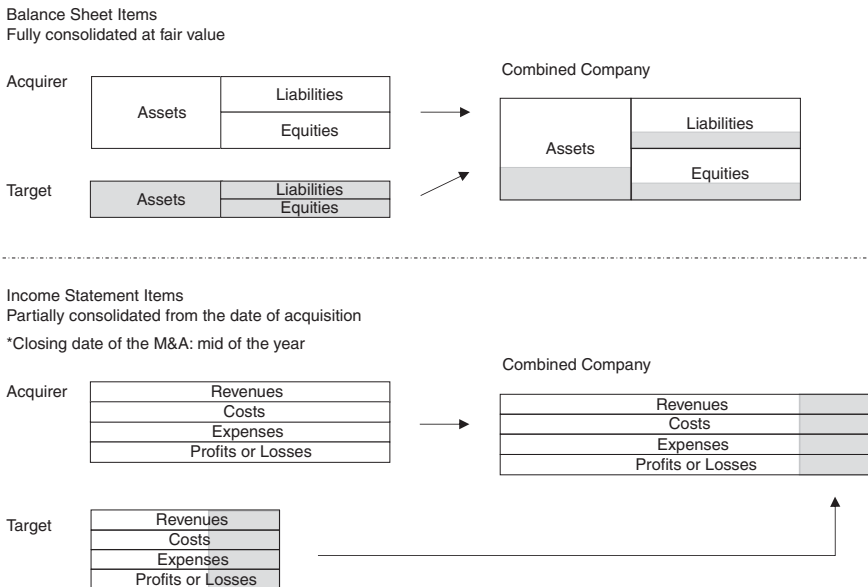
Below we explain the independent variables and control variables for the OLS regressions on  $\Delta ROS^{Adj}$ , and present the results of the regressions. Due to the scarcity of large M&A transactions, we are constrained by limited empirical data points. The small-n nature of the study prevents us from considering many exogenous factors in our econometric model.

*Independent variables*

Dummy variables are used to distinguish the type of segments.

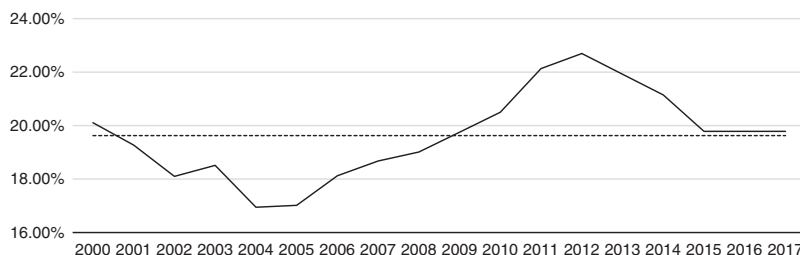
*Control variables*

*Company size*, measured as the logarithm of the acquirer’s assets in  $T_0$ , and *segment size*, measured as the logarithm of the segment’s sales in  $T_0$ , are controlled respectively when we research on the company performance and segment performance. *Transaction size*, measured as the logarithm of target’s value, is included as a control variable. *Industry performance* is measured by the five-year average ROS of the industry between  $T_{-1}$  and  $T_3$  for each transaction.



**Figure A1.**  
Different treatments  
of consolidating the  
balance sheet and the  
income statement  
under IFRS

**Notes:** Balance sheet items: the balance sheet figures of the target are totally consolidated to the combined company, regardless the closing date in the year. Income statement items: the income statements figures are partially consolidated to the combined company, depending on the closing date in the year; here the last six-month results are consolidated



**Figure A2.**  
Industry ROS of  
drugs and chemicals  
by year and the  
average industry ROS  
over the whole period

Independent variables	Dependent variable: $\Delta ROS^{Adj}$					
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	103.41 (0.41)	112.43 (0.94)	195.89** (0.04)	394.54 (0.79)	8.34 (0.95)	67.10 (0.97)
<i>Segment type</i>						
D1	43.41 (0.82)	-8.63 (0.97)				
D2			-828.02** (0.01)	-838.14** (0.02)		
D3					228.80 (0.23)	263.80 (0.17)
Segment size		-26.29 (0.88)		-130.38 (0.42)		-1.08 (0.99)
Transaction size		-289.79 (0.20)		-187.57 (0.39)		-328.79 (0.14)
Industry performance		1,382.16 (0.85)		1,860.97 (0.79)		595.36 (0.93)
Adjusted $R^2$	-0.01	-0.02	0.06	0.05	0.01	0.00
$F$	0.05	0.53	6.74**	2.10*	1.48	1.01
$n$	89	89	89	89	89	89

**Table A1.**  
OLS regression of  
segments' post-merger  
performance

**Notes:**  $p$ -value in parentheses. D1: 1 – integrated segment; 0 – all other segments. D2: 1 – unintegrated target segment; 0 – all other segments. D3: 1 – unintegrated acquirer segment; 0 – all other segments. \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

Independent variables	Dependent variable: $\Delta ROS^{Adj}$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	-93.52 (0.65)	-4,814.74 (0.16)	-444.26 (0.10)	-3,224.43 (0.32)	91.13 (0.61)	-3,203.02 (0.29)	94.92 (0.60)	-3,894.76 (0.22)
<i>Company pattern</i>								
D1	305.08 (0.50)	544.47 (0.26)						
D2			705.99** (0.05)	705.25* (0.07)				
D3					-1,174.75** (0.04)	-1,408.81** (0.02)		
D4							-1,211.44** (0.04)	-1,126.55* (0.06)
Company size		1,124.13* (0.08)		530.50 (0.37)		966.45* (0.08)		735.42 (0.19)
Transaction size		-387.68 (0.50)		228.86 (0.69)		-11.54 (0.98)		-98.60 (0.85)
Industry performance		1,097.18 (0.93)		2,285.84 (0.85)		-3520.02 (0.77)		4,986.81 (0.69)
Adjusted $R^2$	-0.02	0.01	0.10	0.09	0.11	0.18	0.12	0.11
F	0.47	1.10	4.23**	1.70	4.52**	2.53*	4.86**	1.84
n	29	29	29	29	29	29	29	29

**Notes:**  $p$ -value in parentheses. D1: 1 – integration Level I companies (consisting of integrated segments); 0 – all other companies. D2: 1 – integration Level II companies (consisting of integrated segments and unintegrated acquirer segments); 0: all other companies. D3: 1 – integration Level III companies (consisting of integrated segments, unintegrated target segments and unintegrated acquirer segments); 0 – all other companies. D4: 1 – integration Level I companies (consisting of unintegrated target segments and unintegrated acquirer segments); 0 – all other companies. \* $p < 0.10$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$

**Table AII.**  
OLS regression of companies' post-merger performance

**Sample list**

SIC code	Industry
2836	Biological products, except diagnostic substances
2899	Chemicals and chemical preparations
2813	Industrial gases
2851	Paints, varnishes, lacquers and allied products
2841	Soap and other detergents, except specialty cleaners
2873	Nitrogenous fertilizers
2821	Plastics materials and synthetic resins
2879	Pesticides and agricultural chemicals
2865	Cyclic crudes and intermediates, and organic dyes
2895	Carbon black
2874	Phosphatic fertilizers
2891	Adhesives and sealants
2819	Industrial inorganic chemicals
2869	Industrial organic chemicals
2844	Perfumes, cosmetics and other toilet preparations
2816	Inorganic pigments

**Table AIII.**  
Industry of our sample considered by SIC code

No.	$T_0$	Acquirer	Target	Expected years till full-synergy realization	Company integration level <sup>a</sup>	No.	Operating segment	Segment integration form <sup>b</sup>
1.	2002	Bayer	Aventis Crop Science	na	II	1	Crop science	i
						2	Pharmaceuticals, Biological products	ii
						3	Consumer care, Diagnostics	ii
						4	Animal health	ii
						5	Polymers, chemicals and material science	ii
2.	2002	Amgen Inc.	Immunex Corporation	2 years	I	1	Amgen	i
3.	2004	Air Liquide	Messer Griesheim (Germany, the UK and the USA)	3 years	I	1	Air Liquide	i
4.	2005	IMC Global (Mosaic)	Cargill Crop Nutrition	3 years	II	1	Phosphate	i
						2	Potash	ii
						3	Offshore	i
5.	2005	Bayer	Roche Consumer Health	3 years	II	1	Pharmaceuticals, biological products	i
						2	Consumer health	ii
						3	Crop protection	ii
						4	Environmental science, Bioscience	ii
						5	Materials	ii
						6	Systems	ii
6.	2005	Monsanto Company	Seminis	na	II	1	The seeds and genomics	i
						2	Agricultural productivity	ii
7.	2006	Procter & Gamble	Gillette Company	3 years	III	1	Beauty	i
						2	Grooming (New)	iii
						3	Healthcare	i
						4	Snacks and pet care	ii
						5	Fabric care and home care	ii

(continued)

Segmentally aware

**Table AIV.**  
Sample list of companies and their operating segments

No.	T <sub>0</sub>	Acquirer	Target	Expected years till full-synergy realization	Company integration level <sup>a</sup>	No.	Operating segment	Segment integration form <sup>b</sup>
8.	2005	Cytec	UCB (Surface Specialties Business)	1 year	IV	6	Baby care and family care	ii
						1	Surface specialties	iii
						2	Performance Chemicals	ii
						3	Engineered materials	ii
						4	Building block chemicals	ii
9.	2005	Crompton Corporation (Chenitura)	Great Lakes Chemical Finalize	2 years	III	1	Consumer products	iii
						2	Others	iii
						3	Crop protection	ii
						4	Other segments	i
10.	2006	Reckitt Benckiser	BOOTS Healthcare International	2 years	II	1	Europe	i
						2	NAA	i
						3	Developing markets	i
11.	2006	Linde AG	BOC	3 years	II	1	Gas	i
						2	Engineering	i
12.	2007	Monsanto Company	Delta and Pine Land	na	II	1	The seeds and genomics	i
						2	Agricultural	ii
13.	2007	Givaudan	Quest International	3 years	II	1	Productivity	i
						2	Fragrances	i
14.	2007	QIAGEN	DIGENE	1 year	I	1	Flavor	i
15.	2008	Akzo Nobel N.V	Imperial Chemical Industries PLC	2 years	II	2	Decorative paints	i
						3	Performance coating	i
						4	Specialty chemicals	i
16.	2008	PPG Industries	SigmaKalon	2 years	III	1	Performance coating	i
						2	Industrial coatings	i
						3	Architectural coatings-	iii
						4	EMEA (New) Optical and specialty materials	ii

(continued)



No.	T <sub>0</sub>	Acquirer	Target	Expected years till full-synergy realization	Company integration level <sup>a</sup>	No.	Operating segment	Segment integration form <sup>b</sup>
26.	2012	Linde	Lincare	na	II	2	Reinforcement materials	ii
						3	Restructured segments	ii
						1	Gas: America/Africa	i
						2	Gas: Europe	ii
						3	Gas: Asia/Pacific	ii
						4	Engineering	ii
27.	2013	PPG	AKZONOBEL (North American Architectural Coatings Business)	3 years	II	1	Performance coating	i
						2	Industrial coatings	ii
						3	Glass	ii
28.	2014	Huntsman	Rockwood (Performance Additives and TiO2 Businesses)	1 year	II	1	Pigments and Additives	i
						2	Polyurethanes	ii
						3	Performance products	ii
						4	Advanced materials segment	ii
						5	Textile effects	ii
29.	2014	Bayer	Merck and Co., Inc (consumer care business)	3 years	II	1	Consumer health and animal health	i
						2	Pharmaceuticals	ii
						3	Crop science	ii

**Notes:** Average expected years till full-synergy realization is 2.25 years. Total number of operating segments is 89. <sup>a</sup>Company integration level: "I" means companies consisting of integrated segments; "II" means companies consisting of integrated segments and unintegrated acquirer segments; "III" means companies consisting of integrated segments, unintegrated target segments and unintegrated acquirer segments; "IV" means companies consisting of unintegrated target segments and unintegrated acquirer segments. <sup>b</sup>Segment integration forms: "i" stands for integrated segment; "ii" stands for unintegrated acquirer segment; and "iii" stands for unintegrated target segment