



Knowledge transfer, life cycle stages, and M&A success.

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Resumo/Abstract

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Acquiring another company has long been understood as a growth or survival strategy. Nonetheless, prior literature consistently shows that most of the deals are value-destroying. We address this setting by investigating the "knowledge transfer" as a driver of M&A success, arguing that the control for the firms' life cycle stages clarifies how this driver performs differently for firms in different conditions. Using a sample of US M&A deals concluded between 2000 and 2021, we predict and find evidence that growth- and mature-stage firms reach better outcomes by acquiring and adequately integrating the target firm resources. Meanwhile, firms at the decline stage seem to achieve better operational results by attracting new management via a reverse knowledge transfer, where the acquired knowledge is employed to help the firm to return to profitability. We also show this relation using alternative perspectives of deal outcome (goodwill impairment and cumulative abnormal return). Collectively, the results are consistent with the absorptive capacity theory that predicts more than motivation but the managerial ability to reach better outcomes. The overall findings support the underlying theory and can benefit financial analysts, financial advisors, managers, entrepreneurs, and institutional investors interested in M&A deals.

Keywords: Mergers and acquisitions. Success. Synergy. Absorptive capacity.

1. Introduction

This paper examines the knowledge transfer controlled by the firm's life cycle stage as a mechanism under which acquirer firms succeed in M&A deals. Theory predicts that M&A deals are ultimately motivated by the seek for synergies, which are expected to create value for shareholders (Mueller, 1969). However, in past decades, 70 up to 90% of the acquisitions have failed in this goal (Martin, 2016). Prior evidence shows that bidders' overpayment is one factor that could explain the undesirable outcomes (Gu & Lev, 2011). Researchers, in turn, have been struggling to find other consistent explanations for value-destroying deals as well as existing drivers of success (Aktas et al., 2016; Chen et al., 2018; Harford et al., 2012; Jensen, 1988; Roll, 1986). In short, the pursuit of synergy in M&A deals has two main reasons: to grow or to survive. In this regard, prior literature in accounting and finance evidence a firm's life cycle effect on M&A (Owen & Yawson, 2010), where declining firms are more prone to engage in diversifying deals as a path to survive (Ames et al., 2020).

However, achieve the success in an M&A requires more than motivation, the firm must have *a priori* the necessary ability to conduct a management integration (Ruth et al., 2013), otherwise, such ability to reinvent will have to be purchased. Linnanen (1995) introduces a framework where the company's decision-making process reflects the firm's life cycle, where the integration demands the optimization of the impacts caused by the products system during its life cycle. Assuming the firm to be an aggregate of its products (Dickinson, 2011; Mueller, 1972), the firm's life cycle approach offers an attractive perspective to examine this complexity as a mechanism to identify better outcomes.



On the one hand, accounting researchers argue that these theoretical gains are hard to estimate due to compounded factors such as a flurry of reconstructing that follows the deal completion (Dickinson et al., 2016; Jensen, 1988) and due to the market booming (Bouwman et al., 2009). On the other hand, practitioners suggest other factors to reach the estimated synergy, such as providing the acquired firm with access to growth capital, enhancing managerial oversight, transferring valuable skills, and sharing valuable capabilities (Martin, 2016).

This scenario is consistent with studies developed from the management perspective. However, prior studies show limited evidence on the proposed theories to explain M&A outcomes (Castro Casal & Neira Fontela, 2007; Ruth et al., 2013; Sarala et al., 2016; Yahiaoui et al., 2016). In the accounting literature, little attention has been given to this setting where new resources must be properly integrated with the existing ones, consistent with the firm's life cycle stage in the attempt to achieve better outcomes.

To fill this gap, we shed light on this conflicting setting under the assumption that knowledge transfer is a driver of synergy, but we argue that while acquirers with growth opportunities employ their ability to better allocate acquired assets, other acquirers walk in the opposite direction, demanding the target management team to conduct the managerial integration and drive the business. Demerjian et al. (2012) support that firm's life cycle affects the set of opportunity for new projects. Therefore, although the managerial ability impacts the firm growth, the management team is only the internal driver. Under the Structure-Conduct-Performance framework (Bain, 1959; Porter, 1981), the firm plays a game with other participants, where the actions are taken considering the overall scenario. While some firms engage in acquisition to raise the barriers to entry, other engage in an attempt to react/adapt to a new structure (Teece et al., 1997).

Hence, we address the question of how the knowledge transfer controlled by the firm's life cycle stage impacts M&A outcomes.

We follow the recent literature to use the five-stage model of a firm's life cycle (Bhattacharya et al., 2020; Dickinson et al., 2018; Habib & Hasan, 2017; Shahzad et al., 2022; Vorst & Yohn, 2018), and we use the Demerjian et al. (2012)'s measure of management ability to estimate the knowledge transfer. We examine acquirer and target management ability both separately and as a ratio (acquirer-to-target management ability ratio), and the latter allows me to address the idea of "transfer". M&A outcomes are proxied by the industry-adjusted operational return, goodwill impairment, and the cumulative abnormal market return (Barber & Lyon, 1996; Chen et al., 2018).

The remainder of the paper proceeds as follows. We develop the hypotheses in Section 2. In Section 3, we define the research design, describing the sample selection, the sources of data, and the econometric models. In section 4, we present the main results and perform some robustness tests. We finally offer concluding remarks in Section 5.

2. Hypotheses Development

2.1. Integration Process and Absorptive Capacity

M&A is an event that changes the firm nature (Mueller, 1969). Briefly, firms engage in M&A mostly to grow or to survive. However, most of the acquirers fail to achieve the expected outcomes, and researchers have long been struggling to find explanations for value-destroying



acquisitions as well as to find drivers of success (Clifford, 2008; Harford et al., 2012; Healy et al., 1992; Moeller et al., 2005). More important than motivation for the acquisition is the managerial ability to conduct the integration process with the acquired firm resources (Ruth et al., 2013).

The managerial ability relies on the absorptive capacity of the firm (Bae et al., 2020; Cohen & Levinthal, 1990). The underlying theory predicts that absorptive capacity exceeds the concepts of individual knowledge. Instead, it depends on the ability to transfer the knowledge from a unit to another (Cohen & Levinthal, 1990). In other words, M&A deals success relies on the understanding of merging external acquired resources with internal knowledge as a strategic instrument to achieve competitive advantage after merger (Bae et al., 2020; Lane et al., 2006).

Though, managerial ability is not necessarily a synonym of firm efficiency because the former considers the management-specific efficiency driver while the latter implies a broader view of a firm (Demerjian et al., 2012). Moreover, the authors support that ability to drive the business must be consistent with the firm's life cycle stage. Firms in different life cycle stages are expected to present different patterns of strategy and governance (Filatotchev et al., 2006; Jenkins & Kane, 2004; Mueller, 1972). Then, understanding the absorptive capacity consistent with the firm's life cycle stage enhance the view of the former as a governance mechanism that can affect the firm's performance.

2.2. Management Integration and Life Cycle Stages

Life cycle theory characterizes firms at the introduction stage when the business model and overall structure are not as consolidated as firms at the growth and mature stages (Mueller, 1972; Penrose, 1959). However, these components of uncertainty are different from firms in the decline stage, and can be reduced as long as the management team come up with innovative ideas (and strategies to implement them) in order to seek growth (Mueller, 1972). Stigler (1950) draw the first stage of a product commercialization to have a length related to the ease of copying the initial innovator but also the size of the market for the new product. Then, growing via acquisitions is one of the strategies to lead this race. Penrose (1959, p. 20) states that growth relies on the firm's versatility, driven by "creative and dynamic interaction between a firm's productive resources and its market opportunity."

Consistent with this idea, some firms as soon as they go public, they acquire other firms in the attempt to increase the market-share and raise the entry barrier for new entrants (Brau et al., 2012). However, acquiring another firm during the first stage is a riskier attitude, because introduction-stage firms usually present higher asymmetry, lower access to fund, and higher intrinsic risk these firms use to have (Al-Hadi et al., 2016; Hasan et al., 2015). If going public usually requires internal changes such as recruiting more professionalized personnel and increasing the information environment, making acquisitions in the early stages is an even more challenging effort, which enhances the uncertainty. In the initial stage, the firm value primarily relies on discretionary future investment (Myers, 1977).

The intuition is that introduction-stage firms have a considerable amount of uncertainty due to a low track record, but the management team of an introduction-stage firm has incentives to believe in delivering a great growth opportunity. Spence (1979) uses the richness of structure to state that investment and growth are limited by physical and financial factors, and more capable management of early-stage firms anticipates investment to exploit the advantages of leading the



market. Accordingly, Richardson (2006) supports the view that firms make significant investment in new opportunity in early stages. Under this scenario, We hypothesize:

H1: Introduction firms have better M&A outcomes the greater the knowledge transfer from the acquirer to the target.

Growth and mature firms are characterized by having greater knowledge about their operation, which results in greater profitability compared to firms in other stages (Dickinson, 2011; Jenkins & Kane, 2004; Mueller, 1972). Meanwhile, growth firms still have some barriers to remove, such as trying to gain new clients, to retain the existing ones, and to optimize internal processes (Miller & Friesen, 1984). Subsequently, the firm proceeds with the assumed strategy: to add differential attributes to justify an increase in price or to cut expenses in order to reach the cost leadership position (M. Porter, 1996). Then, growth firms may adopt the buying growth strategy to accelerate this process. Again, hunting synergic targets is challenging because the integration must fit not only the acquirer structure but the pace the acquirer is at; otherwise, the integration would hinge the growth expectation instead of contributing to do so.

The market value of growth firms is supported by a historic of real revenue growth and market-share expansion. Miller & Friesen (1984, p. 1164) describe the growth-stage firms as those with “established competences” and that “enjoyed initial product-market success”. Firms in this stage are advancing in consolidating contracts with clients and suppliers. As a result, growth firms achieve better operating performance (Dickinson, 2011), lower intrinsic risk (Hasan et al., 2015) as the informational asymmetry decreases (Al-Hadi et al., 2016). Spence (1979) posits the timing of capital investment to put firms in asymmetrical positions. Then, in the context of M&A, assuming the team management to conduct the firm to the growth stage, the existing knowledge is vital to the integration process, by timely adapting and appropriately allocating the acquired resources (Kogut & Zander, 1993). Therefore, we predict that better outcomes derive from an acquisition where the knowledge transfer flows from the growth-stage acquirer to the target, denoting the appropriate allocation of acquired assets to finally meet the expectations.

To mature-stage firms, the motivation to acquire is slightly different. The expectation is that growth firms evolve to maturity as they stabilize sales (in a high level) and enrich their structure (Miller & Friesen, 1984). Empirical literature shows these firms to have lower informational asymmetry (Habib et al., 2019; Quinn & Cameron, 1983), easier access to funding (Hasan et al., 2015; Myers, 1977), and higher profitability (Dickinson, 2011).

However, profitability and dividends do not necessarily satisfy the investors of a mature firm. Instead, because the market dynamic insert pressure via competition, engaged investors claim for new $NPV > 0$ investment projects. Consequently, the team is pressured to revisit the existing resources and products portfolio, with closer attention to the organizational capital (process, practices, and learning). The objective is to analyze whether there is a room for organic growth, via innovating ideas or if new investments such as acquisitions are necessary to innovate and create value. Although it seems easier for mature firms to grow via acquisitions, different factors disturb this process contributing to failure: misalignment incentives (Boone & Harold Mulherin, 2008; Fung et al., 2009) and comparatively greater access to capital growth (Richardson, 2006), that facilitates overconfidence (Roll, 1986).

In an M&A, the expectation is that the existing management finds synergic targets to meet the new strategy. For instance, when the *Whole Foods Inc.* was acquired by *Amazon.com* in 2017



(at mature in the previous year), the Amazon board of Directors announced that the deal was an effort “to actively assess rapidly evolving industry dynamics, intensifying competitive conditions, deflationary price pressures and technological changes relevant to the Company’s business and its long-term prospects” (See Schedule 14A¹). The reasoning behind the purchase was to cover a growing demand for healthier food, dealing with a superior client segmentation, where new process and technologies could be applied by Amazon’s team to gain market share and increase the overall firm value. This case illustrates how mature firms may conduct the resource integration in order to increase firm value by enhancing the organization growth and understanding the environment complexity mentioned by Miller & Friesen (1984).

Then, we hypothesize:

H2: Growth and Mature firms have better M&A outcomes the greater the knowledge transfer from acquirer to target.

Meanwhile, fierce competition, saturation of market, as well as internal problems related to products and team management may lead the firm to hazardous conditions, where uncertainty rises again (Miller & Friesen, 1984; Penrose, 1959). Under this scenario, new investment projects for returning to profitability - such as via acquisitions - would be conducted with a biased outlook, likely leading to a risk of failure. Therefore, new external managerial service could help to reallocate the acquired collection of resources. However, for a decline-stage acquirer, the acquisition is an ultimate effort to survive, seeking to renovate the business model, via turnarounds, in order to facilitate the penetration in new markets (Ib Löfgren et al., 2020).

The access to funding is not as important factor to return or achieve growth as the understanding of managerial ability (Cohen & Levinthal, 1990). Unlike the other stages, decline-stage firm’s management should consider bring new management, opening a room for a reverse knowledge transfer (Nair et al., 2015). Therefore, we hypothesize:

H3a: Decline firms have better M&A outcomes to the extent the knowledge transfer from target to acquirer increases.

If the decline situation is also a result of a downward in a specific industry (e.g., low demand or new client preferences), a rational attitude to survive would be migrating to a different industry. Consistently, Anand & Singh (1997) propose that a firm can redeploy by entering new market, and that the degree of fungibility of resources depends on the organizational conditions. (Ames et al., 2020) shows that decline-stage firms are more likely to engage in diversifying acquisition due to the lack of competitive advantage. The acquisitions would open a room for entering new business to survive (Shleifer & Vishny, 1988). Therefore, if a firm is attempting to reposition its business model, it is plausible to assume that the acquired firm’s management is better positioned to execute the plan to return to growth. Then, the reverse integration will be even more crucial to achieve better outcomes in diversifying deals.

H3b: Decline firms achieve better M&A outcomes in diversifying deals as the knowledge transfer from target to acquirer increases.

3. Data and Variables

¹ Proxy Statement Pursuant to Section 14(a) of the Securities Exchange Act of 1934, retrieved by <https://www.sec.gov/Archives/edgar/data/865436/000157104917006539/t1702003-prem14a.htm>.



3.1. Sample

We obtain M&A data from the SDC Platinum on deals completed between January 2000 and December 2021 involving traded US firms, according to the criteria summarized in Table 1:

Table 1 - Sample Selection – M&A Dataset

M&A Data Selection Criteria	Number of deals
M&A deals concluded between 2000 and 2021	12,639
Exclude generic and governmental acquirers	-1,380
Exclude deals without deal value information on SDC Platinum	-1,433
Percent of shares sought ≥ 50	-3,629
Exclude deals where acquirer and target have the exact CUSIP number	-57
Exclude deals of serial acquirers (≥ 4 deals in a single year)	-58
Exclude non-top deals for multiple acquisitions in the same year	-500
Exclude repeated deal information	-2
Final Sample (Gross)	5,580

Next, we merge the database of deals with Compustat overall dataset using CUSIP6, resulting in 2,404 deals and a total sample of 216,707 firm-year observations, excluding firms without SIC information and without information required to calculate the interesting variables. Following the related literature (DeAngelo et al., 2004; Fama & French, 2001; Owen & Yawson, 2010), we exclude firms from the financial (SIC codes 6000-6999) and utility (SIC codes 4900-4999) to focus on “industrial firms” firms. This screening process results in 1,713 deals.

3.2. Variables

We follow prior literature to examine different approaches for M&A deal outcomes (Chen et al., 2018). The first perspective of outcome concentrates in capturing the operational result (Equation 1), which is expected to drive all others in the long-term.

$$\Delta ROA_{IND,it} = \frac{ROA_{i,t} - ROA_{i,t-1}}{ROA_{i,t-1}} - \frac{IND_{ROA}_{(t\&3);(t\&1)} - IND_{ROA}_{(t\&3);(t\&1)}}{IND_{ROA}_{(t\&3);(t\&1)}} \quad (1)$$

We adjust the accounting return on asset to the firm’s two-digits SIC median to alleviate concerns about industry overall movements. ROA is the net income divided by the average of total assets between current and previous fiscal year (Barber & Lyon, 1996). We follow the notion that more important than increase the firm’s profitability is increasing it above the median industry. Moreover, by using an average of a three-years window post and prior to acquisition, we alleviate the concern about when the new configuration effectively generates result to the combined firm (e.g., via sales growth, cost reduction) (Chen et al., 2018).

Second, we use the amount of goodwill (GDWL - Compustat #204) recognized subsequent to the acquisition, scaled by Total Asset (Compustat #06). For firms that recognized amounts in goodwill in one year, we replace missing values in subsequent years for zero. This procedure significantly increases the number of observations. Alternatively, we test the change in two, three, and four years in robustness tests to mitigate the effects of artificial growth due to business combination. In addition, following Chen et al. (2018), we use an indicator that assumes one if the firm reports goodwill impairment (GDWLIP – Compustat #368) in the fiscal year the acquisition is completed (year t) or either of the three years subsequent to the completion, and zero otherwise.

Third, also following Chen et al. (2018), we use the acquirer’s three-day announcement returns as a measure of acquisition efficiency. The Cumulative Abnormal Return (CAR) is the stock market-based view of the deal outcome. Ultimately, CAR represents the overall impact of



an event on a stock's performance, beyond what would normally be expected, after the acquisition announcement (Barber & Lyon, 1996; Chen et al., 2018).

We use the Management Ability measure of Demerjian et al. (2012). Managerial ability is a component of the overall firm efficiency measure. Specifically, the authors regress Firm Size, Firm Market Share, Cash Availability, Life Cycle (Firm Age), Operational Complexity, and Foreign Operation on Firm Efficiency. Therefore, using this measurement of managerial ability of acquirer (Acq_MA_Score) and target firm (Tg_MA_Score), we estimate a proxy for the Knowledge Transfer, which accounts for the way the combination of resources will be conducted during the management integration, as presented in Equation 2.

$$\frac{Knowledge\ Transfer_{it}}{Acq\ MA\ Score} = \frac{Tgt\ MA\ Score}{Acq\ MA\ Score} \quad (2)$$

Therefore, values for Knowledge Transfer greater than one indicate that the management integration flows from the acquirer to target, and values lower than 1 represents that target firm have greater management ability and will conduct the management integration. Notably, we use the terms “knowledge transfer” and “transfer of managerial ability” interchangeably. we also test the acquirer’s and target’s managerial ability separately to conduct additional tests.

Consistent with the recent literature (Bhattacharya et al., 2020; Dickinson et al., 2018; Habib & Hasan, 2017; Shahzad et al., 2020, 2022; Vorst & Yohn, 2018), we use the five-stage model of firm’s life cycle proposed by Dickinson (2011), where a firm is classified into Introduction, Growth, Mature, Shake-out, and Decline according to the signals of cash flow from operating, investing, and financing activities, as shown in Panel 1.

Panel 1 - Combination of cash flow signals

Cash Flow	Intro	Growth	Mature	Shake-out			Decline	
From Operating Activities	-	+	+	-	+	+	-	-
From Investing Activities	-	-	-	-	+	+	+	+
From Financing Activities	+	+	-	-	+	-	+	-

Source: Dickinson (2010, p. 9)

In addition, since the cash flow statement explains the variation in structure, this measure allows to capture non-progressive transitions, where a firm can be classified as decline in t and move to growth in $t+1$. Such transition would reflect a recovery in structure, while a firm that persists in decline convey a significantly different signal. Therefore, to robust the notion behind the measure that it reflects “differential behaviors in the persistence and convergence patterns of profitability” (Dickinson, 2011, p. 1969), we use the persistence in each stage for two or more years prior to acquisition. To reduce the concerns about discretion on determining the time, we also test the persistence in at least three years.

4. Research Design and Main Results

To examine all the hypotheses about the knowledge transfer impact, controlled by a firm’s life cycle stage, on better M&A deal outcomes, we use the Equation 3:

$$Outcome_{it} = \beta_0 + \beta_1 KnowledgeTransfer_{it} + \beta_2 \sum_{+ \$1}^{4} FirmLCS + \sum_{k \$ /}^{8} \beta_k (KnowledgeTransfer * Acq_LCS) + \beta_k Controls_{it} + \alpha_{ind} + \delta_{year} + \epsilon_{it} \quad (3)$$

The hypotheses are tested via the coefficient $\beta_k (KnowledgeTransfer * Acq_LCS)$, where H_1 and H_2 predicts a positive relationship between the better outcomes and the knowledge transfer from acquirer to target in deals where the acquirer is at the introduction (H_1), growth, and



mature stages (H_2). On the other hand, $H_{\$a}$ predicts a negative relationship between better outcomes and the knowledge transfer. Indirectly, this negative signal implies an idea of “reverse knowledge transfer”. We segregate the deals into different types to test the hypothesis $H_{\$b}$ of better outcomes for reverse knowledge transfer in diversifying deals, when acquirer is at the decline stage. Then, the expectation is of a negative and significant coefficient for the interaction *Knowledge Transfer * Decline*.

Control variables are segregated into deal-related variables and firm-related variables, following the consistent literature (Ames et al., 2020; Chen et al., 2018; Habib & Hasan, 2017; Owen & Yawson, 2010). Appendix A describes each variable. In short, the deal-related control variables comprise the following: *All_Cash*, *All_Stock*, *Diff_Ind*, *Hostile*, *Rel_Size*, *Target_ROA*, and *Target_Lev*. Firm-related variables are as follows: *FCF*, *ROA*, *FirmSize*, *MTB*, *Leverage*, *Liquidity*, *IGRO*, and *ISHK*. Descriptive Results

Table 2 shows the descriptive statistics for the full sample, where all metric variables are winsorized at 1% and 99%.

Table 2 - Descriptive Statistics

Variable	N	Mean	SD	Min	p25	p50	p75	Max
Dependent Variables								
<i>Δ_ROA_ni_IND</i>	908	-0.014	0.307	-4.846	-0.049	-0.012	0.021	3.678
<i>Δ_ROA_ib_IND</i>	920	-0.012	0.242	-3.721	-0.047	-0.011	0.022	2.839
<i>Δ_ROA_oibdp_IND</i>	905	-0.011	0.221	-3.646	-0.050	-0.013	0.023	2.671
<i>Goodwill-Write-off (3Y)</i>	1086	-0.001	0.011	-0.232	0.000	0.000	0.000	0.064
<i>GW_Impairment (3Y)</i>	1713	0.290	0.454	0.000	0.000	0.000	1.000	1.000
<i>CAR</i>	985	-0.008	0.096	-0.397	-0.049	-0.007	0.029	0.510
Independent Variables								
<i>Acq_MA_Score</i>	1489	0.051	0.178	-0.261	-0.072	0.004	0.127	0.683
<i>Tg_MA_Score</i>	1008	0.005	0.133	-0.261	-0.076	-0.016	0.054	0.683
<i>Knowledge Transfer</i>	985	0.545	7.400	-34.970	-0.767	0.527	1.605	35.940
Deal related Control Variables								
<i>All_Cash</i>	1713	0.433		0.000	0.000	0.000	1.000	1.000
<i>All_Stock</i>	1713	0.208		0.000	0.000	0.000	0.000	1.000
<i>Diff_Ind</i>	1713	0.507		0.000	0.000	1.000	1.000	1.000
<i>Hostile</i>	1713	0.004		0.000	0.000	0.000	0.000	1.000
<i>Friendly</i>	1713	0.971		0.000	1.000	1.000	1.000	1.000
<i>Rel_Size</i>	1459	0.298	0.450	0.001	0.033	0.143	0.377	2.853
<i>Tgt_ROA</i>	981	-0.300	1.450	-10.902	-0.224	0.012	0.093	2.011
<i>Target Leverage</i>	1231	0.167	0.222	0.000	0.000	0.050	0.277	1.015
Firm-related Control Variables								
<i>Acq_Leverage</i>	1687	0.236	0.178	0.000	0.089	0.221	0.361	0.599
<i>Acq_Liquidity</i>	1699	0.149	0.155	0.006	0.036	0.092	0.208	0.656
<i>Acq_Firm_Size</i>	1709	8.013	2.261	-1.619	6.484	8.073	9.694	13.614
<i>IGRO</i>	1096	0.025	0.274	-0.335	-0.200	-0.010	0.209	0.506
<i>ISHK</i>	1095	0.247	0.179	0.029	0.088	0.205	0.395	0.554

Similar to Chen et al. (2018), who studied the 1983–2009 period, we find a mean (median) of -1% (0%) for change in industry-adjusted return on asset. While the mean values of ROA using the operating income (*oibdp*) is seemingly and expectably higher than the others, the median values show a different pattern, with ROA using the net income (*ni*): -0.012 against -0.011 of ROA using the income before extraordinary items (*ib*). Such differences are also observable in the max values,



where the highest value of $\Delta_{ROA_ni_IND}$ indicates a firm have appreciated a variation of 3.67 p.p. after the acquisition, while the $\Delta_{ROA_ib_IND}$ indicates a change of 2.839p.p. The differences between them basically lies on the tax issues. Indeed, some deals are motivated by tax attributes, such as the amount of net operating loss carryforwards and tax credits (Hayn, 1989).

Moreover, we find both mean and median of Cumulative Abnormal Return close to -1% for acquirers, which is close to the findings reported by Chen et al. (2018). The average of Goodwill write-offs presents a lower rate compared to the previous study. We find positive mean and median, even when we test the variation in two, three or four years. Although this approach is sensitive to a decision to disclose the impairment goodwill, which is only found in a few cases, this different pattern may signalize a different merger wave compared to previous studies.

To further examine the main variable of interest, Table 3 shows the mean differences (t-tests) of managerial ability across the life cycle stages.

Table 3 - Univariate Test – Mean Difference Test

Variables	Acq_MA_Score	Tg_MA_Score	Difference
<i>Full</i>	0.052	0.003	0.048***
Panel A: Acquirer's Life Cycle Stage			
<i>Acq_Introduction</i>	-0.004	-0.007	0.003
<i>Acq_Growth</i>	0.033	0.001	0.032***
<i>Acq_Mature</i>	0.084	0.019	0.064***
<i>Acq_Shake-out</i>	0.083	-0.019	0.101***
<i>Acq_Decline</i>	0.028	0.013	0.014
Panel B: Target's Life Cycle Stage			
<i>Tgt_Introduction</i>	0.070	-0.008	0.078***
<i>Tgt_Growth</i>	0.057	0.016	0.040***
<i>Tgt_Mature</i>	0.034	0.006	0.027***
<i>Tgt_Shake-out</i>	0.037	-0.005	0.042**
<i>Tgt_Decline</i>	0.085	0.003	0.082***

We operationalize this test in three ways: First, we test overall management ability for acquirers compared to target firms, and find that, on average, acquirers have greater managerial ability than target firms. Second, we segregate the sample into the acquirer's life cycle stage, and we find that introduction and decline-stage firms present no significant difference in managerial ability; growth, mature, and shake-out stage firms present greater levels of managerial ability than their targets, on average. Third, we explore the target's life cycle stage, and find that acquirers have significantly greater managerial ability than their targets.

In untabulated results, also analyze the spearman correlation matrix, which provides some hints about acquirers and targets characteristics. We note a positive but low significant correlation between acquirer and target management ability (0.296***). This indicates that, on average, firms with high management ability are not intended to purchase another firm where the existing management team in at the same level of managerial ability. In sum, the overall analysis of correlation matrix helps to alleviate the concerns about hazardous correlation about the explanatory variables, which could characterize multicollinearity. Even so, we test the Variance Inflation Factor subsequent to the estimations.

4.1. Linear Regressions

Before testing the main hypotheses, we test the assumption about the impact of life cycle stages on acquirer management ability via a linear regression model. Table 4 shows the coefficients



for the linear regression comparing usual fixed effect approach (column 1) with multiple fixed effect (column 2). We also verify robust estimations for firm life cycle persistence (columns 3 and 4).

Table 4 - Impact of Life Cycle Stages on Acquirer Management Ability

Variables are detailed in appendix A. Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.10. Control variables are omitted to ease the exposition, but we use the same as in previous models. Independent variables are all lagged.

VARIABLES	Dep. Var.: Acquirer Management Ability		
	(1)	(2)	(3)
	<i>Life Cycle</i>	<i>Persist 2y</i>	<i>Persist 3y</i>
<i>Acq_Introduction</i>	-0.020*** (-8.431)	-0.026*** (-11.052)	-0.034*** (-11.833)
<i>Acq_Growth</i>	0.006*** -2.835	0.012*** -6.97	0.015*** -6.726
<i>Acq_Mature</i>	0.012*** -6.137	0.015*** -10.792	0.020*** -13.268
<i>Acq_Shake-Out</i>		0.007* -1.851	0.028*** -4.14
<i>Acq_Decline</i>	-0.019*** (-7.074)	-0.011*** (-3.288)	0.006 -1.214
<i>Leverage</i>	-0.040*** (-12.315)	-0.040*** (-12.297)	-0.040*** (-12.171)
<i>Liquidity</i>	0.088*** -25.331	0.084*** -24.35	0.083*** -24.092
<i>Firm_Size</i>	0.004*** -16.376	0.005*** -19.061	0.005*** -20.508
<i>IGRO</i>	0.007*** -2.827	0.007*** -2.834	0.007*** -2.814
<i>ISHK</i>	0.009** -2.536	0.009*** -2.606	0.009** -2.516
<i>Constant</i>	-0.038*** (-14.697)	-0.042*** (-20.227)	-0.043*** (-21.333)
<i>Firm FE</i>	<i>No</i>	<i>No</i>	<i>No</i>
<i>Year FE</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Industry FE</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Observations</i>	60,596	60,596	60,596
<i>Adjusted R-square</i>	14%	14%	14%

Using the full sample, the models estimated via multiple fixed effects approach explain 14% of firm's management ability variation. In the spirit of Habib & Hasan (2017), we find an "inverted-U pattern" of the acquirer's managerial ability, where the coefficients of growth and mature stages are greater than shake-out (omitted dummy), and the introduction and decline-stage firms have lower levels of managerial ability compared to shake-out firms. Results are robust to life cycle persistence in 2 or more years. These results expands the Demerjian et al. (2012)'s findings about the life cycle effect on management ability. While prior study shows a positive relationship with firm's age, we indirectly show the management ability increases from introduction to mature stage, and then it decreases as the firm moves to the decline stage. Such difference supports the modern notion that firm's life cycle does not necessarily coincides with firm's age (Dickinson, 2011).



Next, to test the hypotheses H_1 , H_2 , and H_{3a} , Table 5 shows the results for the linear regressions that captures the impact of managerial ability transfer controlled by firm's life cycle on the M&A outcomes. We use both the previous year classification (Life cycle) and the Life Cycle Persistence in 2 or more years (Persist 2y) prior to deal announcement using two operational return perspectives: the change in the firm's ROA (Δ_ROA_ni) and the change in the industry-adjusted ROA ($\Delta_ROA_ni_IND$).

Table 5 - Impact of Knowledge Transfer controlled by Acquirer's Life Cycle Stage on M&A Outcomes

Variables are detailed in appendix A. Robust t-statistics in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Control variables are omitted to ease the exposition, but we use the same as in previous models. Independent variables are all lagged.

VARIABLES	Dep. Var.: Δ_ROA_ni		Dep. Var.: $\Delta_ROA_ni_IND$	
	(1)	(2)	(3)	(4)
	Life Cycle Stage	LC Persistence	Life Cycle Stage	LC Persistence
knowledge Transfer	-0.001** (-2.138)	-0.000 (-1.208)	-0.001** (-2.198)	-0.000 (-1.211)
Introduction	0.025 (0.293)	0.365*** (3.350)	0.026 (0.305)	0.368*** (3.390)
Growth	0.015 (0.417)	0.006 (0.404)	0.014 (0.408)	0.006 (0.377)
Mature	0.002 (0.052)	-0.009 (-0.562)	0.001 (0.035)	-0.009 (-0.563)
Shake-out		-0.074 (-0.817)		-0.073 (-0.797)
Decline	0.092 (1.305)	0.133 (1.445)	0.091 (1.294)	0.133 (1.444)
knowledge Transfer * Acq_Life Cycle				
<i>Introduction</i>	-0.006* (-1.734)	-0.134*** (-2.830)	-0.006* (-1.678)	-0.134*** (-2.858)
<i>Growth</i>	0.001* (1.665)	0.000 (0.301)	0.001* (1.726)	0.000 (0.295)
<i>Mature</i>	0.001** (2.209)	0.000 (1.493)	0.001** (2.263)	0.000 (1.480)
<i>Shake-out</i>		-0.024 (-1.199)		-0.024 (-1.175)
<i>Decline</i>	-0.022 (-1.471)	-0.026** (-2.345)	-0.022 (-1.460)	-0.026** (-2.335)
Constant	-0.041 (-0.508)	-0.048 (-0.965)	-0.043 (-0.523)	-0.049 (-0.993)
Control	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	306	306	306	306
Adjusted R-square	1%	16%	2%	16%

The number of observations decreases from 1.713 deals to 306 because we require the firms to have information in seven years (three years before and after the announcement year) to calculate the variation. The coefficient of determination (R-square) is 1% and 2% for the models that use the acquirer life cycle stages prior to deal, and 16% in the models that uses the life cycle



persistence. Although we follow the existing literature to use as much control variables as possible, other factors may help to improve the model specification and power of explanation.

The only control variable significant is the relative size (Rel_Size) of the deal value, relative to the acquirer's market value. Indirectly, this variable captures the financial effort to purchase the target firm. On average, greater deals seem to increase the challenge to generate better outcomes. This result can be interpreted under two channels: or greater deals demand more complex integration (Grossman & Hart, 1986; Zollo & Singh, 2004), or overpayment inflates the relative size and compromise the financial structure after the deal (Dutta & Jog, 2009).

Examining the former perspective, we find a negative and significant coefficient for the variable Knowledge Transfer (-0.001**), which denotes an overall challenge to combine accrued knowledge of both firms to improve the firm's result. Analyzing this combination across the life cycle stage, we find a negative relationship between the knowledge transfer (from introduction-stage acquirer to targets) and the firm's operational return after the deal. Then, unlike the prediction in Hypothesis H_1 , this denotes that the greater the acquirer managerial ability compared to the target's one the lower the operational profitability after deal. The results hold for both perspectives of operational return (-0.006* and -0.007*, respectively) and for the life cycle stages persistence form (-0.134*** and -0.139***). On the other hand, the negative relation could suggest an inverted knowledge transfer angle, as expected to decline-stage firms, where the target's management team has a greater managerial ability and then conduct the integration in the combined firm.

To better understand this result, we use a multinomial logit to test the impact of the acquirer's life cycle stage (prior to deal) on the probability to purchase target in specific life cycle stages. On average, we find that introduction-stage firms are more likely to acquire targets also at the introduction stage (results are available under request). Subsequently, we test whether the management team of an introduction-stage target can lead the acquirer also at the introduction-stage (prior to deal) to find better outcomes. In untabulated results (available under request), we find a positive and significant coefficient (1.421***), which signalizes that this combination (acq_intro x tgt_intro) positively impacts the operational outcomes. However, we do not consider the knowledge transfer in this test not to incur in a triple interaction. Future researchers are invited to address this matter in more details.

We find that growth and mature firms achieve better outcomes when they conduct the integration and allocate the acquired resources. Aligned with expectation, growth and mature firms have established competences (Miller & Friesen, 1984), including consolidating contracts with clients and suppliers. In general, these firms benefit from greater knowledge about their markets, comparatively to firms in other stages (Dickinson, 2011; Spence, 1977). Moreover, these results are aligned with Kogut & Zander (1993) about the timing to allocate acquired assets. Then, we confirm the hypotheses H_2 that growth and mature firms have better M&A outcomes the greater the knowledge transfer from acquirer to target.

For declining firms, we find a negative relation between knowledge transfer and operational return, other things equal (-0.026**), as predicted in hypothesis $H_{\$a}$. This result holds for both perspective of operational return, but only when analyzing the persistence at the decline stage for two or more years. Again, although one could interpret this result as negative impact on change in ROA, we claim this significant coefficient stands for the knowledge transfer in the opposite direction. An acquisition is an even riskier movement for a decline-stage firm. In



untabulated results (available under request), we show that decline-stage firms are more likely to acquire targets at the introduction and decline stages, and this can be viewed as “hail marry” to innovate and/or to survive.

We note that decline-stage firms that appreciate positive variation of industry-adjusted ROA are those where the median values of target’s managerial ability are greater than the acquirer’s one. This result confirm the hypothesis H_{5a} , and is consistent with the literature about assimilating and transforming the target’s knowledge into growth (Bae et al., 2020; Cohen & Levinthal, 1990).

Collectively, my findings support the notion that the ability to drive the business must be consistent with the firm’s life cycle stage since firms in different life cycle stages are expected to present different patterns of strategy and governance (Filatotchev et al., 2006; Jenkins & Kane, 2004b; Mueller, 1972).

4.1.1. *Alternative proxies for M&A outcomes*

In untabulated results (available under request), we test two alternatives of deal outcomes: Goodwill write-offs and the Cumulative Abnormal Return (CAR). Due to limited number of records in goodwill-related accounts, we use an indicator that assumes one if the firm reports a goodwill impairment in the fiscal year subsequent to acquisition or in any of the three subsequent periods. The CAR is calculated using a window of three days around the deal announcement.

We find that introduction-stage firms are more likely to recognize goodwill impairment subsequent to acquisitions as the knowledge transfer increases. Goodwill impairment for introduction-stage firms can arise from, at least, three channels: overpayment, bad choice of target, or market changes. All of them potentially reveal the fact that introduction-stage firms are dealing with riskier projects, with lower background. These scenarios concur with the previous findings about lower operational return.

On the other hand, the market participants positively evaluate these acquisitions since we observe higher cumulative abnormal returns as the knowledge transfer increases from introduction-stage acquirers to target (0.186***). Though we note that this result load only for acquirers that persist at the introduction stage. We view this result as a reflect of the market *ex-ante* perspective. Although the literature shows that market has long been anticipating the firm’s performance and then adjusting the stock price (Ball & Brown, 1968), the M&A is distinct event that enhance the uncertainty about the combined firm.

For growth-stage firms, we find a significantly negative effect on the likelihood to recognize goodwill impairment subsequent to acquisition as the knowledge transfer increases, but only when the firm persists at the growth stage. This result concurs with the prediction (H_2) that growth stage firms with greater managerial ability seek adequate targets to timely integrate the business in order to achieve the expected results (Kogut & Zander, 1993). The market viewpoint, though, is different. We find neither significant result for growth nor for mature-stage firm. We interpret the nonsignificant coefficients as a response to ongoing business, where market participants can better predict the outcome, since they have more stable earnings generation (Dickinson, 2011). Then no abnormal return is perceived, since the expectation is better calibrated for firms in these stages (Vorst & Yohn, 2018).

The interpretation of decline stage-firms is again challenging. Assuming the inverted knowledge transfer, as mentioned in previous subsection, the effect on goodwill impairment is



positive. Similar to the interpretation of introduction-stage firms, decline-stage firms have lower bargain power. As a result, they are more likely to overpayments. Even considering this possibility that reduces the net income, the inverted knowledge transfer result in better accounting performance. This result is aligned with prior literature (Ames et al., 2020; Sun & Zhang, 2017) that indicates greater propensity to overpay. On the other hand, to the extent the target-firm transfer their managerial ability to acquirer, the firm appreciate a higher cumulate abnormal return (-0.054***). In other words, the market participants absorb the information as a driver of success, assuming a recovering for the so far deteriorating firm. This also reveals that because decline-stage firms have great amount of uncertainty, the stockholders positively value the new perspective considering the upcoming knowledge, perhaps through a turnaround on the business model.

Diversifying deals under new management can be viewed as facilitating the penetration in new markets (Ib Löfgrén et al., 2020). However, we find no significant result for the variables of interest when we examine the type of deals (horizontal, vertical, and diversifying). The absence of significance can be explained by different reasons, but mainly due to the few numbers of observation. Therefore, my result does not validate the hypothesis H_{sb} about the inverted knowledge transfer effect on diversifying deals where the acquirer is at the decline stage.

5. Conclusion

This paper addresses the question of how the knowledge transfer controlled by the firm's life cycle stage impacts the M&A outcomes under the acquirer point of view. The literature indicates the knowledge transfer adequacy as a determinant factor of success in M&A deals, and we show how firms in different life cycle stages achieve better M&A outcomes. While firms at the introduction, growth, and mature stages pursue M&A to grow, declining firms engage in M&A to survive. On average, M&A deals end up with decreases in both operating and market results. This supports the notion that more important than the motivation to engage is the mechanism to succeed. This paper uses the knowledge transfer approach as this mechanism, controlling for the firm life cycle.

First, we find the impact of the life cycle stage on the acquirer management ability. In addition, consistent with predictions, we find that growth and mature firms find greater improvement in operational return, compared to the industry median, when the knowledge transfer flows from the acquirer to the target, and the opposite is true for consistently declining firms. Collectively, the results support the idea of absorptive capacity as a governance mechanism to strategically combine knowledge in order to reach the success (Gorton et al., 2009; Zollo & Singh, 2004), depending on the firm's life cycle stage (Demerjian et al., 2012).

My findings contribute to at least three perspectives. *First*, we contribute to the life cycle stage and M&A literature by showing an M&A outcomes theoretical driver to be sensitive to the firm's life cycle stages. Then, my findings expand prior literature (Ames et al., 2020; Dickinson, 2011; Miller & Friesen, 1984; Owen & Yawson, 2010) with a new perspective of life cycle impact. We also validate the robust analysis of firm life cycle stage using a persistence in each stage for 2 or more years. Then, future researchers should analyze the persistence in each stage in order to verify the consistence of firm life cycle, since the 5-stage measure enables a non-progressive changing.

Second, my findings contribute to financial analysts and financial advisors, who can assess both firms' life cycle stage and the expected flow of knowledge transfer as a mechanism to predict



better outcomes. These intermediary parties can contribute to the way investors interpret the coming event, and we show results consistent with Dickinson et al. (2018) about the undervaluation of firms in a riskier stage.

Third, the findings contribute to managers, potential participants of an M&A deal, both as acquirers as targets, including institutional investors. Prior research cast some concerns about an absence of fit when merging two firms (Milliman et al., 1991; Zollo & Singh, 2004). Then, my finding supports the arguments of Ruth et al. (2013) of managerial ability to properly conduct the integration process with the acquired firm resources.

Future research can exploit further characteristics to assess the individual ability of firms' management teams across life cycle stages during M&A deals. In addition, future research may investigate eventual changes in the management team periods before the decision to engage in the M&A. Finally, further exploitation of the goodwill perspective of deal success and different specifications while calculating the CAR may help explain the results.

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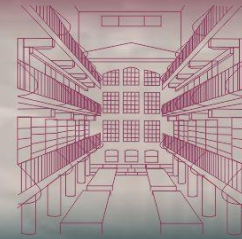
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6. Appendix A

<i>Variable</i>	<i>Description</i>	<i>Reference</i>
<i>Dependent Variables</i>		
<i>Ind-Adj Δ_ROA</i>	Change in ROA. Measured as the difference between three-year benchmark-adjusted ROA after the acquisition and three-year benchmark-adjusted ROA before the acquisition. Benchmark is the 2-digit SIC firms. ROA is calculated by dividing the net income (Compustat item #02) to total asset (Compustat item #06)	Chen (2018)
<i>GW_Imp3</i>	Indicator that assumes one if the firm reports goodwill impairment (GDWLIP – Compustat #368) in the fiscal year the acquisition is completed (year t) or either of the three years subsequent to the completion, and zero otherwise.	Chen (2018)
<i>CAR</i>	Acquirer cumulative abnormal return measured over three days around the acquisition announcement. Abnormal return is the excess of return considering the Fama-French factor model.	Barber and Lyon (1996); Chen (2018)
<i>Independent Variable</i>		
<i>Mgmt_Ability</i>	Management Ability is the residual from a firm efficiency function. This variable is retrieved from https://peterdemerjian.weebly.com/managerialability.html	Demerjian et al. (2012)
<i>Knowledge_Transfer</i>	Acquirer's management ability divided by target's management ability measure. Positive values denote transference from acquirer to target, and negative values represent the transference in the opposite direction.	



<i>Deal-related Control Variables</i>		
<i>All_Cash</i>	Indicator that assumes one if the acquisition was financed at least 90 percent by cash, and zero otherwise	Chen (2018)
<i>All_Stock</i>	Indicator that assumes one if the acquisition was financed at least 90 percent by acquirer's stocks, and zero otherwise	Chen (2018)
<i>Diff_Ind</i>	Indicator that assumes one if the acquirer and the target are in different industries based on 2-digit SIC code, and zero otherwise	Chen (2018)
<i>Hostile</i>	Indicator that assumes one if the acquisition was achieved through a hostile takeover, and zero otherwise	Chen (2018)
<i>Rel_Size</i>	Relative deal size. Measured as the ratio of the transaction value to the market value of the bidder.	Chen (2018)
<i>Target_ROA</i>	Target return on assets for the year ended before the announcement year, measured as operating income before depreciation scaled by average total assets	Chen (2018)
<i>Target_Lev</i>	Target's pre-acquisition leverage. Measured as the sum of long-term debt and short-term debt deflated by total assets at the fiscal year-end prior to an acquisition announcement	Chen (2018)
<i>Firm-related Control Variables</i>		
<i>FCF</i>	Ratio of cash flow from operations minus Capital Expenditures to Total assets	Owen & Yawson (2010)
<i>ROA</i>	Ratio of income before extraordinary items to the total assets	Hasan & Habib (2017) and Owen & Yawson (2010)
<i>FirmSize</i>	Natural logarithm of total assets	
<i>MTB</i>	Ratio of the market value of common equity to the book value of common equity	Ames et al. (2020); Hasan & Habib (2017); Owen & Yawson (2010)
<i>Leverage</i>	Ratio of total debt to total asset	Owen & Yawson (2010)
<i>Liquidity</i>	Ratio of cash and marketable securities to total assets.	
<i>IGRO</i>	Previous 5 years growth in sales	
<i>ISHK</i>	Absolute difference between an industry's 5-year growth rate in sales and the average 5-year growth rate in sales across all industries	