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One-Way Versus Two-Way Postacquisition Integration Efforts: Theory and Evidence

Albert Banal-Estañol[1] | Joseph A. Clougherty[2] | Jo Seldeslachts[3,4,5] | Florian Szücs[6]

[1]Departament d'Economia i Empresa, Universitat Pompeu Fabra, Barcelona, Catalonia, Spain | [2]Gies College of Business, University of Illinois at Urbana-Champaign, Champaign, Illinois, USA | [3]Firms and Markets Department, DIW-Berlin, Berlin, Germany | [4]Faculty of Economics and Business, KU Leuven, Leuven, Belgium | [5]Faculty of Economics and Business, University of Amsterdam, Amsterdam, the Netherlands | [6]Department of Economics, WU Vienna University of Economics and Business, Vienna, Austria

Correspondence: Joseph A. Clougherty (jaclough@illinois.edu)

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ABSTRACT

We develop a theory of postacquisition integration that distinguishes between one-way (acquirer-only) and two-way (mutual) effort strategies. We argue that the method of payment—cash versus shares—may serve as an ex ante commitment mechanism to a particular integration strategy, where cash deals align with unilateral effort, and share deals induce mutual engagement. Using transaction-level mergers and acquisitions data covering 1986–2009, we show that stock-financed acquisitions yield higher postmerger productivity, particularly in knowledge-intensive industries, but also exhibit greater performance variance. These higher-mean and higher-variance tendencies for share-financed vis-à-vis cash-financed acquisitions involve countervailing effects when factoring stock-market valuations; further, share-financed acquisitions are discounted when financial markets are characterized by high degrees of risk aversion. Overall, our findings highlight how financial structure shapes integration dynamics and synergy realization.

JEL Classification: G34, L20, L21

1 | Introduction

The success or failure of mergers and acquisitions (M&A) often hinges on the postmerger integration phase (e.g., Haspeslagh and Jemison 1991; Homburg and Bucerius 2006; Barkema and Schijven 2008; Graebner et al. 2017). The postmerger stage involves complex decisions about organizational alignment, resource coordination, and managerial effort, all of which shape whether potential synergies are ultimately realized. Within this context, postmerger integration strategies can be broadly categorized by the distribution of effort between the acquiring and target firms, where effort strategies differ to the extent to which the target contributes to postmerger integration and value creation. "One-way strategies" primarily place responsibility on the acquirer, while "two-way strategies" depend on active involvement and mutual adaptation by both firms. These approaches reflect fundamentally different assumptions about control, capability integration, and effort allocation (Haspeslagh and Jemison 1991; Graebner et al. 2017; Heimeriks et al. 2020). Understanding how these strategies perform is, therefore, central to explaining overall M&A performance.

This paper presents a framework that differentiates between these two different modes of postacquisition integration—one-way (acquirer-only) effort versus two-way (mutual) integration effort—and generates testable predictions with respect to the observable performance differences between these two transaction types. We demonstrate that this distinction affects the first and second moments of the distribution in synergy outcomes. One-way strategies, in which the acquirer drives integration unilaterally, tend to produce more predictable gains, primarily through operational efficiencies, such as cost-cutting

and restructuring (Capron 1999; Maksimovic et al. 2011). These postacquisition efforts are typically associated with lower variance and more reliable postmerger performance (Larsson and Finkelstein 1999; Banal-Estañol and Seldeslachts 2011). However, they also involve limited scope for deeper value creation, as the absence of mutual engagement constrains innovation and strategic renewal (Haspeslagh and Jemison 1991; Dessein et al. 2010). In contrast, two-way effort strategies—where both firms remain actively involved—offer greater potential for long-term value through collaboration, knowledge sharing, and strategic alignment (Rhodes-kropf and Robinson 2008; Agarwal et al. 2012). These arrangements raise the potential gains from integration but introduce greater complexity and coordination risk (Haspeslagh and Jemison 1991; Puranam et al. 2009). As a result, they are characterized by a higher variance in performance: when successful, they generate substantial synergies; but failure to manage mutual dependence can lead to underperformance (Gort and Hogarty 1970; French et al. 1987).

We further argue that the method of payment in acquisitions—cash versus shares—is not merely a financial choice, but a strategic variable that shapes postmerger integration dynamics and outcomes. "Cash-financed" acquisitions naturally lend themselves to one-way effort strategies, where the acquirer assumes full control and responsibility for integration (Morck et al. 1990; Yim 2013). By contrast, "share-financed" acquisitions, where we also use the equivalent term "stock-financed" acquisitions, create ongoing financial interdependence between the acquirer and target, reinforcing incentives for mutual engagement and joint effort (Faccio and Masulis 2005; Haleblian et al. 2009). This link rests on differences in postmerger incentives for decision-makers: cash deals sever financial ties with the target, leading to the disengagement or exit of target management and personnel, and centralize effort within the acquiring firm (Krug and Hegarty 1997); while stock deals sustain shared ownership, managerial continuity, and a collaborative motivation (Graebner 2004; Ranft and Lord 2002).

Our theoretical model formalizes how the method of payment affects posttransaction effort incentives and performance outcomes. In share-financed acquisitions, both firms retain ownership in the combined entity, generating two-way effort incentives and the potential for joint value creation. In cash-financed deals, the acquirer becomes the sole residual claimant and sole contributor of postmerger effort. The model assumes that effort is costly, synergy gains depend on contributions from both firms, and that gains exhibit strategic complementarities—that is, effort by one party increases the return to effort by the other. Under this structure, stock-financed acquisitions offer higher expected synergies but are subject to strategic uncertainty, thereby resulting in higher variance. Cash deals produce more predictable but lower gains. A further key implication is that in environments characterized by high-risk aversion—whether among decision-makers or capital markets—there will be a systematic preference for cash deals, despite their lower expected value.

To situate our approach within established M&A theory, we briefly revisit Haspeslagh and Jemison's (1991) well-known framework of postacquisition integration strategies. Their typology distinguishes between integration modes along two dimensions: strategic interdependence (the extent to which value creation depends on coordination and resource sharing) and organizational autonomy (the degree to which the acquired firm retains decision-making independence). Two strategies are particularly relevant for our analysis. First, the "Absorption" strategy (high interdependence, low autonomy) emphasizes operational efficiency through tight integration, often yielding synergy gains from one-sided efforts. Second, the more complex "Symbiosis" strategy (high interdependence and high autonomy) enables collaborative value creation, relying on mutual adaptation between firms. Our conceptualization of one-way and two-way postacquisition effort maps directly onto these strategies: one-way effort corresponds to Absorption, while two-way effort aligns with Symbiosis.

One limitation of directly applying Haspeslagh and Jemison's integration typology lies in its qualitative nature (e.g., Birkinshaw et al. 2000; Ranft and Lord 2002), which makes it difficult to empirically assess or compare integration outcomes across transactions. Prior studies have noted the challenge of operationalizing such frameworks across large samples (Graebner 2004; Bauer and Matzler 2014), as they typically rely on post hoc managerial assessments or case-based classifications (Zollo and Singh 2004). Our approach addresses this gap by introducing a quantifiable framework based on the method of payment—cash versus shares—as a proxy for postacquisition integration strategy. This financing method serves as an ex ante signal of expected integration dynamics: cash deals typically reflect unilateral efforts aimed at operational synergies, while share-based deals imply mutual engagement and the potential for joint value creation (Chang et al. 2013; Fich et al. 2016). This shift from qualitative typologies to an objectively observable deal characteristic offers two methodological advantages. First, the payment method is systematically recorded in transaction data, thereby allowing for consistent comparisons across deals (Alexandridis et al. 2010). Second, it provides a directly observable and verifiable input into empirical analysis, enabling broader data-driven testing of integration theories (Capron and Pistre 2002; Banal-Estañol and Seldeslachts 2011). By grounding our framework in financial structure, we offer a scalable and testable lens for predicting synergy realization, bridging the conceptual richness of integration typologies with empirical validity.

We test the model's predictions using comprehensive transaction-level data and fixed-effects regression models. To measure realized synergy gains, we use postacquisition total factor productivity (TFP), estimated via a translog production function. The empirical evidence supports our theoretical claims. First, acquiring firms in share-financed acquisitions exhibit higher posttransaction TFP growth than those in cash deals. Second, consistent with the higher uncertainty associated with two-way strategies, we observe greater dispersion in acquirer productivity following share-acquisitions. Third, the performance advantage is greater in knowledge-intensive industries, where complementarities and joint efforts are especially valuable. Finally, we show that financial markets discount stock deals relative to cash deals in periods of elevated risk aversion, as reflected in lower 3-day cumulative abnormal returns (CARs) around the announcement.

While we initially rely on regressions that employ all the available fixed effects to test our predictions, we also undertake empirical testing that models and corrects for self-selection effects as the choice between share-financed and cash-financed deals could well be selected into by managers with performance outcomes in mind. We employ both an endogenous-treatment procedure and a standard instrumental variable (IV) approach to correct for endogeneity. Specifically, we take advantage of industry expansions (Maksimovic and Phillips 2001) and the proclivities of focal and nonfocal industry peers (Campa and Kedia 2002) to identify exogenous variation. These additional empirical results, which model and correct for the selection into the transaction mode, corroborate the main empirical findings.

A large body of literature examines the determinants of the payment method in M&As—that is, cash versus stock payments—including risk diversification, efficiency, market timing, signaling, and bidder overvaluation (e.g., Travlos 1987; Fishman 1989; Loughran et al. 1997; Rappaport and Sirower 1999). In contrast, our approach emphasizes the postmerger consequences of the payment method by linking payment to postmerger strategy and basing this on microfoundations. By focusing on the incentive structure induced by the payment form, we offer a complementary perspective that helps explain how value creation (or destruction) unfolds after the deal closes. We also contribute to a broader literature documenting productivity gains from M&A activity, particularly through improved resource allocation and technology transfer. Lichtenberg and Siegel (1990) find TFP gains in acquired plants, while Maksimovic et al. (2011) and Guadalupe et al. (2012) show that acquisitions enhance performance by enabling organizational restructuring. Building on this, we demonstrate that these productivity improvements are not uniform but vary systematically with the financing structure. Share deals, by embedding reciprocal posttransaction incentives, generate higher TFP gains than cash deals, which rely on unilateral effort. We also highlight an overlooked dimension—variance in postacquisition performance—and find that stock transactions are associated with greater dispersion in outcomes, consistent with the greater strategic uncertainty inherent in joint integration.

We organize the remainder of the paper as follows. Section 2 introduces a conceptual framework and provides micro foundations of cash- versus share-financed transactions being, respectively, connected to one-way versus two-way postacquisition efforts. Section 3 provides a theoretical model that differentiates cash-financed and share-financed acquisitions and generates formal predictions for empirical testing. Section 4 describes our data, defines the variable constructs, and sets our estimation strategies. Section 5 presents the empirical results that test our theoretical predictions, beginning with the baseline findings and then incorporating adjustments for self-selection effects. Section 6 concludes.

2 | Conceptual Framework

This section first introduces the distinction between one-way and two-way integration strategies, which form the core conceptual foundation of our analysis. These categories capture the extent to which postacquisition integration relies on unilateral versus mutual effort from the acquiring and target firms. We then show how these strategies align with the influential framework developed by Haspeslagh and Jemison (1991). We contend that the mode of payment in acquisitions—specifically, whether transactions are financed via cash or shares—plays a pivotal role in shaping these integration strategies. As we thereafter demonstrate, this link is supported by microfoundations drawn from the existing finance and strategy literature. Finally, we argue that the mode of payment in acquisitions shapes integration strategies, thereby providing a quantifiable framework for predicting synergy realization.

2.1 | One-Way Versus Two-Way Integration Strategies

A central distinction in our framework lies between one-way and two-way integration strategies. This distinction captures the degree to which postmerger integration depends on one-sided versus mutual efforts between the acquiring and target firms. In a *one-way strategy*, the integration process is driven predominantly by the acquiring firm.[1] The target firm plays a largely passive role, with the acquirer unilaterally implementing restructuring, cost rationalization, and the absorption of operations. This approach can generate synergy gains through scale and control, but often underutilizes the target's resources and capabilities. By contrast, a *two-way strategy* involves mutual effort from both the acquiring and target firms. Here, integration is based on collaboration, joint problem-solving, and reciprocal adaptation. The parties work together to combine capabilities, transfer knowledge, and jointly identify and implement synergies. While more complex, two-way strategies can unlock higher-value synergies—such as innovation, cross-selling, and strategic repositioning—that depend on interaction. This distinction provides a useful lens for interpreting integration outcomes. As we discuss in Section 2.2, our typology maps directly onto Haspeslagh and Jemison's classical integration framework, thereby allowing us to link our conceptual foundation with an established strategic perspective.

2.2 | Alignment With Haspeslagh and Jemison's Integration Strategies

We argue that our integration strategies align consistently with those in Haspeslagh and Jemison's classical framework. They classify integration approaches based on two dimensions: strategic interdependence (the need for coordinated resource use) and organizational autonomy (the extent to which the acquired firm retains independence). In the case of high interdependence, the integration strategies are twofold. First, the *"Absorption" strategy* (high interdependence, low autonomy) offers moderate to high value creation potential primarily via operational efficiencies. There is less complexity with such a strategy, but potential drawbacks, such as cultural clashes or loss of valuable personnel, exist. On the other hand, the *"Symbiosis" strategy* (high interdependence, high autonomy) offers high potential for value creation due to collaborative efforts but also involves significant complexity. These definitions clarify that the one-way and two-way effort cases in our model,

respectively, correspond to the Absorption and Symbiosis strategies. Absorption involves less complexity but primarily unilateral synergy gains, while Symbiosis, though more complex, has higher potential due to collaborative engagement.[2]

2.3 | Mode of Payment, Integration Strategies, and Outcomes

We posit that distinct financing options—cash versus shares—set the stage for specific integration strategies, directly linking financial structure to integration outcomes. Cash-financed acquisitions align with Absorption and one-way effort, allowing unilateral control and predictable but limited synergy gains. In contrast, share-financed acquisitions align with Symbiosis, fostering mutual engagement and maximizing potential synergy gains, but involving greater uncertainty due to the need for ongoing coordination.

2.3.1 | Cash-Financed Acquisitions

Cash-financed acquisitions do not necessarily preclude synergy gains, but they typically prioritize operational efficiencies over strategic synergies. Because the acquiring firm compensates the target's shareholders fully and immediately with cash, the financial link between the acquirer and target is effectively severed following the transaction. Consequently, the acquirer assumes complete control of the integration process and bears the entire financial and operational risk associated with realizing potential synergies.

In practice, this means that the acquiring company typically employs a unilateral integration strategy—driving operational restructuring, cost-cutting, and straightforward Absorption of the target's operations. Such unilateral actions generally result in clear and predictable efficiency gains. However, this approach also limits opportunities for deeper, collaborative value creation. Specifically, because the target firm's stakeholders no longer hold financial interests in the combined entity, their incentives to actively participate in integration efforts or contribute additional resources and knowledge sharply diminish. This absence of ongoing mutual incentives restricts the acquirer's ability to leverage the acquired firm's resources beyond basic operational synergies and may hinder the realization of more complex, innovation-driven strategic synergies. Thus, while cash transactions offer greater certainty and simplicity in integration, they also tend to produce synergies with lower overall potential due to limited mutual engagement between the merging entities.

2.3.2 | Share-Financed Acquisitions

In contrast, share-based transactions inherently align the financial interests of both acquiring and target firms. Since target shareholders receive shares in the combined entity rather than cash, they retain a direct financial stake in its future success. This financial arrangement creates a scenario of mutual dependence and encourages a two-way effort in posttransaction integration. Both acquiring and target firms have strong incentives to actively engage in the integration process, combining their respective resources, knowledge, and capabilities to create joint value.

The ongoing financial stake of both parties significantly enhances incentives for collaboration, fostering deeper knowledge transfer, shared innovation, and strategic alignment over a longer time horizon. This cooperative approach tends to facilitate the realization of more complex, strategic synergies that require sustained joint effort and engagement from both firms. Indeed, the continued presence of the target firm's stakeholders in the new entity creates conditions conducive to the pursuit of opportunities beyond mere cost savings, including the development of new products, technologies, or market strategies that benefit from the combined expertise of both organizations.

However, this two-way collaborative approach also inherently introduces greater complexity and uncertainty into the integration process. Because the successful realization of joint synergies depends critically on both parties' ongoing cooperation and coordination, such transactions face heightened integration risks. Achieving the full potential of strategic synergies under share-financed transactions requires careful management, clear communication, and mutual trust between the merging entities—factors that significantly raise the demands placed on management. In short, while share-financed acquisitions carry a greater potential for substantial strategic value creation due to mutual incentives, they simultaneously introduce greater integration complexity and uncertainty.

2.4 | Microfoundations of the Link Between Mode of Payment and Integration Strategies

We provide here the arguments, based on the existing strategy and finance literature, that allow making a link between payment methods and postmerger effort: first, from theoretical papers, and second, from empirical papers. We draw on literature to establish a theoretically grounded link between the method of payment in M&As and the structure of postmerger integration. This link operates through two complementary mechanisms: incentive alignment and managerial effort. From a finance perspective, equity-based payments align interests by tying the target's compensation to the future performance of the combined firm (Hansen 1987). More recent models reinforce this logic and focus on managerial motives. Oh and Park (2022) show that synergy-seeking Chief Executive Officers (CEOs) are more likely to offer stock, as doing so signals a willingness to share value creation. In contrast, empire-building CEOs tend to prefer cash, which preserves control. The choice of payment method thus functions as a credible signal of the acquirer's postacquisition intent.

Beyond signaling, the theory also emphasizes moral hazard in integration. While realizing synergies requires joint effort, cash payments create asymmetric incentives: once the target is acquired, its shareholders—and often its managers—have no residual claim on the combined firm. This may reduce their willingness to contribute postmerger efforts. By contrast, stock payments function as a form of profit-sharing. Ding et al. (2013)

show that such mechanisms improve outcomes by aligning incentives across both parties.

Empirical evidence confirms these incentive patterns. In all-cash transactions, acquirers assume the full burden of post-merger performance, while target shareholders exit entirely. This asymmetry often extends to the managerial level. Babenko et al. (2021) show that acquirers are significantly more likely to cancel target employee stock options in cash-financed deals, removing any potential upside for the target workforce. The result is a one-sided effort dynamic, with the acquirer's personnel responsible for delivering synergies, while the target's human capital is more likely to disengage or exit.

Stock-financed deals, by contrast, foster shared ownership and interdependence. When targets receive equity in the combined firm, their economic exposure—and that of their managers—continues beyond the transaction. Ghosh and Ruland (1998) find that stock-financed acquisitions are associated with greater postmerger managerial ownership by target executives. Wilkinson and Kannan (2013) similarly describe stock payments as an alignment device, comparable to equity-based compensation for managers, which links rewards to firm performance. In this view, stock payments not only encourage continuity but also strengthen target managers' motivation to contribute to integration.

A key mechanism underlying this alignment is retention. Empirical studies consistently show that managerial continuity improves integration outcomes, particularly when underpinned by financial incentives. Ghosh and Ruland (1998) report that top target managers are more likely to stay in stock deals, while cash transactions are associated with higher executive turnover and a greater risk of losing firm-specific knowledge. In such cases, early leadership departures can undermine the full realization of potential synergies.

The nature of the transaction further mediates these effects. Hostile takeovers—which bypass target management and are commonly executed via tender offers—are more likely to be financed with cash (Raghavendra Rau 1998). These deals also exhibit elevated managerial turnover: Walsh (1988) documents widespread executive exits after hostile bids, while Martin and McConnell (1991) report that over 40% of target CEOs are replaced within 1 year of a tender offer. This suggests an indirect but systematic link between cash-financing and disruption to leadership continuity.

In sum, stock-financed acquisitions tend to support a more collaborative postmerger structure. By distributing ownership and incentives across both parties, they help preserve managerial continuity, encourage reciprocal effort, and sustain the organizational capabilities embedded in the target. Cash-financed acquisitions, by contrast, centralize control within the acquirer, reduce participation from the target side, and rely more heavily on unilateral restructuring. As such, the method of payment is not merely a contractual detail but a structural determinant of postmerger integration dynamics.

2.5 | A Quantifiable Framework for Predicting Synergy Realization

One challenge in practically applying Haspeslagh and Jemison's influential framework is the difficulty associated with measuring the performance of integration strategies. While their typology provides valuable conceptual clarity, it is fundamentally qualitative. Such qualitative categorization makes systematic empirical measurement and comparison of integration setups difficult, as assessment often relies on subjective managerial judgments or detailed firm-specific case studies.

Our approach addresses this issue by shifting the analytical focus from qualitative to more objective and quantifiable metrics—specifically, the method of financing employed in the acquisition (cash vs. stock). As explained in Section 2.4, the financing method carries predictive power concerning subsequent integration efforts. In our model, the choice of financing method acts as an ex ante signal of the anticipated integration approach and the associated synergy potential. Cash-financed acquisitions typically signal an expectation of an Absorption-type integration, which is characterized by unilateral efforts aimed at straightforward synergy gains. Conversely, stock-financed acquisitions imply expectations of greater collaboration, interdependence, and knowledge sharing between merging firms, thereby reflecting the conditions necessary for symbiotic integration and more complex joint-synergy gains.

This approach provides at least two methodological advantages. First, the financing method constitutes a clear and objectively measurable transaction characteristic. Unlike qualitative evaluations of postmerger integration processes, the financing method is explicitly recorded and unambiguously documented in available transaction data. Therefore, it represents a reliable and consistent empirical measure, allowing researchers to systematically track and compare outcomes across multiple transactions without requiring extensive in-depth qualitative knowledge of each deal. Second, the method of financing offers direct observability. Financing choices—whether cash or stock—are predetermined and externally verifiable elements of the deal structure. As such, they offer researchers clear observability, facilitating comparative analysis and empirical testing across multiple transactions. By grounding our empirical analysis explicitly in the choice of financial structuring, we transition from intangible and qualitative managerial processes to an objectively measurable, data-driven approach. This not only enhances the theoretical robustness and precision of our argument but also provides a clear empirical framework that can be tested.

While our framework draws on prior literature to motivate several intermediate mechanisms—such as managerial retention, stock option preservation, and postmerger integration efforts—our empirical analysis does not seek to directly test each of these channels. Instead, we focus on the reduced-form relationship between the method of payment and postmerger performance. As our concluding remarks further specify, future work could aim to unpack the particular mechanisms via which payment choice affects integration dynamics, but our setup offers a first-order empirical validation of the hypothesized link between ex ante financing structure and postmerger

effectiveness. We now move to the model to generate clear theoretical predictions.

3 | Theoretical Model

We introduce the simplest possible model that captures the differences in posttransaction effort incentives and the resulting outcomes between cash and share-financed acquisitions. We model these two modes of payment as follows. Consider two ex ante symmetric firms, labeled as the "acquirer" and the "target," which have decided to engage in an acquisition. Since the two partnering firms are ex ante symmetric, we assume that they wield equal bargaining power when deciding upon the terms of the agreement.[3] In an acquisition financed with stocks, labeled hereafter as "share-acquisition," the two firms agree to a contract that splits the shares of the new organization equally while, in an acquisition financed with cash, labeled as "cash-acquisition," the acquirer pays the target firm a fixed amount that is equal to half of the expected joint profits.[4] That is, we assume that the two firms—or more specifically, the key decision-makers of these firms—share control of the combined organization in an equal manner in a share-acquisition, whereas the acquirer gains full control over the target firm in a cash-acquisition.[5]

We model posttransaction effort incentives and outcomes as follows. We assume that the joint profits of the new organization depend on the "synergy gains," the additional value created when the two firms combine their operations, beyond the value they could generate separately. The synergy gains, in turn, depend on the "potential gains" available in the combination, and on the extent to which these potential gains are "realized" in the posttransaction process. As argued by Farrell and Shapiro (2001), Rhodes-kropf and Robinson (2008), Puranam et al. (2009), and others, each partnering firm can contribute specific and hard-to-trade knowledge and resources to the combined organization. Yet, such contributions entail privately costly effort, representing a private sacrifice on the part of the partnering firms.

In the case of a share-acquisition, both partnering firms may be willing to exert such efforts ("two-way efforts"), while, in the case of a cash-acquisition, only the acquirer is potentially willing to do so ("one-way effort"). The key distinction lies in the structure of posttransaction incentives. In a share-acquisition, both firms retain ownership stakes in the combined entity and thus share in residual profits. This creates a direct incentive for both sides to exert effort, since the gains from synergy realization accrue jointly. However, effort remains costly, and whether each party chooses to exert it will depend on whether the expected share of benefits outweighs the individual cost. In a cash-acquisition, by contrast, the target receives a fixed payment and exits the ownership structure. It no longer holds a claim on posttransaction profits and therefore has no incentive to contribute costly effort, regardless of the potential gains. The incentive to exert effort lies solely with the acquirer, who retains full control and captures all benefits—but, again, whether that effort is actually exerted depends on the balance between the gains and costs of effort.

3.1 | Model

More precisely, we assume, following Farrell and Shapiro (2001), that the potential synergy gains that can be obtained by the resulting organization, $\theta \geq 0$, can be divided into two types. Through the contributions of *a single* partnering firm, the new organization can obtain "single synergistic gains" $\frac{\theta}{d}$ in each unit. Through the contributions of *both* partnering firms, the new organization can obtain, in addition to the twice rendered single synergistic gains ($2\frac{\theta}{d}$), "joint synergistic gains" $\theta\left(1-\frac{2}{d}\right)$ (Agarwal et al. 2012). Thus, the single and joint synergistic gains add up to the full potential gains θ.[6] The parameter d captures the degree of complementarity between partnering firms (where $d<2$ would characterize efforts as substitutes, and $d>2$ as complements). As d increases, the extra gains from contributing become larger when the partnering firm has also contributed and become smaller when the partnering firm has not done so.

The net gains for each partnering firm depend not only upon the obtained synergy gains, but also upon the costs $c \geq 0$ incurred in obtaining these gains, and are thus considered an effort. In a share-acquisition, the net gains depend upon whether the other partnering firm provides effort or not. Table 1 summarizes the net gains for each partnering firm across the four possible effort outcomes.[7] As shown in the table, it is profitable to exert effort when the other firm exerts effort so long as $\left(\frac{\theta}{2}-c\right) \geq \frac{\theta}{2d}$. Yet if the other firm does not provide effort, then it is profitable to exert effort only so long as $\left(\frac{\theta}{2d}-c\right) \geq 0$.

In the context of a cash-financed acquisition, the acquirer compensates the target firm with a fixed-amount payment, thereby de-incentivizing the target firm from exerting posttransaction effort. Yet the acquirer exerts posttransaction effort so long as the single synergistic gains in each unit are greater than the effort costs, $\left(\frac{\theta}{d}-c\right) \geq 0$, as the fixed payment to the target represents a sunk cost at that stage. Moreover, the acquirer's fixed payment to the target equals half of the net gains (due to the equal bargaining power assumption); thus, the acquiring firm earns net gains of $\frac{1}{2} \times 2\left(\frac{\theta}{d}-c\right)$ when it exerts effort and zero otherwise. When comparing the two transaction types, it is evident that partnering firms can potentially obtain larger net gains in share-acquisitions than in cash-acquisitions, $\left(\frac{\theta}{2}-c\right) > \frac{1}{2}\left(\frac{\theta}{d}-c\right)$. However, an acquiring firm engaged in a share-financed acquisition has less incentive to exert effort

TABLE 1 | Net gains for each partnering firm as a function of the realized efforts in a share-financed transaction.

	Effort	**No effort**
Effort	$\frac{\theta}{2}-c, \frac{\theta}{2}-c$	$\frac{\theta}{2d}-c, \frac{\theta}{2d}$
No effort	$\frac{\theta}{2d}, \frac{\theta}{2d}-c$	$0, 0$

Note: We report the net gains for each partnering firm in a share-financed transaction where these gains depend on the manifestation of effort by the two partnering firms; hence, four different effort outcomes are possible. These net gains involve not only the realized synergy gains, but also the costs involved with respect to obtaining these gains.

when the other partner does not exert effort as compared with an acquirer engaged in a cash-financed acquisition, $\left(\frac{\theta}{2d} - c\right) < \left(\frac{\theta}{d} - c\right)$.

3.2 | Optimal Effort Decisions

We can now consider the circumstances that incentivize the exertion of effort by the partnering firms under the two transaction types. As shown in Table 1, the posttransaction environment for share-financed acquisitions is best characterized as a coordination game in which efforts are strategic complements. We solve for (pure-strategy Nash) equilibrium results in three regions that are parametrized by the extent of the potential synergy gains, θ. If the potential gains are low, $\theta < \frac{2dc}{d-1}$, then neither partnering firm will find it optimal to exert effort. If the potential gains are high, $\theta \geq 2dc$, then both partnering firms exert effort. And finally, if the potential gains are intermediate, $\frac{2dc}{d-1} \leq \theta < 2dc$, then both partnering firms exerting effort and noneffort represent possible equilibria in this strategic game. In the case of a cash-financed acquisition, recall that target firms are paid a fixed amount up front; hence, target firms are not incentivized to engage in costly posttransaction efforts in acquisitions as they reap no rewards from such efforts. Yet, the acquirer exerts effort in an acquisition so long as the potential synergy gains from the transaction are sufficiently high, $\theta \geq dc$.

Before considering the relative incentives to exert effort in the two transaction types, we make the following simplifying assumptions. First, we hold that potential gains are high enough so that firms have an incentive to exert some effort in both transaction types; that is, $\theta > \underline{\theta} \equiv \max\left\{\frac{2dc}{d-1}, dc\right\}$. Second, in case of multiple equilibria, we assume that each of the two possible equilibrium outcomes, θ and 0, is assigned an equal probability of being realized, that is, the expected gains are $\frac{\theta}{2}$. This is one of the correlated equilibria of this game.[8] Third, we assume that the degree of complementarities is high enough so that the full potential gains, even under strategic uncertainty, are more profitable than the single synergetic gains, $\frac{\theta}{2} \geq 2\frac{\theta}{d}$, or, equivalently, $d \geq 4$. Summarizing the above discussion, we can generate the following proposition regarding the effort choices of partnering firms:

Proposition. *Provided that there exist incentives to exert effort in both transaction types, that is, $\theta > \underline{\theta}$,*

ia. *If $\underline{\theta} \leq \theta < 2dc$, then both the mutual exertion and nonexertion of effort by partnering firms represent equilibrium outcomes in a share-acquisition. Each of the partnering firms obtains, in expectation, net gains of $\frac{1}{2}\left(\frac{\theta}{2} - c\right)$, whereas the variance of outcomes is $\frac{1}{4}\left(\frac{\theta}{2} - c\right)^2$.*

ib. *If $\theta \geq 2dc$, then both partnering firms exerting effort represent the unique equilibrium in a share-acquisition. Each of the partnering firms obtains net gains of $\left(\frac{\theta}{2} - c\right)$ with certainty.*

ii. *For any $\theta \geq \underline{\theta}$, the acquiring firm exerts effort in a cash-acquisition. Each of the partnering firms obtains net gains of $\left(\frac{\theta}{d} - c\right)$ with certainty.*

It should be noted that these (ex post) performance outcomes may, in turn, affect ex ante decisions to opt for a share- or a cash-acquisition. The optimal transaction type depends, however, not only on the level of potential gains (θ), the degree of complementarity (d), and the cost of exerting effort (c)—as these parameters define the regions of the Proposition—but also on the decision-makers' preferences. The degree of risk aversion of decision-makers will be particularly relevant as the choice between a share- and a cash-acquisition is taken ex ante and under uncertainty. Indeed, under relatively low potential gains, acquiring firms engaged in share-acquisitions obtain strictly higher expected gains but also experience higher variance in performance outcomes when compared with acquiring firms engaged in cash-acquisitions. As a result, the optimal decision between transaction types depends on the degree of risk aversion and on the weights that decision-makers attach to the expected gains and the variance. Due to these trade-offs, we do not include the transaction-type decision in our conceptual model, though we will empirically model and account for this decision when dealing with self-selection.

3.3 | Means and Variances in Synergy Gains

We can now compare the performance outcomes of share- and cash-acquisitions. We do so by distinguishing between the two regions identified in the proposition: potential gains that are relatively low ($\underline{\theta} \leq \theta < 2dc$) and potential gains that are relatively high ($\theta \geq 2dc$). In the latter region, as shown in parts (ib) and (ii) of the proposition, the acquiring firms in a share-acquisition obtain strictly higher expected gains, $\left(\frac{\theta}{2} - c\right) > \left(\frac{\theta}{d} - c\right)$, though the variance for both transactions is identical at zero. In the former region, as shown in parts (ia) and (ii) of the proposition, acquiring firms engaged in share-acquisitions obtain strictly higher expected gains as compared with those firms engaged in cash-acquisitions, $\frac{1}{2}\left(\frac{\theta}{2} - c\right) > \left(\frac{\theta}{d} - c\right)$, as we assume the degree of complementarities to be high, that is, $d \geq 4$. However, the acquiring firms engaged in share-acquisitions also experience a strictly higher variance, $\frac{1}{4}\left(\frac{\theta}{2} - c\right)^2 > 0$, when compared with the variance experienced by acquiring firms engaged in cash-acquisitions. It is the presence of strategic uncertainty—that is, the two equilibria in effort levels—which leads to share-acquisitions involving a positive variance. We can summarize these results in the following two predictions:

Prediction 1. *The synergy gains obtained by acquiring firms engaged in share-acquisitions are strictly higher in expectation as compared with those obtained by firms engaged in cash-acquisitions.*

Prediction 2. *The synergy gains obtained by acquiring firms engaged in share-acquisitions have greater variance as compared with those obtained by firms engaged in cash-acquisitions.*

The intuition behind these results is straightforward. Share-acquisitions involve a higher ceiling for outcomes as they potentially involve the full efforts of both partnering firms, which in turn can generate synergistic gains. Yet the strategic uncertainty and coordination problems that are characteristic of joint activity can lead to both partnering firms not exerting

effort in the posttransaction organization. In a cash-acquisition, however, strategic uncertainty does not exist, as only the acquiring firm exerts effort in these transactions. While acquisitions involve more certainty in terms of outcomes, they come at the cost of not being able to obtain joint synergistic gains. Therefore, share-acquisitions generate higher expected synergy gains on average as compared with cash-acquisitions; however, share-acquisitions also exhibit a higher variance in terms of these expected gains as compared with cash-acquisitions.[9]

3.4 | Heterogeneous Effects in Function of the Degree of Complementarities

We now make a comparative analysis that examines how the relative value of each transaction mode varies with the degree of complementarities, for a given level of potential synergies. In our analysis, share-acquisitions yield higher expected gains than cash-acquisitions (Prediction 1). Prediction 3 shows that the expected synergy gains from share-acquisitions are relatively higher, relative to the expected gains obtained in cash-acquisitions, when strategic complementarities between the firms increase. This arises because, in the share-acquisition case, both firms either exert effort or neither does, in equilibrium, resulting in the realization of the full synergy potential or none at all. In contrast, in cash-acquisitions, effort is exerted by the acquiring firm, capturing only the single synergistic gains (but not the jointly synergistic gains). This corresponds to an increase in the complementarity parameter d for a given level of θ, which raises the marginal return of joint relative to single effort. As complementarities increase—making joint synergies more valuable relative to the total potential—expected gains under unilateral effort and cash-based acquisitions become comparatively lower.[10] We can summarize this discussion in the following prediction:

Prediction 3. *The synergy gains obtained in expectation by acquiring firms engaged in share-acquisitions are relatively higher than those obtained by firms engaged in cash-based acquisitions if the degree of strategic complementarities between the partnering firms increases.*

There are several contexts in which complementarities are likely to be stronger for a given level of overall potential synergies, thereby increasing the relative gains from share-based acquisitions. Industries with high knowledge intensity, for example, offer greater opportunities for mutual learning, knowledge transfer, and the preservation of human capital. In such settings, postacquisition cooperation and sustained joint efforts are especially important for unlocking complex synergies. Similarly, environments characterized by rapid technological change—such as the adoption of advanced data analytics, AI-enabled coordination, or integrated digital platforms—tend to enhance the value of combining capabilities, as collaborative efforts can generate disproportionate productivity gains relative to standalone optimization. Also, in product markets with intense competition, the benefits of coordinating pricing, product offerings, or innovation across the merged firm may exceed the value of separate, uncoordinated strategies, again making joint efforts more central to realizing synergies. Finally, cross-border mergers also tend to increase the scope for joint value creation, as differences in market structures, regulatory frameworks, consumer preferences and resource endowments often require integrated approaches to adapt products, manage regulatory complexity and align supply chains. All else equal, therefore, technological change, competitive pressure, and cross-border as opposed to domestic mergers can shift the composition of synergies towards those stemming from joint efforts, thereby deepening the strategic interdependence between the merging firms.[11]

3.5 | Financial-Market Reactions

We can also make predictions with respect to the reaction of financial markets to the two types of transactions. Specifically, we compare the reaction of a representative investor in the acquiring firm to an announcement of a share-acquisition rather than a cash-acquisition. We assume that the investor is risk-averse and penalize idiosyncratic risk, thus she factors not only the expected gains of the combined organization but also the variance in these gains.[12] For illustrative purposes, let us assume that this representative investor has "mean–variance" preferences, that is, a utility function given by $U(\cdot) = E(\cdot) - \rho * Var(\cdot)$, where ρ is the coefficient of risk-aversion.

The representative investor shall anticipate, in the region of potential gains defined by part (ia) of the proposition, that a share-acquisition involves higher expected gains but also involves more variance when compared with a cash-acquisition. As a result, her reaction to a share-acquisition announcement could be more-positive or less-positive as compared with her reaction to a cash-acquisition announcement. This trade-off depends on the coefficient of risk aversion, which, in the mean–variance preferences, parametrizes for the relative importance of mean and variance in the utility function. In the region of potential gains defined by part (ib) of the proposition, the reaction to a share-acquisition shall be more-positive as it involves higher expected gains and the same variance.

While our model yields an ambiguous prediction with respect to the reactions of financial markets to share-acquisitions as compared with cash-acquisitions, the model clearly indicates that this difference is less favorable towards a share-acquisition under higher degrees of risk aversion. Indeed, for a given expectation and variance in the synergy gains, a higher coefficient of risk aversion lowers the utility of a share-acquisition relative to that of a cash-acquisition due to the higher outcome variance involved with share-acquisitions on average. We can summarize this discussion in the following prediction:

Prediction 4. *The financial-market reaction of acquiring-firm investors to share-acquisitions as compared with cash-acquisitions involves an additional discount under high degrees of risk aversion.*

4 | Data and Estimation

The Thomson Reuters "Mergers & Acquisitions" database represents the main source of data for our empirical analysis. We

start by obtaining information on all the relevant M&A transactions contained in the database that occurred between January 1986 and December 2009. In particular, we retain the M&A transactions that are registered as either a "merger," an "acquisition of majority interest," or an "acquisition of assets." We drop all the transactions that are registered as "acquisitions of partial interest," "buybacks," and "recapitalizations." Finally, to provide for a clean empirical test of our predictions, we only retain transactions that were either fully paid for in cash or fully paid for in stock.[13]

We then match up the acquiring firms from the retained transactions with firm-level accounting data from the Thomson Reuters "Worldscope" database. Employing accounting-based measures is essential for constructing control variables and for creating a measure of firm-level productivity. In particular, we consider the pretransaction and posttransaction TFP of the acquiring firm. Taking then into account the transactions in which we observe both pretransaction and posttransaction measures of productivity (as well as additional control constructs), our initial sample consists of 12,305 transactions over a 24-year period. In the next data compilation step, we match our acquiring firms with data on the announcement date and the CAR from Eventus to consider the impact of M&A activities on the stock-market valuations of acquiring firms. While Eventus provides the necessary data on stock-market reactions, this measure is restricted to acquiring firms that are publicly listed. Accordingly, our sample is reduced to 11,570 transactions when considering stock-market outcomes.

In terms of additional characteristics, our data on M&A activity is global in scope, as the acquiring firms in our sample hail from 62 different nations: where 32.2% of our acquirers are based in the UK, 15.4% are based in the United States, 5.9% based in France and 5.6% in Australia. Furthermore, 59% (41%) of our transactions are domestic (cross-border) in nature as they involve acquirers and targets based in the same (different) nations. Finally, our sampled M&A transactions span many different industries as they manifest in 660 different four-digit Standard Industrial Classification (SIC) sectors.

4.1 | Dependent Variables

Testing our theoretical priors requires different types of dependent-variable constructs. We require a measure of the synergy gains experienced by acquiring firms engaged in M&A activity to test the first and third predictions. We also require a measure of the variance in synergy gains experienced by acquiring firms engaged in M&A activity to test the second prediction. Finally, we require a measure capturing the stock-market reaction to the announcement of the acquisition to test the fourth prediction.

First, a number of studies (e.g., Li and Xu 2004; Schoar 2002; Maksimovic et al. 2011, 2013) have employed TFP measures to capture synergy gains. Following the procedure employed in these studies, we construct a TFP measure to capture the synergy gains experienced by acquiring firms engaged in M&A activities to test our first and third predictions. We employ translog production functions to approximate general two-factor constant elasticity of substitution production functions. To do so, we estimate regressions of acquiring-firm sales on the firm's capital stock and its labor expenditures, the squared-terms for these production factors, the interaction between these two factors (where all variables are logged), and a full set of firm-specific fixed effects.[14] The production functions are estimated separately for 355 three-digit industries to allow heterogeneity across sector-specific production technologies. Using the industry-specific coefficient estimates for the production factors, annual TFP measures are then calculated as the residuals from these production functions. Since TFP measures involve residuals and not levels, we take the difference between the sum of the annual TFP residuals in the 4-year post-transaction period and the sum of the annual TFP residuals in the 4-year pretransaction period.

Figure 1 provides some indication that share-based transactions are characterized by larger synergy gains for acquirers. We plot the distribution of the TFP growth for acquiring firms along with a measure that indicates the share of transactions that are stock-financed from the transactions that come to the right of that point in the distribution. Accordingly, 19.3% of all sampled transactions are considered purely stock-based per the Thomson SDC classification; thus, the share of the stock-based construct takes a value close to 0.19 on the left side of the distribution, where acquiring firms are experiencing productivity losses. However, the share of transactions characterized as stock-based rises substantially on the right side of the distribution. This indicates that stock-financed transactions are over-proportionately represented in those transactions where acquiring firms experience increases in TFP growth.

Our second theoretical prediction conjectures that acquiring firms engaged in stock-financed transactions will generally experience higher variance in synergy gains as compared with acquiring firms engaged in cash-financed transactions. Unlike the first theoretical prior, this dispersion in outcomes is not readily analyzed when the transaction constitutes the unit of analysis. We accordingly transform the level of analysis in our data so that the industry-level dispersion in gains represents the dependent variable of interest. In particular, we compile our transaction-level data to create yearly measures of dispersion for 306 four-digit SIC industries over the data's 1986–2009 sample period—the number of four-digit industries drops from 660 to 306 here, as we require a sufficient number of sector-specific observations to calculate dispersion. This subsample, based on industry-level data, involves 1639 industry-year observations with an average (median) of 7(6) transactions per year in these four-digit industries. We capture dispersion by calculating the standard deviation in the transaction-level TFP within the specific industry-year combinations. While the estimation strategy subsection provides additional details, the basic testing intuition here is to gather whether industries characterized by higher degrees of share-based transactions experience greater dispersion in synergy outcomes for the acquiring firms in these industries.

In line with this industry-level approach, Figure 2 provides some indication that share-financed acquisitions are characterized by greater variance as compared with cash-financed acquisitions. This figure plots the share-of-stock-based deals

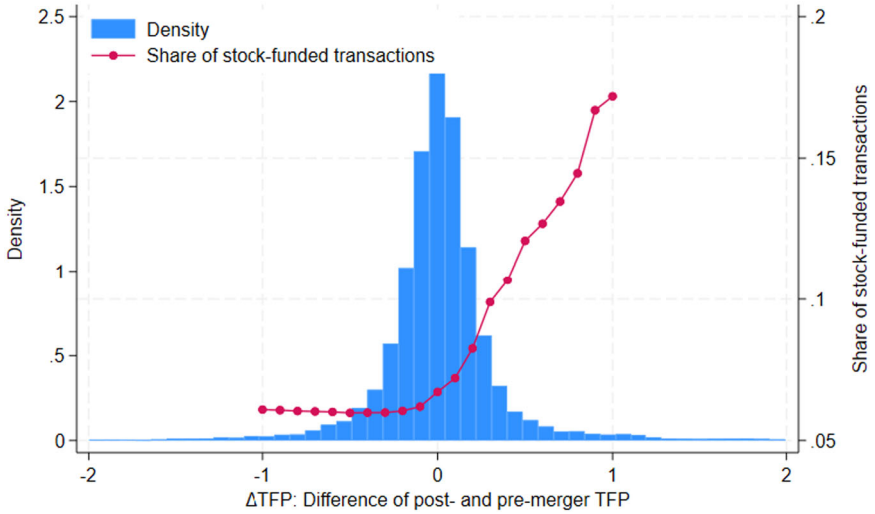

FIGURE 1 | Density of acquiring-firm TFP growth outcomes and share-of-stock-funded activity. This graph reports the distribution of TFP growth outcomes for acquiring firms, along with a measure indicating the share-of-stock-financed deals for all transactions that manifest to the right of that point in the distribution. TFP, total factor productivity. [Color figure can be viewed at wileyonlinelibrary.com]

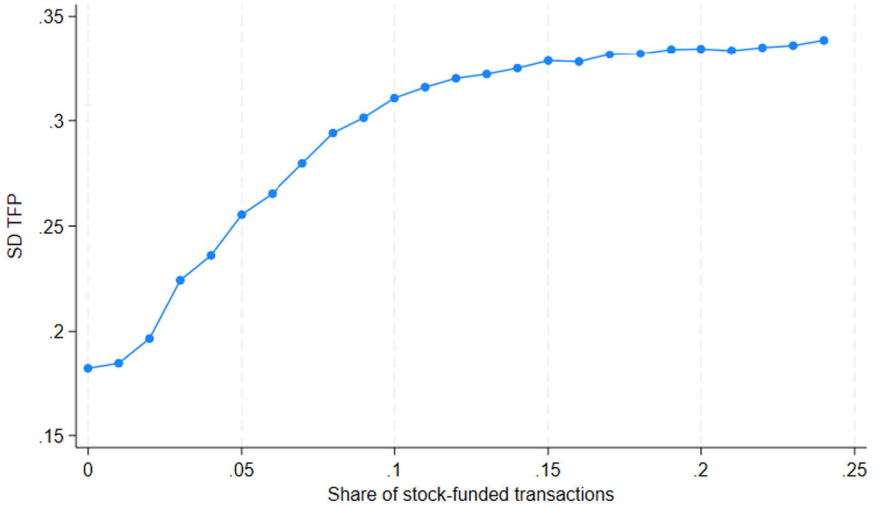

FIGURE 2 | Share-of-stock-funded transactions and the standard deviation in TFP growth at the industry level. This graph reports a plot of industry-level measures capturing the share-of-stock-funded transactions amongst all transactions in the focal industry against the standard deviation in acquiring-firm TFP growth outcomes manifest in the focal industry. TFP, total factor productivity. [Color figure can be viewed at wileyonlinelibrary.com]

amongst all transactions in the industry against the standard deviation for the TFP growth outcomes in the focal industry. As indicated in the figure, industries characterized by greater levels of share-based activity tend to have greater dispersion in acquiring-firm productivity growth outcomes. The plotted range (0–0.25) covers 95% of the observations; the standard deviation of TFP remains at a similar level for those industries with more than 25% share-based transactions.

Our fourth prediction conjectures that acquiring firms engaged in share-based transactions when financial markets are characterized by high degrees of risk aversion will experience relatively low stock-market valuations as compared with the acquiring firms engaged in cash-funded acquisition activity. To test this theoretical prior, we return to a transaction-level unit of observation; moreover, we capture the stock-market reaction for acquiring firms via the standard event-study procedure. We use Eventus—a software package from Wharton Research Data Services that interfaces with the CRSP database—to compute the 3-day CARs for the acquiring firms in our sample of M&A transactions. Specifically, our CARs were calculated by employing the market model, equally weighting the stocks and estimating via the "SuperReg" option to create valid inferences—see Halperin and Lusk (2013) for more details. While the relationship between CARs and the TFP growth of partnering firms in M&A transactions is not well studied (see X. Li 2013, for an exception), our CARs measure does exhibit a positive and statistically significant (at the 1% level) pairwise correlation of 0.043 with our measure of acquiring-firm TFP growth.

4.2 | Additional Variables

To test our third prediction, we construct a measure of sectoral R&D intensity to capture heterogeneity in knowledge intensity across sectors, which serves as a proxy for variation in complementarities. We calculate the ratio of firms' R&D spending over its sales and average the resulting measure across two-digit SIC industries. Prior studies show that R&D intensity not only identifies knowledge-intensive sectors but also captures variation in the likelihood of complementarities across mergers. For instance, Makri et al. (2009) document that technology-related R&D overlaps enhance postmerger invention rates, while Ceccagnoli et al. (2012) show that joint internal and external R&D efforts generate synergistic innovation gains in pharmaceuticals. Moreover, comparative analyses of knowledge-intensive services find that complementarities can differ across industries. Based on these findings, we divide industries into knowledge-intensive and other sectors—using varying cutoffs (P25, P50, and P75) on R&D intensity—to explore whether stock-financed deals generate larger synergy gains in high-complementarity environments.

Testing our fourth prediction also requires information on the degree of risk aversion which best characterizes financial markets. The Chicago Board Options Exchange (CBOE 2004) compiles a volatility index (referred to as the volatility index option [VXO] measure) that employs the implicit volatility of option prices for the S&P 100. This VXO measure is widely regarded by analysts as a direct gauge of market fear that broadly captures the risk aversion of financial markets (Coudert and Gex 2008; Pan and Singleton 2008). Accordingly, we employ the VXO index as a measure of global-risk-aversion to test the prior that investors penalize share-based activities more so than cash-based activities when financial markets are characterized by high levels of risk aversion. Specifically, we create a dichotomous construct to capture periods of high-risk aversion by setting that variable to one when the daily VXO measure is above the median value in our sample.[15]

We also require control variables to mitigate the risk of omitting potentially confounding factors. Specifically, at the industry-level, we control for the time-varying total assets, sales, net income, employees and debt manifest in an industry. These industry-level constructs are all logged and compiled at the four-digit industry level (hereafter referred to as Industry-Assets, Industry-Sales, Industry-Income, Industry-Employees, and Industry-Debt). In addition to these generic controls, we introduce an industry-level control when testing our first prediction with respect to whether acquiring firms engaged in share-based activity experience higher synergy gains on average. To make stronger causal inferences regarding the productivity upgrading experienced by acquiring firms, we control for the average productivity gains for all firms sharing the same four-digit industry classification of the acquiring firm by taking the industry's average change in TFP (hereafter referred to as Industry-ΔTFP).

The industry-level controls constitute the full set of controls for the tests of the second prediction, where industries represent the level of analysis. The empirical tests for our first and third predictions are, however, based on transaction-level data and allow for additional controls with respect to the nature of the actual transaction. First, cross-border transactions involve complexities, challenges and different characteristics as compared with domestic transactions; thus, we control for whether the transaction involves an acquirer and a target based in different countries with a dichotomous construct (hereafter referred to as Cross-Border). Second, it has been well understood in the empirical literature since Jensen and Ruback's (1983) work that acquiring firms employing tender offers tend to generate larger abnormal returns; moreover, it stands to reason that these value effects can be based on underlining productivity increases. Accordingly, we control via a dichotomous construct—in line with Malmendier et al. (2016) and others—for whether a tender offer in terms of the bidding was employed in the transaction (hereafter referred to as Tender-Offer). Third, whether the partnering firms in the transaction are characterized by substantial overlap in terms of industries served—that is, horizontal transactions—represents a common control variable in studies of value creation (e.g., Moeller et al. 2005; Duso et al. 2007) and productivity enhancement (Schoar 2002) for acquiring firms. Accordingly, we control via a dichotomous construct for whether the acquiring and target firms share the same four-digit industry (hereafter referred to as Horizontal). Fourth, whether the partnering firms in the transaction are characterized by relatedness in terms of industries served—where related overlap is generally wider than horizontal overlap—also represents an important control concept as the level of diversification manifest in the transaction may be both broader and impactful (e.g., Montgomery and Hariharan 1991). Accordingly, we control for whether the acquiring and target firms share the same two-digit industry (hereafter referred to as Related). Fifth, the public status of target firms has been linked to acquiring-firm value destruction by a number of scholars (e.g., Moeller et al. 2005; Betton et al. 2008); furthermore, Matsusaka (1993) conjectured that the public status of target firms has implications with respect to profitability and productivity. Accordingly, we control for whether the target firm is publicly traded (hereafter referred to as Public-Target). Sixth, whether the acquiring firm is publicly traded or not has been found to influence productivity gains (Maksimovic et al. 2013); though, this variable is clearly not relevant and identifiable in the estimations explaining the abnormal returns experienced by acquiring firms as all such firms will be publicly traded. Accordingly, we control for whether the acquiring firm is publicly traded (hereafter referred to as Public-Acquirer). Schipper and Thompson (1983), Montgomery (1994), Barkema and Schijven (2008), and others observe that not only does experience matter when it comes to M&A performance, but also that acquiring firms will often engage in a series of M&A transactions. Accordingly, we control for whether the acquiring firm has engaged in a previous M&A transaction as an acquirer in the 4 years before the focal transaction (hereafter referred to as Acquirer-Experience). For all the variables outlined above, Table 2 presents descriptive and summary statistics.

4.3 | Estimation Strategies

Our analysis involves four clear-cut theoretical predictions. To establish stronger causal inferences, we employ all the available fixed effects (e.g., industry, year, acquirer-nation, and

TABLE 2 | Descriptive statistics.

	Observations	Mean	Std. Dev.	Minimum	Maximum
Dependent variables					
TFP-Growth	12,305	0.02	0.30	−1.23	1.64
Acquirer-CAR	11,570	0.66	5.80	−18	25
Transaction-level control variables					
Cross-Border	12,305	0.40	0.49	0	1
Tender-Offer	12,305	0.07	0.26	0	1
Horizontal	12,305	0.31	0.46	0	1
Related	12,305	0.54	0.50	0	1
Public-Target	12,305	0.19	0.39	0	1
Public-Acquirer	12,305	0.96	0.20	0	1
Acquirer-Experience	12,305	0.82	0.38	0	1
Industry-level control variables					
Industry-ΔTFP (log)	12,305	0.02	0.61	−46	21
Industry-Assets (log)	12,305	18.78	2.50	8.5	24.3
Industry-Sales (log)	12,305	18.03	1.85	6.6	21.9
Industry-Income (log)	12,305	14.89	2.29	4.1	19.4
Industry-Employees (log)	12,305	12.45	1.66	2.7	15.4
Industry-Debt (log)	12,305	16.71	2.47	2	22
Global-risk-aversion measure					
VXO	11,570	21.46	8.03	9	150
Complementarities measure					
R&D intensity	12,305	0.72	0.61	0	2.76

Note: We report summary statistics (observation numbers, mean, standard deviation, minimum, and maximum) in this table for the variables used in the regression estimations.
Abbreviations: CAR, cumulative abnormal return; R&D, Research and Development; TFP, total factor productivity; VXO, volatility index option.

target-nation). We empirically test Prediction 1 while employing all our available transaction-level data concerning M&A activities. Specifically, the following regression specification is estimated:

$$\text{Acquirer-Productivity-Growth}_k = \alpha_0 + \alpha_1 \text{allstock}_k + \alpha_2 X_k + \alpha_3 Y_i + \eta_i + \eta_t + \eta_q + \eta_g + \varepsilon_k, \quad (1)$$

where k refers to the transaction, i refers to the industry (four-digit SIC), t refers to time (year), q refers to the acquirer's nation, g refers to the target's nation. The variable "allstock" refers to those transactions that were fully financed through shares, where the counterparts are all-cash transactions. In addition, X represents the vector of transaction-level controls, while Y represents the vector of industry-level controls. Furthermore, the terms η_i, η_t, η_q, and η_g, respectively, represent industry, time, acquiring-nation, and target-nation fixed effects. Finally, ε_k represents the disturbance term. We should caution that this estimation approach omits target-side productivity effects, and thus differences across share- and cash-based acquisitions in the tendency to internalize targets or partner with different target types may bias our results.[16]

We empirically test Prediction 2 by transforming our data to the industry level, since capturing dispersion in synergy outcomes requires a level of analysis beyond the transaction. The intuition behind these empirical tests is that industries characterized by higher levels of share-based transaction activity will be more likely to manifest higher dispersion in synergy outcomes for acquiring firms, if stock-financed acquisitions generally involve greater variance in synergy outcomes as compared with cash-financed acquisitions. Accordingly, we aggregate the data to the four-digit industry level and estimate the following specification:

$$\text{Disp(Productivity-Growth)}_{i,t} = b_0 + b_1 \frac{\#\text{allstock}}{\#\text{Transactions}_{i,t}} + b_2 Y_{i,t} + \eta_i + \eta_t + \varepsilon_{i,t}, \quad (2)$$

where the same notations from above are employed. Since the industry-year represents the unit of observation, the estimation controls for industry-level characteristics (Y) as well as industry (η_i) and time (η_t) fixed effects. The switch to industry-year observations also yields a panel-data setting as opposed to the previous cross-sectional setting in which the transaction constituted the unit of observation. The coefficient estimates from this specification can thus be interpreted as within estimators

where causal inferences are derived from within-industry changes in the tendency for stock-based deals to manifest.

The empirical setup for testing Prediction 3 is very similar to the first prediction, but we interact the indicator for stock-financed transactions with an indicator for the R&D percentile of the focal industry:

$$\begin{aligned}\text{Acquirer-Productivity-Growth}_k = {} & \alpha_0 + \alpha_1 \text{allstock}_k \\ & * \text{R\&D\_intensity}_i \\ & + \alpha_2 X_k + \alpha_3 Y_i + \eta_i + \eta_t \\ & + \eta_q + \eta_g + \varepsilon_k,\end{aligned} \tag{1'}$$

where $\text{R\&D\_intensity}_i$ denotes the percentile of the focal sector's R&D intensity (measured as average R&D spending over sales) across two-digit sectors. Specifically, we consider sectors above the 25th, 50th, and 75th percentiles of R&D intensity and study how the treatment effect varies with R&D intensity. We find high R&D intensities for sectors, such as "Chemicals and Allied Products," "Industrial and Commercial Machinery and Computer Equipment," and "Electronic & Other Electrical Equipment & Components"; conversely, low R&D intensities are observed for sectors, such as "Oil and Gas Extraction," "Metal Mining," and "Food Stores."

We empirically test Prediction 4 by again employing all the available transaction-level data on M&A activities. The following regression specification is estimated:

$$\begin{aligned}\text{Acquirer-CAR}_k = {} & c_0 + c_1 \text{allstock}_k * \text{HighRiskAversion}_d \\ & + c_2 \text{allstock}_k + c_3 \text{VXO}_d + c_4 \\ & X_k + c_5 Y_i + \eta_i + \eta_t + \eta_q + \eta_g + \varepsilon_k,\end{aligned} \tag{3}$$

where d—referring to the day (month) of the transaction announcement for the VXO measure of risk aversion—represents new notation, but otherwise the same notations from above are employed. It is the interaction between a share-based deal and the measure of high-risk aversion that tests our theoretical prior, as our model predicts that stock-financed transactions should be increasingly discounted by markets when risk aversion levels are generally high. We should caution that this estimation approach omits target-side abnormal returns, though we control for whether targets are public, and such targets further represent only 10% of our sample.[17]

5 | Empirical Findings

5.1 | Main Results

Tables 3–6 present the results from testing our four theoretical predictions: that is, stock-financed deals are characterized by higher TFP gains, higher variance in TFP outcomes, stronger relative performance in knowledge-intensive sectors, and lower stock-market valuations when markets exhibit high degrees of risk aversion. All the regressions contained in these four tables appear to be reasonably well specified; furthermore, the transaction-level and industry-level control variables generally have intuitive coefficient estimates. For brevity, we focus our discussion of the empirical results on the main variables of interest.

TABLE 3 | Regressions on acquiring-firm TFP growth.

	Coefficient	S.E.
Stock-financed transaction	0.040***	(0.01)
Industry-ΔTFP	−0.022**	(0.01)
Public-Acquirer	0.020	(0.01)
Public-Target	−0.032***	(0.01)
Cross-Border	0.005	(0.01)
Tender-Offer	0.018	(0.01)
Horizontal	−0.000	(0.01)
Related	0.013*	(0.01)
Industry-Assets	0.049**	(0.02)
Industry-Sales	−0.018	(0.02)
Industry-Income	−0.016***	(0.00)
Industry-Employees	−0.008	(0.01)
Industry-Debt	0.012	(0.01)
Acquirer-Experience	−0.007	(0.01)
Constant	−0.123	(0.28)
Observations	12,305	

Note: We report a regression that tests whether share-financed transactions exhibit higher levels of TFP-growth for acquiring firms as compared with cash-financed acquisition activities. In addition to the full set of transaction-level and industry-level controls, our estimation controls for industry, year, acquirer-nation, and target-nation specific fixed effects. The standard errors are reported in parentheses.
Abbreviation: TFP, total factor productivity.
*, **, and ***, respectively, represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

Table 3 presents the results that consider the impact of stock-financed acquisitions on the TFP growth experienced by acquiring firms in the years subsequent to the transaction. The coefficient of the variable indicating a share-financed transaction is positive and significant at the 1% level and indicates that stock-based transactions, on average, result in 4% higher productivity gains as compared with cash-financed transactions. This result conforms to our first prediction with respect to stock-financed transactions being characterized by higher synergy gains on average as compared with cash-financed transactions.

Table 4 presents the results that consider whether sectors experiencing higher shares of stock-financed transactions also experience higher degrees of dispersion in terms of TFP outcomes for acquiring firms. The share-of-stock-financed transactions variable represents the focal variable of interest, and the coefficient estimate for this variable is positive and significant at the 1% level. The coefficient estimate is 0.103; given an average value for dispersion of 0.223 in our sample, this coefficient estimate suggests that altering the nature of transactions in an industry from purely cash-financed activities to purely share-financed activities would increase dispersion by almost 50% on average. These empirical results conform to our second

TABLE 4 | Regressions on industry-level standard deviation in TFP-growth outcomes for acquiring firms.

	Coefficient	S.E.
Share-of-stock-financed transactions	0.103***	(0.02)
Industry-Assets	−0.089***	(0.03)
Industry-Sales	0.056*	(0.03)
Industry-Income	−0.005	(0.01)
Industry-Employees	0.012	(0.02)
Industry-Debt	0.018	(0.02)
Constant	0.366	(0.32)
Observations	1639	

Note: We report a regression that tests whether industries characterized by higher shares of stock-financed activity (as compared with cash-financed acquisition activity) exhibit higher dispersion in the synergy gains—as measured by TFP-growth—experienced by acquiring firms. In addition to the full set of industry-level controls, our estimation controls for industry- and year-specific fixed effects. The standard errors are reported in parentheses.
Abbreviation: TFP, total factor productivity.
*, **, and ***, respectively, represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

prediction with respect to share-financed activities being characterized by greater variance in terms of synergy outcomes as compared with cash-financed activities.

Table 5 contains the regression results where we modulate the treatment effect by interacting it with the focal industry's R&D intensity, specifically considering firms in industries above the 25th, the 50th, and the 75th percentile of R&D intensity. Thus, the three regressions reported in Table 5 incrementally zoom in on more knowledge-intensive industries, for which our model predicts higher synergy gains. This is reflected in the estimated coefficients. While acquiring firms engaged in stock-financed transaction in an industry above the 25th percentile of R&D intensity on average gain 3.9% of TFP, this value rises to 5.6% when we only consider acquirers in industries above median R&D intensity, and this value further rises to 8% on average when we only consider acquirers in industries above the 75th percentile of R&D intensity. Thus, synergy gains seem to be monotonically increasing in the degree of knowledge intensity in an industry and more than double when moving from the 25th to the 75th percentile.

Finally, Table 6 presents the empirical results that consider the impact of share- and cash-financed acquisitions on the stock-market valuations of acquiring firms. The interaction of share-based deals with the measure of high-risk aversion (captured via above-median values of the VXO index) represents the focal variable of interest, as a negative coefficient estimate for this interaction term would suggest that financial markets attach an additional discount to stock-financed as compared with cash-financed acquisitions when markets are characterized by high degrees of risk aversion. The coefficient estimate for this interaction term is indeed negative and significant at the 1% level, thus suggesting that stock-financed acquisitions are discounted. The coefficient estimate of −0.555 indicates that such acquisitions experience stock-market valuation discounts of around one-half percentage point on average. These empirical results conform to our fourth prediction where high-variance stock-financed transactions require a greater amount of compensation on the part of investors when financial markets are characterized by high degrees of risk aversion.

TABLE 5 | Industry-level R&D intensity and TFP-growth of acquiring firms.

	(1)	(2)	(3)
Stock-financed transaction * 25th R&D percentile	0.039***		
	(0.01)		
Stock-financed transaction * 50th R&D percentile		0.056***	
		(0.01)	
Stock-financed transaction * 75th R&D percentile			0.080***
			(0.02)
Industry-ΔTFP	−0.022**	−0.022**	−0.021**
	(0.01)	(0.01)	(0.01)
Public Acquirer	0.021	0.022	0.023
	(0.01)	(0.01)	(0.01)
Public Target	−0.030***	−0.026***	−0.025***
	(0.01)	(0.01)	(0.01)
Cross-Border	0.004	0.003	0.002
	(0.01)	(0.01)	(0.01)
Tender-Offer	0.018	0.014	0.016
	(0.01)	(0.01)	(0.01)
Horizontal	−0.000	0.000	0.000
	(0.01)	(0.01)	(0.01)
Acquirer-Experience	−0.008	−0.008	−0.008
	(0.01)	(0.01)	(0.01)
Related	0.013*	0.014*	0.014*
	(0.01)	(0.01)	(0.01)
Constant	−0.125	−0.138	−0.148
	(0.28)	(0.28)	(0.28)
N	12,305	12,305	12,305

Note: We report regressions that test whether acquirers in stock-financed transactions that take place in industries characterized by higher R&D intensity experience higher TFP-growth than acquiring companies of cash-based transactions. Percentiles are P25, P50, and P75. In addition to the full set of industry-level controls, our estimation controls for industry- and year-specific fixed effects. The standard errors are reported in parentheses.
Abbreviations: R&D, Research and Development; TFP, total factor productivity.
*, **, and ***, respectively, represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

5.2 | Self-Selection into Stock- and Cash-Acquisitions

Our empirical analysis estimating the performance differences between stock- and cash-financed acquisitions to this point

TABLE 6 | Regressions on acquiring-firm CARs.

	Coefficient	S.E.
Stock-financed transaction * High-Risk-Aversion	−0.555**	(0.25)
Stock-financed transaction	−0.359*	(0.20)
VXO	0.036***	(0.01)
Public Target	−1.629***	(0.17)
Cross-Border	−0.019	(0.23)
Tender-Offer	1.382***	(0.29)
Horizontal	0.316**	(0.16)
Related	−0.052	(0.15)
Industry-Assets	−0.164	(0.41)
Industry-Sales	−0.358	(0.42)
Industry-Income	0.015	(0.09)
Industry-Employees	0.047	(0.27)
Industry-Debt	0.059	(0.21)
Acquirer-Experience	−0.393**	(0.16)
Constant	4.564	(5.78)
Observations	11,570	

Note: We report a regression that tests whether acquiring firms undertaking stock-financed transactions during periods characterized by high-risk-aversion experience an additional discount in terms of stock-market reactions to the announcement. In addition to the full set of transaction-level and industry-level controls, our estimation controls for industry, year, acquirer-nation, and target-nation specific fixed effects. The standard errors are reported in parentheses. Abbreviations: CAR, cumulative abnormal return; VXO, volatility index option. *, **, and ***, respectively, represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

involves forming regression equations with transaction- and industry-level control variables that also involve a full set of fixed effects (industry, year, acquirer-nation, and target-nation fixed effects). Yet this analysis has implicitly assumed that managerial decisions regarding the choice between cash- and stock-financed transactions are not predicated on the outcome variables. Li and Prabhala (2007) highlight how stock-market and productivity outcomes both represent empirical applications in which self-selection effects should be addressed. In particular, self-selection-based endogeneity can manifest when researchers consider discrete explanatory constructs (e.g., our stock-financed construct) that are potentially endogenous in nature due to their representing managerial decisions that are selected into with performance outcomes in mind. In such an empirical context, unobserved factors which influence both the choice of payment method and the ultimate performance outcomes—that is, productivity upgrading and stock-market reactions—can lead to biased coefficient estimates as the error term potentially correlates with the explanatory variable of interest.

To correct for any self-selection bias in our regression estimations that distinguish between cash-financed and stock-financed transactions in terms of productivity-upgrading (Predictions 1 and 3) and stock-market reactions (Prediction 4), we employ an endogenous-treatment procedure: a latent variable approach which derives from Heckman (1974) seminal work. Specifically, we undertake a full information maximum likelihood estimation that delivers consistent and asymptotically efficient coefficient estimates so long as the error terms in the main and selection equations are characterized by bivariate normality. The empirical tests for Prediction 2, however, are of a different nature, as the share-of-stock-financed activity taking place in a sector—a decidedly continuous variable construct—represents the explanatory variable of interest. These empirical tests do not then manifest the discrete explanatory construct that indicates the appropriateness of the endogenous-treatment procedure. Instead, it is more straightforward to deal with potential endogeneity bias in the share-of-stock-financed-acquisitions construct by employing the standard IV approach.

Operationalizing the above procedures—endogenous treatment and IV estimation—requires instruments that affect the proclivity of managers to employ stock over cash as payment to properly model the selection process. Yet in addition to explaining variation in the potentially endogenous constructs, a greater issue involves the excludability of such instruments. Namely, the instruments must identify variation that is uncorrelated with the error terms in the main regression equations. To this end, we follow the common practice of taking advantage of industry-level conditions and shocks (e.g., Campa and Kedia 2002) to identify exogenous variation that is not correlated with the error terms in the ultimate equations of interest.

Our first exclusion restriction is that the presence of industry expansions affects the prevalence of stock- and cash-financed deals but does not directly affect the productivity upgrading and value reactions of acquiring firms. The rationale behind employing measures that capture when an industry experiences a substantial expansion in our identification strategy is based on the study by Maksimovic and Phillips (2002) as they consider expansions to be shocks that influence demand conditions and ultimately influence corporate investment decisions. Moreover, it is not unreasonable to assume that industry expansions do not directly affect the productivity upgrading and value reactions manifest in acquiring firms. In terms of productivity upgrading, the actual productivity growth experienced by acquiring firms in the 4 years subsequent to the transaction is unlikely to be directly affected by industry-level expansions at the time of announcement. Furthermore, Ang (2001) supports the prior that expansions do not directly impact acquiring-firm CARs when controlling for other relevant explanatory factors. To identify industry-specific expansions at the four-digit level in our data, we follow the approach outlined by Maksimovic and Phillips (2002) to determine industry-expansion years (hereafter referred to as Expansion-Year).[18]

Our second exclusion restriction is that the proclivity for industry peers to employ stock- over cash-financed affects the acquiring-firm's decision but does not directly affect the productivity upgrading and value reactions manifest in acquiring firms. The rationale behind employing the share-of-stock-financed activity taking place in an industry as an instrument is based on the premise that the proclivity of a reference group represents an exogenous market condition, which can influence acquiring-firm decisions regarding the choice between payment methods. In particular, acquiring firms potentially benchmark

the decisions of their peers; however, these peer decisions will not directly affect the productivity upgrading and value reactions manifest in acquiring firms. Campa and Kedia's (2002) study of diversified firms takes a similar approach, as they employ the percentage of diversified firms in an industry as an instrument when modeling the decision of firms to self-select into diversification status. We capture the tendency for an industry to be characterized by stock deals as opposed to cash deals at the four-digit industry level by taking the yearly count of stock-based transactions and dividing by the yearly count of all M&A transactions in the relevant sector (referred to as share-of-stock-financed transactions).

We should point out, however, that the share-of-stock-financed-acquisitions construct can only be employed as an instrument in our estimations on productivity upgrading (Predictions 1 and 3) and stock-market reactions (Prediction 4)—that is, when we employ an endogenous-treatment procedure on transaction-level data. The empirical tests for Prediction 2 are of a different nature, as they are based on yearly industry-level observations. Nevertheless, we can similarly instrument for these industry-level estimations by employing a measure of the share-of-stock-financed activity taking place in industries that are nonfocal to the relevant sector (referred to as Non-Focal Share-of-Stock-Financed Transactions). While this third exclusion restriction is essential to effectively instrument via the standard IV approach for our tests of the second prediction, it can be included as an additional instrument in our estimations that employ endogenous-treatment procedures to test the first (productivity upgrading) and fourth (stock-market reactions) predictions with respect to share-based vis-à-vis cash-based acquisitions.

We report diagnostics that indicate that our exclusion restrictions are acceptable, as we appear to have a workable identification in our empirical context. First, our instruments generally manifest strength in their ability to explain variation in the proclivity of managers to employ stock-financed over cash-financed acquisitions. The share-of-stock-financed constructs for both the focal and nonfocal industries indicate strong significance when employed in the three tables that model the selection into the payment method (Tables 7–10). The expansion-year construct is less robust across the different estimations, though it does explain some variation in stock-financed tendencies and is essential for undertaking over-identification tests. The *F* test reported in Table 8 also attests to the explanatory power of our instruments. Most importantly, the exogeneity of these instruments is reasonable in this empirical context. In particular, the reported Sargan tests for over-identifying restrictions is consistent—that is, significant in the Table 8 estimation—with the prior that the instruments are valid and excludable as they do not correlate with the error terms.[19]

In addition to the above, a few diagnostics suggest that self-selection-based endogeneity bias is not so severe in our empirical context. For one, the hyperbolic tangent of ρ ($\text{atanh}\rho = \frac{1}{2}\ln(\frac{1+\rho}{1-\rho})$)—represents the estimated correlation amongst the error terms in the main and selection equations. This correlation in the error terms—which suggests that the treatment correlates with main-equation residual term—is insignificant in Tables 7, 9 and 10. Furthermore, the Durbin–Wu–Hausman test—which can be employed in the IV estimations—does not manifest significance in Table 8. This convergence in the coefficient estimates for the instrumented and noninstrumented share-of-stock activity constructs suggests that endogeneity is not a severe issue in our empirical context.

TABLE 7 | Endogenous-treatment procedure for acquiring-firm TFP growth.

	Coefficient	S.E.
Stock-financed transaction	0.039***	(0.01)
Industry-ΔTFP	−0.022***	(0.01)
Tender-Offer	0.018	(0.01)
Horizontal	−0.000	(0.01)
Cross-Border	0.005	(0.01)
Related	0.013*	(0.01)
Public-Target	−0.032***	(0.01)
Public-Acquirer	0.020	(0.01)
Acquirer-Experience	−0.007	(0.01)
Industry-Assets	0.049**	(0.02)
Industry-Sales	−0.018	(0.02)
Industry-Income	−0.016***	(0.00)
Industry-Employees	−0.008	(0.01)
Industry-Debt	0.012	(0.01)
Constant	0.189	(0.29)
First stage: Selection equation		
Share-of-stock-financed transactions	3.763***	(0.07)
Non-Focal share-of-stock-financed transactions	−1.511***	(0.32)
Expansion-Year	0.062**	(0.03)
Constant	−1.620***	(0.07)
Athrho $\hat{\rho}$	0.004	(0.02)
Observations	12,305	

Note: We report an endogenous-treatment procedure that tests whether acquiring firms engaged in share-based transactions exhibit higher TFP-growth while modeling and controlling for selection into share-based transactions via a first-stage equation. In addition to transaction-level and industry-level controls, the estimation controls for industry, year, acquirer-nation, and target-nation specific fixed effects. The standard errors are reported in parentheses.
Abbreviation: TFP, total factor productivity.
*, **, and ***, respectively, represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

While the above addresses the soundness of our methodological approach to model and correct for the selection into stock-financed and cash-financed acquisitions, we move now to a discussion of the empirical results for our variables of principal interest. Here, we report three tables of empirical results (Tables 7–10) that appropriately model the selection process but otherwise mirror in substance the main equations of interest that were employed in Tables 3–6 in which self-selection was not considered. Striking from this integrated estimation approach is that our core findings regarding the tendencies of stock-financed vis-à-vis cash-financed acquisitions (higher synergy outcomes, higher variance in these outcomes, higher

TABLE 8 | IV regressions on industry-level standard deviation in TFP-growth outcomes for acquiring firms.

	Coefficient	S.E.
Share-of-stock-financed transactions	0.100*	(0.06)
Industry-Assets	−0.089***	(0.03)
Industry-Sales	0.056**	(0.03)
Industry-Income	−0.005	(0.01)
Industry-Employees	0.012	(0.02)
Industry-Debt	0.018	(0.02)
Constant	1.123***	(0.28)
Observations	1639	
First-stage F value (p value)	88.818	[0.000]
Durbin–Wu–Hausman (p value)	0.002	0.96

Note: We report an IV estimation that tests whether industries characterized by higher shares of stock-based activity (as compared with cash-based acquisition activity) exhibit higher dispersion in the synergy gains—as measured by TFP-growth—experienced by acquiring firms. In addition to the full set of industry-level controls, our estimation controls for industry- and year-specific fixed effects. The standard errors are reported in parentheses.
Abbreviations: IV, instrumental variable; TFP, total factor productivity.
*, **, and ***, respectively, represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

synergy outcomes in high-R&D contexts, and lower stock-market valuations when markets are risk averse) all continue to be borne out when self-selection is properly modeled.

Our first theoretical prior—acquiring firms in stock-financed deals are characterized by higher synergy gains—is tested in Table 7. Akin to the main empirical results reported in Table 3, we find that the stock-based construct is positive and significant. Accordingly, these empirical results, which model and control for the selection process, conform to our first prediction where stock-financed deals are deemed to be characterized by higher synergy gains for acquiring firms on average. The coefficient estimate of 0.039 is quite similar to that obtained without accounting for selection (0.04).

Our second theoretical prior—acquiring firms in stock-financed deals are characterized by higher variance in synergy TFP gains—is empirically tested in Table 8 where dispersion in synergy TFP outcomes is captured via the industry-level standard deviation in acquiring-firm TFP growth. Akin to the main empirical results reported in Table 4, the share-of-stock-financed construct is positive and statistically significant. Accordingly, these empirical results, which account for endogeneity in the share-of-stocks construct generally conform to our second prediction, where stock-financed, as compared with cash-financed acquisitions, are deemed to be characterized by higher variance in synergy outcomes on average. Again, the coefficient estimate is very similar (0.1) to the one obtained without accounting for selection (0.103).

Our third theoretical prior—acquiring firms in stock-financed deals are characterized by relatively higher synergy gains in more knowledge-intensive industries—is tested in Table 9. As with the main empirical results reported in Table 5,

TABLE 9 | Endogenous-treatment industry-level R&D intensity and TFP-growth.

	(1)	(2)	(3)
Second stage: Productivity			
Stock-financed transaction * 25th R&D percentile	0.043***		
	(0.01)		
Stock-financed transaction * 50th R&D percentile		0.057***	
		(0.02)	
Stock-financed transaction * 75th R&D percentile			0.086**
			(0.03)
Industry-ΔTFP	−0.022***	−0.022**	−0.021**
	(0.01)	(0.01)	(0.01)
Public Acquirer	0.021	0.022	0.023*
	(0.01)	(0.01)	(0.01)
Public Target	−0.030***	−0.026***	−0.025***
	(0.01)	(0.01)	(0.01)
Cross-Border	0.004	0.003	0.002
	(0.01)	(0.01)	(0.01)
Tender-Offer	0.018	0.014	0.016
	(0.01)	(0.01)	(0.01)
Horizontal	−0.000	0.000	0.000
	(0.01)	(0.01)	(0.01)
Acquirer-Experience	−0.008	−0.008	−0.008
	(0.01)	(0.01)	(0.01)
Related	0.013*	0.014**	0.014**
	(0.01)	(0.01)	(0.01)
Constant	0.201	0.190	0.183
	(0.29)	(0.29)	(0.29)
First stage: Selection equation			
Non-Focal share-of-stock-financed transactions	3.043***	1.545***	1.405***
	(0.07)	(0.08)	(0.10)
Expansion-Year	0.040	0.302***	0.258***
	(0.03)	(0.04)	(0.05)
Constant	−1.902***	−2.176***	−2.534***
	(0.03)	(0.04)	(0.05)
Athrho $\hat{P}$	−0.008	−0.001	−0.010
N	12,305	12,305	12,305

Note: We report a regression that tests whether acquirers in stock-financed transactions that take place in industries characterized by higher R&D intensity experience higher TFP-growth than acquiring companies in cash-based transactions, while accounting for the potential endogeneity of stock-financed transactions. Percentiles are P25, P50, and P75. In addition to the full set of industry-level controls, our estimation controls for industry- and year-specific fixed effects. The standard errors are reported in parentheses.
Abbreviations: R&D, Research and Development; TFP, total factor productivity.
*, **, and ***, respectively, represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

TABLE 10 | Endogenous-treatment procedure for acquiring-firm CARs.

	Coefficient	S.E.
Second stage: CARs equations		
Stock-financed transaction * High-Risk-Aversion	−0.558**	(0.25)
Stock-financed transaction	−0.414	(0.27)
VXO	0.036***	(0.01)
Public Target	−1.631***	(0.16)
Cross-Border	−0.019	(0.22)
Tender-Offer	1.383***	(0.28)
Horizontal	0.315**	(0.15)
Related	−0.052	(0.14)
Industry-Assets	−0.164	(0.40)
Industry-Sales	−0.354	(0.41)
Industry-Income	0.014	(0.08)
Industry-Employees	0.045	(0.26)
Industry-Debt	0.057	(0.21)
Acquirer-Experience	−0.393***	(0.15)
Constant	−3.037	(5.68)
First stage: Selection equation		
Share-of-stock-financed transactions	4.072***	(0.08)
Non-Focal share-of-stock-financed transactions	0.568*	(0.33)
Expansion-Year	−0.112***	(0.03)
Constant	−1.994***	(0.08)
Athrho $\hat{\rho}$	0.007	(0.02)
Observations	11,570	

Note: We report an endogenous-treatment procedure that tests whether acquiring firms undertaking share-based transactions during periods of high-risk-aversion experience an additional discount in terms of stock-market reactions while modeling and controlling for selection. In addition to the full set of transaction-level and industry-level controls, our estimation controls for industry, year, acquirer-nation, and target-nation specific fixed effects. The standard errors are reported in parentheses.
Abbreviations: CAR, cumulative abnormal return; VXO, volatility index option.
*, **, and ***, respectively, represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

productivity gains due to stock-financed transactions increase monotonically with the knowledge-intensity of an industry. The size of the coefficients is also very similar to those obtained earlier, indicating that here too endogeneity seems to play a lesser role.

Our fourth theoretical prior—acquiring firms in stock-financed deals are characterized by an additional discount in stock-market reactions during periods of high-risk aversion—is empirically tested in Table 10 where global-risk-aversion is captured via the VXO index. Table 10 reports the empirical results for the estimations modeled via an endogenous-treatment procedure. Akin to the main empirical results reported in Table 6, we find that the interaction between the stock-financed construct and high global-risk-aversion yields a negative and statistically significant coefficient estimate. Accordingly, these empirical results again conform to our fourth prediction, where stock-financed acquisitions generally involve an additional discount with respect to cash-financed acquisitions when financial markets are characterized by high degrees of risk aversion. Once more, the coefficient estimates accounting for selection (−0.558) do not substantially differ from those obtained via Ordinary Least Squares (−0.555).

6 | Conclusion

We develop and test a theory of postacquisition integration based on the distinction between one-way and two-way effort. In our framework, one-way strategies—which we associate with cash deals—rely on the acquiring firm to drive postmerger value creation through unilateral efforts and restructuring. By contrast, two-way strategies—which we link to stock-financed transactions—depend on shared ownership and mutual engagement. Our model shows that two-way effort leads to higher expected gains but also introduces greater strategic uncertainty, thereby resulting in higher variance of postmerger outcomes. We formalize this logic through a theoretical model with effort decisions characterized by strategic complementarities and where the structure of financial claims affects equilibrium behavior.

We test these predictions using a large sample of completed M&A transactions from 1986 to 2009 that is drawn from Thomson Reuters SDC Platinum and matched to firm-level data from Worldscope. We estimate TFP for acquiring firms using translog production functions, allowing us to track performance before and after the deal. We also implement endogenous-treatment and IV strategies to address concerns over the selection of payment types. Across specifications, the empirical evidence supports our theoretical claims: stock-financed acquisitions yield larger average TFP gains, greater dispersion in outcomes, and heightened sensitivity to risk aversion in financial markets. Moreover, the performance advantage of stock-based deals is particularly pronounced in R&D-intensive sectors where knowledge complementarities and joint integration efforts are likely to generate higher returns.

Our approach enables scalable empirical testing of post-M&A behavior by using the method of payment as a transparent and ex ante indicator of integration structure. While our framework draws on prior literature to motivate several intermediate mechanisms—such as managerial retention (Ghosh and Ruland 1998), stock option preservation (Babenko et al. 2021), and postmerger effort (Haspeslagh and Jemison 1991)—our empirical analysis does not seek to directly test each of these channels. Instead, we focus on the reduced-form relationship between the method of payment and postmerger performance as proxied by TFP. By linking payment structure directly to realized synergy outcomes, we provide evidence of a robust and economically meaningful association.

This study opens up several avenues for future research. Fine-grained data sets—such as linked employer-employee records or administrative registers (e.g., Bagger et al. 2013; Card et al. 2013)—could be used to examine how payment methods

affect job creation, workforce restructuring, and the reallocation of human capital. In particular, future studies could test whether stock-financed acquisitions facilitate more intensive reorganization or higher managerial retention. Additionally, high-resolution panel data could be used to study whether financial incentives (e.g., stock option vesting) predict post-M&A executive behavior (Gopalan et al. 2014).

The comparative statics of our model also suggest that external conditions may shape the relative effectiveness of one-way versus two-way effort strategies. Future empirical work could explore whether stock deals deliver higher synergies in innovation-intensive environments (Ahuja and Katila 2001), in highly competitive product markets (Karuna 2007), or in cross-border transactions where coordination and local adaptation are crucial (Shimizu et al. 2004; Erel et al. 2012). These contexts may increase the value of joint posttransaction effort and amplify the payoff to collaboration.

In sum, we provide a tractable and data-driven framework for understanding how financing structure shapes postacquisition incentives and outcomes. By anchoring our conceptual model in observable transaction characteristics, and validating it empirically with productivity data, we offer both a theoretical and empirical foundation for future research on integration dynamics.

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Data Availability Statement

Data are available upon request from the authors, and it will eventually be available in a public repository.

Endnotes

[1] Akin to Rajan and Zingales (1998), managers have the authority to make the key decisions for firms. While it is reasonable to expect that employees at all levels impart their own influence on the posttransaction process, the management—more specifically, the top management team—of each partnering firm plays the crucial role in establishing and shaping the strategic direction of the combined firm (Chatterjee 1992). We employ the terms "firm" or "partnering firms" while bearing in mind that it is the top management of these firms that makes strategic decisions.

[2] Note that we do not model the third strategy in Haspeslagh and Jemison, the "Preservation" strategy (low interdependence and high autonomy) because it involves minimal integration efforts and falls outside our research scope focusing on effort-driven synergy realization.

[3] While there exists a literature on bargaining and M&A activity (e.g., Berkovitch and Khanna 1991; Das and Sengupta 2001), we opt to simplify and abstract away from how asymmetric bargaining power affects the division of gains between the partnering firms.

[4] Although the two firms are ex post symmetric in a share-acquisition, we label in both cases (share-acquisition and cash-acquisition) one partnering firm as the acquirer and the other as the target.

[5] We compare the equilibrium behavior and outcomes under each payment mode—shares or cash. While our analysis is framed as a comparison of outcomes, it can also be interpreted as the second stage of a two-stage game. In this broader view, firms first choose the mode of transaction—either a share-based or cash-based acquisition— and subsequently decide whether to exert effort in posttransaction integration. For clarity and focus, we simplify the exposition by directly comparing equilibrium profits under each mode. Nonetheless, this implicitly characterizes the conditions under which each payment mode is optimal. We favor this formulation as it aligns more closely with our empirical strategy: although we control for potential endogeneity in the choice of transaction mode, we do not fully model or estimate its determinants (see Section 5.2 for further discussion). Still, our theoretical predictions can be understood as statements about when one payment mode should be preferred over the other.

[6] Suppose, for example, that a firm specializing in basic programming merges with a firm that employs experts in system design. By combining their knowledge, the partners might be able to produce a new and superior computer apparatus. Yet a more cost-effective and superior product can only be developed if one partner writes the necessary programs and the other designs the adequate system. When only one partner develops a better computer system, this can still lead to (nonsynergistic) gains by selling the new system through the already existing warehousing and delivery operations from the other partner (Banal-Estañol and Seldeslachts 2011).

[7] We assume posttransaction efforts to be noncontractible and chosen simultaneously. See, for instance, the analysis by de Bettignies and Ross (2014) regarding the verifiability of postmerger managerial efforts in a merger to monopoly. Indeed, actions in the posttransaction phase are likely to be plagued by ambiguity about what the other partnering firm is doing (Vaara 2003). It is inherently difficult to distinguish optimal procedures from seemingly similar actions that yield far-less optimal outcomes (Mailath et al. 2004). This explains why posttransaction efforts are often modeled as if they were chosen simultaneously (Dessein et al. 2010), that is, each partnering firm takes effort decisions without knowing what the other partnering firm is doing. The above-said contracts can of course encourage the efforts of partnering firms (e.g., Gilson 2005), though such contractual means are not perfect.

[8] In a correlated equilibrium, strategies are recommended to players according to a probability distribution. For simplicity, in the assumed correlated equilibrium, each player is recommended to play "Effort" with probability one-half and each player is recommended to play "No effort" with probability one-half. As long as the probability of playing the good equilibrium (in which both exert effort) is larger than one-half and below one, then our results hold.

[9] We should underscore that our parametrization is meant to reflect average tendencies. There will, of course, be some cash-acquisitions that have a higher potential than some share-acquisitions, but the idea behind our model is to capture general tendencies.

[10] Note that the variance of outcomes, in our setup, is independent of the degree of complementarities, given that they do not affect the synergy gains obtained by acquiring firms engaged in share-acquisitions, and those obtained by firms engaged in cash-acquisitions do not have any variance.

[11] Note, though, there may be simultaneous effects of these factors on other parameters of the model. For instance, cross-border transactions typically involve higher integration costs—arising from cultural distance, legal frictions, or institutional mismatch—which would effectively increase the costs of integration effort, parameter c in our model. As a result, cross-border mergers might favor cash-based acquisitions (because of the higher costs of exerting effort) or they may favor share-based acquisitions (because of the complementarities), depending on what parameter changes most.

[12] As explained by Goyal and Santa-Clara (2003), there are many models in financial economics that take idiosyncratic risk into account and acknowledge that not only systematic risk should affect returns. Levy (1978) and Merton (1987), for instance, build extensions of the capital asset pricing model in which the investors, for some exogenous reason, hold undiversified portfolios. Extensive evidence exists suggesting that individuals hold undiversified portfolios: for example, Barber and Odean (2000), Benartzi and Thaler (2001), and Goetzmann and Kumar (2008). Limited diversification could then appear for a wide variety of reasons, including transaction costs, tax rationales, and private information.

[13] This not only provides clear-cut distinctions between our two predictions, that is, one-way effort versus two-way effort, but also matches the fact that we leave out one of the typologies of Haspeslagh and Jemison (1991), that is, "Preservation." Because our model is built around synergy creation through active efforts, we exclude Preservation strategies by design. Mixed-payment deals, which often accompany so-called light-touch integrations, are more likely to fall into the Preservation category. In such transactions, acquirers typically avoid deep integration, choosing instead to retain the target's autonomy, organizational structure, and culture. This approach reflects a strategic intent to minimize disruption rather than to actively realize synergies through effort. Because our framework focuses on transactions where synergies are endogenously driven by either one-sided or mutual effort, these low-integration, low-effort deals fall outside the scope of our empirical analysis and are therefore excluded.

[14] The specific measure of capital stock from Thomson WorldScope reflects total assets: the sum of total current assets, long-term receivables, investment in unconsolidated subsidiaries, other investments, net property, plant and equipment and other assets.

[15] The relevant VXO (where we use the daily closing price) measure is downloadable at http://www.cboe.com/products/vix-index-volatility/vix-options-and-futures/vix-index/vix-historical-data. VXO contains information with respect to the risk aversion in a market but also with respect to the uncertainty manifest in a market (Bloom 2014). A number of studies (Bollerslev et al. 2011; Bekaert et al. 2013) have proposed techniques to split these implied-volatility indexes into a measure capturing stock-market uncertainty and a residual that is more closely associated with risk aversion. In unreported testing available upon request, we replaced the VXO measure with Zhou's (2018) Variance Risk Premium measure and found qualitatively similar results.

[16] In diagnostic testing, we were able to establish that the total assets of acquirers in share-based acquisitions did not systematically differ from the total assets of acquirers in cash-based acquisitions when considering the period covering two-years-prior to two-years-after the transaction date. These results suggest that the distinction we make is not driven by systematic differences in terms of the target assets being folded into acquiring firms.

[17] In addition to the fact that the public nature of targets is controlled for and only represents 10% of the sample, our results hold when dropping all of the public targets. Furthermore, acquirer and target CARs generally move in concert. That said, it is possible that the CARs of target firms involved in share-based acquisitions do not exhibit the same discount that we hypothesize with respect to acquirer CARs.

[18] Specifically, this process employs both real and detrended production at the industry level. Detrended production is the actual production less the predicted production, where predicted industrial production is calculated from a regression of industrial production on a time trend. Expansion years are then years in which both real and detrended industrial production increase relative to the previous year.

[19] In unreported empirical tests available upon request, our Cross-Border construct was moved from the second- to the first-stage equation, and this further improved our instrumental approach. While cross-border transactions seemingly involve greater coordination costs as compared with domestic transactions, thereby favoring the manifestation of cash-based over share-based acquisitions (making this construct a strong instrument from an empirical perspective), cross-border transactions should also invoke a higher effort posttransaction according to our conceptual framework (making this construct a poor instrument from a theoretical perspective).

References

Agarwal, R., J. Anand, J. Bercovitz, and R. Croson. 2012. "Spillovers Across Organizational Architectures: The Role of Prior Resource Allocation and Communication in Post-Acquisition Coordination Outcomes." *Strategic Management Journal* 33: 710–733.

Ahuja, G., and R. Katila. 2001. "Technological Acquisitions and the Innovation Performance of Acquiring Firms: A Longitudinal Study." *Strategic Management Journal* 22, no. 3: 197–220.

Alexandridis, G., D. Petmezas, and N. G. Travlos. 2010. "Gains From Mergers and Acquisitions Around the World: New Evidence." *Financial Management* 39, no. 4: 1671–1695.

Ang, J. 2001. "The Take-Over Market for Privately Held Companies: The US Experience." *Cambridge Journal of Economics* 25: 723–748.

Babenko, I., S. Du, and Y. Tserlukevich. 2021. "Employee Incentives in Mergers and Acquisitions." *Journal of Financial Economics* 139, no. 2: 457–479.

Bagger, J., B. E. Sørensen, and R. Vejlin. 2013. *Wage Sorting Trends. Finance and Economics Discussion Series*. Board of Governors of the Federal Reserve System.

Banal-Estañol, A., and J. Seldeslachts. 2011. "Merger Failures." *Journal of Economics & Management Strategy* 20: 589–624.

Barber, B. M., and T. Odean. 2000. "Trading Is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors." *Journal of Finance* 55: 773–806.

Barkema, H. G., and M. Schijven. 2008. "How Do Firms Learn to Make Acquisitions? A Review of Past Research and an Agenda for the Future." *Journal of Management* 34, no. 3: 594–634.

Bauer, F., and K. Matzler. 2014. "Antecedents of M&A Success: The Role of Strategic Complementarity, Cultural Fit, and Degree and Speed of Integration." *Strategic Management Journal* 35, no. 2: 269–291.

Bekaert, G., M. Hoerova, and M. Lo Duca. 2013. "Risk, Uncertainty and Monetary Policy." *Journal of Monetary Economics* 60: 771–788.

Benartzi, S., and R. H. Thaler. 2001. "Naive Diversification Strategies in Defined Contribution Saving Plans." *American Economic Review* 91: 79–98.

Berkovitch, E., and N. Khanna. 1991. "A Theory of Acquisition Markets: Mergers Versus Tender Offers, and Golden Parachutes." *Review of Financial Studies* 4: 149–174.

Betton, S., B. Eckbo, and K. Thorburn. 2008. "Corporate Takeovers." In *Handbook of Empirical Corporate Finance*, edited by B. Espen Eckbo, Vol. II, 290–427. Elsevier B.V.

Birkinshaw, J., H. Bresman, and L. Håkanson. 2000. "Managing the Post-Acquisition Integration Process: How the Human Iintegration and Task Integration Processes Interact to Foster Value Creation." *Journal of Management Studies* 37, no. 3: 395–425.

Bloom, N. 2014. "Fluctuations in Uncertainty." *Journal of Economic Perspectives* 28: 153–176.

Bollerslev, T., M. Gibson, and H. Zhou. 2011. "Dynamic Estimation of Volatility Risk Premia and Investor Risk Aversion From Option-Implied and Realized Volatilities." *Journal of Econometrics* 160: 235–245.

Campa, J. M., and S. Kedia. 2002. "Explaining the Diversification Discount." *Journal of Finance* 57: 1731–1762.

Capron, L. 1999. "The Long-Term Performance of Horizontal Acquisitions." *Strategic Management Journal* 20: 987–1018.

Capron, L., and N. Pistre. 2002. "When Do Acquirers Earn Abnormal Returns?" *Strategic Management Journal* 23, no. 9: 781–794.

Card, D., J. Heining, and P. Kline. 2013. "Workplace Heterogeneity and the Rise of West German Wage Inequality." *Quarterly Journal of Economics* 128, no. 3: 967–1015.

CBOE. 2004. *The CBOE Volatility Index—VIX*. White Paper. Chicago Board Options Exchange. https://www.cboe.com/micro/vix/vixwhite.pdf.

Ceccagnoli, M., M. J. Higgins, and V. Palermo. 2012. "Do Acquisitions and Internal Development Serve as Substitutes? Evidence From the Pharmaceutical Industry." *Strategic Management Journal* 33, no. 13: 1350–1371.

Chang, S., E. L. Mais, and M. J. Sullivan. 2013. "The Impact of Method of Payment on Post-Merger Integration: Evidence From Performance-Vested Stock Grants." *Journal of Economics and Business* 65: 71–95.

Chatterjee, S. 1992. "Sources of Value in Takeovers: Synergy or Restructuring-Implications for Target and Bidder Firms." *Strategic Management Journal* 13: 267–286.

Coudert, V., and M. Gex. 2008. "Does Risk Aversion Drive Financial Crises? Testing the Predictive Power of Empirical Indicators." *Journal of Empirical Finance* 15: 167–184.

Das, S. P., and S. Sengupta. 2001. "Asymmetric Information, Bargaining, and International Mergers." *Journal of Economics & Management Strategy* 10, no. 4: 565–590.

de Bettignies, J.-E., and T. W. Ross. 2014. "Mergers, Agency Costs, and Social Welfare." *Journal of Law, Economics and Organization* 30, no. 2: 401–436.

Dessein, W., L. Garicano, and R. Gertner. 2010. "Organizing for Synergies." *American Economic Journal: Microeconomics* 2: 77–114.

Ding, D., C. Fan, and E. Wolfstetter. 2013. "Sharing Control in Corporate Acquisitions." *International Journal of Industrial Organization* 31, no. 2: 119–130.

Duso, T., D. J. Neven, and L.-H. Röller. 2007. "The Political Economy of European Merger Control: Evidence Using Stock Market Data." *Journal of Law and Economics* 50: 455–489.

Erel, I., R. C. Liao, and M. S. Weisbach. 2012. "Determinants of Cross-Border Mergers and Acquisitions." *Journal of Finance* 67, no. 3: 1045–1082.

Faccio, M., and R. W. Masulis. 2005. "The Choice of Payment Method in European Mergers and Acquisitions." *Journal of Finance* 60, no. 3: 1345–1388.

Farrell, J., and C. Shapiro. 2001. "Scale Economies and Synergies in Horizontal Merger Analysis." *Antitrust Law Journal* 68: 685–710.

Fich, E. M., E. M. Rice, and A. L. Tran. 2016. "Contractual Completeness and Post-Acquisition Performance: The Moderating Role of Earnouts." *Journal of Corporate Finance* 41: 128–147.

Fishman, M. J. 1989. "Preemptive Bidding and the Role of the Medium of Exchange in Acquisitions." *Journal of Finance* 44, no. 1: 41–57.

French, K. R., G. W. Schwert, and R. F. Stambaugh. 1987. "Expected Stock Returns and Volatility." *Journal of Financial Economics* 19: 3–29.

Ghosh, A., and W. Ruland. 1998. "Managerial Ownership, the Method of Payment for Acquisitions, and Executive Job Retention." *Journal of Finance* 53, no. 2: 785–798.

Gilson, R. J. 2005. "Understanding MACs: Moral Hazard in Acquisitions." *Journal of Law, Economics and Organization* 21, no. 2: 330–358.

Goetzmann, W. N., and A. Kumar. 2008. "Equity Portfolio Diversification." *Review of Finance* 12: 433–463.

Gopalan, R., T. Milbourn, F. Song, and A. V. Thakor. 2014. "Duration of Executive Compensation." *Journal of Finance* 69, no. 6: 2777–2817.

Gort, M., and T. F. Hogarty. 1970. "New Evidence on Mergers." *Journal of Law and Economics* 13: 167–184.

Goyal, A., and P. Santa-Clara. 2003. "Idiosyncratic Risk Matters!." *Journal of Finance* 58: 975–1007.

Graebner, M. E. 2004. "Momentum and Serendipity: How Acquired Leaders Create Value in the Integration of Technology Firms." *Strategic Management Journal* 25, no. 8–9: 751–777.

Graebner, M. E., K. H. Heimeriks, Q. N. Huy, and E. Vaara. 2017. "The Process of Post-Merger Integration: A Review and Agenda for Future Research." *Academy of Management Annals* 11, no. 1: 1–32.

Guadalupe, M., O. Kuzmina, and C. Thomas. 2012. "Innovation and Foreign Ownership." *American Economic Review* 102, no. 7: 3594–3627.

Haleblian, J., C. E. Devers, G. McNamara, M. A. Carpenter, and R. B. Davison. 2009. "Taking Stock of What We Know about Mergers and Acquisitions: A Review and Research Agenda." *Journal of Management* 35, no. 3: 469–502.

Halperin, M., and E. Lusk. 2013. "Events and Eventus: Understanding and Facilitating Event Studies." *Journal of Business & Finance Librarianship* 18: 1–13.

Hansen, R. G. 1987. "A Theory for the Choice of Exchange Medium in Mergers and Acquisitions." *Journal of Business* 60, no. 1: 75–95.

Haspeslagh, P. C., and D. B. Jemison. 1991. *Managing Acquisitions: Creating Value Through Corporate Renewal*. Free Press.

Heckman, J. 1974. "Shadow Prices, Market Wages, and Labor Supply." *Econometrica* 42: 679–694.

Heimeriks, K. H., G. Duysters, and P. M. Vaaler. 2020. "Alliance and Acquisition Capabilities: How Do They Affect Performance?" *Strategic Management Journal* 41, no. 4: 671–694.

Homburg, C., and M. Bucerius. 2006. "Is Speed of Integration Really a Success Factor of Mergers and Acquisitions?" *Strategic Management Journal* 27, no. 4: 347–367.

Jensen, M. C., and R. S. Ruback. 1983. "The Market for Corporate Control." *Journal of Financial Economics* 11: 5–50.

Karuna, C. 2007. "Industry Product Market Competition and Managerial Incentives." *Journal of Accounting and Economics* 43, no. 2–3: 275–297.

Krug, J. A., and W. H. Hegarty. 1997. "Postacquisition Turnover Among U.S. Top Management Teams: An Analysis of the Effects of Foreign vs. Domestic Acquisitions of U.S. Targets." *Strategic Management Journal* 18, no. 8: 667–675.

Larsson, R., and S. Finkelstein. 1999. "Integrating Strategic, Organizational, and Human Resource Perspectives on Mergers and Acquisitions: A Case Survey of Synergy Realization." *Organization Science* 10: 1–26.

Levy, H. 1978. "Equilibrium in an Imperfect Market: A Constraint on the Number of Securities in the Portfolio." *American Economic Review* 68: 643–658.

Li, K., and N. Prabhala. 2007. "Self-Selection Models in Corporate Finance." In *Handbook of Corporate Finance*, edited by B. Espen Eckbo, Vol. I, 37–86. North-Holland.

Li, W., and L. C. Xu. 2004. "The Impact of Privatization and Competition in the Telecommunications Sector Around the World." *Journal of Law and Economics* 47: 395–430.

Li, X. 2013. "Productivity, Restructuring, and the Gains From Takeovers." *Journal of Financial Economics* 109, no. 1: 250–271.

Lichtenberg, F. R., and D. Siegel. 1990. "The Effect of Ownership Changes on the Employment and Wages of Central Office and Other Personnel." *Journal of Law and Economics* 33, no. 2: 383–408.

Loughran, T., A. M. Vijh, T. Loughran, and A. M. Vijh. 1997. "Do Long-Term Shareholders Benefit From Corporate Acquisitions?" *Journal of Finance* 52, no. 5: 1765–1790.

Mailath, G., V. Nocke, and A. Postlewaite. 2004. "Business Strategy, Human Capital, and Managerial Incentives." *Journal of Economics & Management Strategy* 13: 617–633.

Makri, M., M. A. Hitt, and P. J. Lane. 2009. "Complementary Technologies, Knowledge Relatedness, and Invention Outcomes in High Technology Mergers and Acquisitions." *Strategic Management Journal* 31, no. 6: 602–628.

Maksimovic, V., and G. Phillips. 2001. "The Market for Corporate Assets: Who Engages in Mergers and Asset Sales and Are There Efficiency Gains?" *Journal of Finance* 56: 2019–2065.

Maksimovic, V., and G. Phillips. 2002. "Do Conglomerate Firms Allocate Resources Inefficiently Across Industries? Theory and Evidence." *Journal of Finance* 57: 721–767.

Maksimovic, V., G. Phillips, and N. R. Prabhala. 2011. "Post-Merger Restructuring and the Boundaries of the Firm." *Journal of Financial Economics* 102: 317–343.

Maksimovic, V., G. Phillips, and L. Yang. 2013. "Private and Public Merger Waves." *Journal of Finance* 68: 2177–2217.

Malmendier, U., M. M. Opp, and F. Saidi. 2016. "Target Revaluation After Failed Takeover Attempts: Cash Versus Stock." *Journal of Financial Economics* 119: 92–106.

Martin, K. J., and J. J. McConnell. 1991. "Corporate Performance, Corporate Takeovers, and Management Turnover." *Journal of Finance* 46, no. 2: 671–687.

Matsusaka, J. G. 1993. "Target Profits and Managerial Discipline During the Conglomerate Merger Wave." *Journal of Industrial Economics* 41: 179–189.

Merton, R. C. 1987. "A Simple Model of Capital Market Equilibrium With Incomplete Information." *Journal of Finance* 42: 483–510.

Moeller, S. B., F. P. Schlingemann, and R. M. Stulz. 2005. "Wealth Destruction on a Massive Scale? A Study of Acquiring-Firm Returns in the Recent Merger Wave." *Journal of Finance* 60: 757–782.

Montgomery, C. A. 1994. "Corporate Diversification." *Journal of Economic Perspectives* 8, no. 3: 163–178.

Montgomery, C. A., and S. Hariharan. 1991. "Diversified Expansion by Large Established Firms." *Journal of Economic Behavior & Organization* 15: 71–89.

Morck, R., A. Shleifer, and R. W. Vishny. 1990. "Do Managerial Objectives Drive Bad Acquisitions?" *Journal of Finance* 45, no. 1: 31–48.

Oh, J.-M., and K. M. Park. 2022. "Do Acquirers Choose Stock Financing to Share Value Creation?" *Strategic Management Journal* 43, no. 2: 269–296.

Pan, J., and K. J. Singleton. 2008. "Default and Recovery Implicit in the Term Structure of Sovereign CDS Spreads." *Journal of Finance* 63: 2345–2384.

Puranam, P., H. Singh, and S. Chaudhuri. 2009. "Integrating Acquired Capabilities: When Structural Integration Is (Un)Necessary." *Organization Science* 20: 313–328.

Raghavendra Rau, P. 1998. "Glamour, Value and the Post-Acquisition Performance of Acquiring Firms." *Journal of Financial Economics* 49, no. 2: 223–253.

Rajan, R. G., and L. Zingales. 1998. "Power in a Theory of the Firm." *Quarterly Journal of Economics* 113: 387–432.

Ranft, A. L., and M. D. Lord. 2002. "Acquiring New Technologies and Capabilities: A Grounded Model of Acquisition Implementation." *Organization Science* 13, no. 4: 420–441.

Rappaport, A., and M. L. Sirower. 1999. "Stock or Cash? The Trade-Offs for Buyers and Sellers in Mergers and Acquisitions." *Harvard Business Review* 77: 147–158.

Rhodes-kropf, M., and D. T. Robinson. 2008. "The Market for Mergers and the Boundaries of the Firm." *Journal of Finance* 63: 1169–1211.

Schipper, K., and R. Thompson. 1983. "Evidence on the Capitalized Value of Merger Activity for Acquiring Firms." *Journal of Financial Economics* 11: 85–119.

Schoar, A. 2002. "Effects of Corporate Diversification on Productivity." *Journal of Finance* 57: 2379–2403.

Shimizu, K., M. A. Hitt, D. Vaidyanath, and V. Pisano. 2004. "Theoretical Foundations of Cross-Border Mergers and Acquisitions: A Review of Current Research and Recommendations for the Future." *Journal of International Management* 10, no. 3: 307–353.

Travlos, N. G. 1987. "Corporate Takeover Bids, Methods of Payment, and Bidding Firms' Stock Returns." *Journal of Finance* 42, no. 4: 943–963.

Vaara, E. 2003. "Post-Acquisition Integration as Sensemaking: Glimpses of Ambiguity, Confusion, Hypocrisy, and Politicization." *Journal of Management Studies* 40: 859–894.

Walsh, J. P. 1988. "Top Management Turnover Following Mergers and Acquisitions." *Strategic Management Journal* 9, no. 2: 173–183.

Wilkinson, J., and N. Kannan. 2013. "Payment Method in Mergers and Acquisitions: Implications for Firm Performance and Executive Compensation." *Journal of Corporate Finance* 21: 28–45.

Yim, S. 2013. "The Acquisitiveness of Youth: CEO Age and Acquisition Behavior." *Journal of Financial Economics* 108, no. 1: 250–273.

Zhou, H. 2018. "Variance Risk Premia, Asset Predictability Puzzles, and Macroeconomic Uncertainty." *Annual Review of Financial Economics* 10: 481–497.

Zollo, M., and H. Singh. 2004. "Deliberate Learning in Corporate Acquisitions: Post-Acquisition Strategies and Integration Capability in U.S. Bank Mergers." *Strategic Management Journal* 25, no. 13: 1233–1256.