Mergers versus Acquisitions: Theory and Empirical Evidence

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ABSTRACT
We differentiate between mergers and acquisitions based on the potential for partnering firms to respectively engage in two-way or one-way efforts in obtaining operational efficiencies. Our model predicts that acquiring firms engaged in mergers will be characterized by both a higher mean and a higher variance in operational-efficiency gains. These higher-mean and higher-variance tendencies for mergers vis-à-vis acquisitions involve countervailing effects when factoring stock-market valuations; hence, mergers are discounted when financial markets are characterized by high degrees of risk aversion. Employing data on 38,706 transactions covering 1986 to 2009, we find strong empirical support for our three theoretical predictions.

Key words: Mergers, Acquisitions, Productivity, Announcement returns, Synergy
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1. Introduction

The literature focusing on the market for corporate control often employs the terms 'mergers' and 'acquisitions' interchangeably when in fact these terms refer to different transaction types. As Netter et al. (2011) underscore, "the terms 'mergers' and 'acquisitions' encompass a wide variety of transactions with different structures that have varying effects on participants" (p. 2352). For one, the premium-for-power literature argues that mergers lead to shared governance between the partnering firms (Bruner, 2004; Hartzell et al., 2004; Wulf, 2004). Mergers often involve an equitable combination of partnering-firm operations, while acquisitions involve less the equitable combining of operations and more the disciplining and replacing of target-firm strategies (Morck et al., 1998; Martin and McConnell, 1991). Furthermore, mergers and acquisitions are potentially distinguishable by neither partnering firm necessarily dominating in a merger, though the acquirer tends to dominate the integration and future operation of the combined entity in an acquisition (Netter et al., 2011). In sum, mergers create a new organization in which shared control characterizes the combined entity, whereas acquisitions instead tend to involve an acquiring firm gaining control over a target firm and its assets (Asquith, 1983; Mastracchio and Zunitch, 2002).

This paper presents a theoretical model that differentiates between mergers and acquisitions and generates testable predictions with respect to the observable performance differences between these two transaction types. In line with the above-noted M&A conceptualizations, our model underscores that the manifestation of post-transaction contributions in the combined entity represents a key distinction between merger and acquisition activity. Specifically, mergers can involve two-way contributions by the partnering firms, while acquisitions simply involve one-way (acquirer) contributions. We demonstrate that this distinction affects the first and second moments of the distribution in operational-efficiency outcomes. Put simply, mergers generate greater operational efficiencies on average, yet they also manifest more variance in these efficiencies. As such, stock markets could attach an additional discount to mergers vis-à-vis

acquisitions when financial markets exhibit high degrees of risk aversion. Employing data on up to 38,706 transactions covering the 1986 to 2009 period, we empirically test these three predictions and find strong empirical support for these observable performance differences between mergers and acquisitions.

Our reasoning follows a number of studies (Maksimovic and Phillips, 2001; Schoar, 2002; Devos et al., 2008; Maksimovic et al., 2011; Li, 2013) by holding that operational-efficiency gains represent the initial performance objective in both transaction types. In a merger, the two partnering firms need to contribute more equally to the post-transaction operation of the combined entity. That is, a merger calls for two-way contributions by both partnering firms to secure efficiency gains. Yet in an acquisition, the contributions of the partnering firms in the post-transaction entity are more likely to be characterized by asymmetries. That is, an acquisition calls for the acquirer to take on a more decisive role as compared to the target firm in terms of securing operational-efficiency gains and exerting effort in the post-transaction entity.

While distinctions between merger and acquisition activity have generally been recognized by previous scholarship, the potential for these transaction types to involve varying performance implications has been neglected. Our model predicts that mergers are superior as compared to acquisitions in terms of securing operational-efficiency gains in the post-transaction environment. Mergers involve a higher ceiling as these transactions can involve the contributions of both partnering firms, which could in turn lead to the realization of synergistic gains. Yet merger outcomes are also relatively more uncertain due to the inherent coordination problems involved with obtaining two-way contributions.[1] Acquisitions, on the other hand,

[1] For instance, Hoberg and Phillips (2017) make clear that integration difficulties – which often lead to failure – are most salient when the transaction attempts to draw from both partnering firms to create synergies (i.e., in a merger). In this vein, Weber and Camerer (2003) established some of the conditions which make it difficult for partnering firms to view post-transaction issues similarly which in turn can lead to substantial coordination failures when firms engage in mergers.

are less likely to involve strategic uncertainty, as these transactions are more likely to rely on only one partnering firm (the acquirer) making substantial contributions. The relative certainty that is characteristic of acquisitions does, however, come at a cost, as one-sided contributions limit the ceiling in terms of the maximum obtainable operational-efficiency gains; i.e., synergistic gains from two-sided contributions are not obtainable in acquisitions.

Our model also makes predictions regarding the ex-ante reaction of financial markets to these two types of transactions. We submit that investors anticipate that mergers involve higher operational-efficiency gains on average, but also anticipate greater variance in these operational gains as compared to the gains in acquisitions. Supposing that financial investors reward the relatively higher operational-efficiency expectations and discount the relatively higher (idiosyncratic) risk involved with mergers, acquiring firms engaged in merger activities can experience stock-market reactions that are either greater or lower than those experienced by acquiring firms engaged in acquisitions. While the countervailing effects yield ambiguous predictions with regard to the stock-market reactions for acquirers engaged in mergers as compared to acquisitions (French et al., 1987), our model generates clear predictions with regard to how a change in risk preferences affects relative stock-market reactions. Namely, financial markets attach a relative discount to high-variance merger activities – as compared to low-variance acquisition activities – when markets are characterized by high degrees of risk aversion.

In our empirical testing, we distinguish between merger and acquisition activities via seven different classifications to underscore the robustness of our results. While we initially use the transaction classifications embedded in the Thomson M&A database, we are cognizant of Netter et al.'s (2011) caution that these classifications are not perfectly suited to distinguishing between the two transaction types. In particular, Thomson's 'merger' category consists of many transactions that are actually better characterized as acquisitions, which in turn partly explains why the terms 'mergers', 'acquisitions' and 'takeovers' have

been employed interchangeably in the literature (Betton et al., 2008; Barnes et al., 2014). In order then to also improve upon the exactness of our merger construct and enhance the empirical fit with our theoretical model, we distinguish between mergers and acquisitions via six additional variable operationalizations. The observation by Gort (1969) and Netter et al. (2011) that mergers take place between firms of equal size – while acquisitions involve relatively large acquirers – resides behind two of these additional variable constructs. Furthermore, Agrawal et al.'s (1992) observation that the method of payment represents a means to differentiate mergers from acquisitions resides behind four of these additional variable constructs. Thus in line with our theoretical model, merger activity can be characterized by significant degrees of equity transfer while acquisition activity can be characterized by significant degrees of cash transfer.

We estimate regression equations that control for all of the appropriate fixed effects on comprehensive samples of transaction data to empirically test our predictions. We employ total factor productivity (hereafter TFP), estimated via a translog production function, to capture operational-efficiency gains.[2] Moreover, we estimate fully-specified regression models for all seven definitions of a merger transaction. We find that acquiring firms engaged in mergers experience higher operational-efficiency outcomes as compared to acquiring firms engaged in acquisitions, as acquirer TFP growth in mergers exceeds the corresponding growth for acquirers in acquisitions. Second, in line with the prior that acquirers engaged in mergers experience higher variation in operational-efficiency outcomes as compared to acquisitions, we find that industries characterized by greater merger activity experience greater dispersion in acquiring-firm productivity outcomes. Third, we find that acquiring firms engaged in mergers experience an additional stock-market discount (as measured by the 3-day CAR) as compared to acquiring firms engaged in acquisitions when financial markets are characterized by high degrees of risk aversion.

[2] While we employ a more-complete TFP measure to capture operational-efficiency gains in the manuscript, all of our results are robust to applying a more-simple labor productivity measure.

While we initially rely on well-specified regressions that employ all of the available fixed effects to test our three predictions, we also undertake empirical testing that models and corrects for self-selection effects as the choice between a merger and an acquisition could well be selected into by managers with performance outcomes in mind (Li and Prabhala, 2007). We employ both an endogenous-treatment procedure and a standard instrumental variable (IV) approach to correct for endogeneity manifest in the merger constructs. Specifically, we take advantage of industry expansions (Maksimovic and Phillips, 2001) and the proclivities of focal and non-focal industry peers (Campa and Kedia, 2002) to identify exogenous variation in the seven different classifications of the merger construct. These additional empirical results, which model and correct for the selection into the transaction mode, corroborate the main empirical findings. Thus, we find strong empirical support for the predictions that mergers, as compared to acquisitions, involve higher operational-efficiency outcomes for acquiring firms but also involve higher variance in these outcomes; and that the financial market discounts mergers – as compared to acquisitions – when investors exhibit high degrees of risk aversion.

It is worth highlighting how our analysis of mergers versus acquisitions aligns with pre-existing debates concerning the nature of M&A activities. In particular, mergers in our theoretical and empirical context are akin to the M&A activities driven by partnering-firm complementarities that were considered by Rhodes-Kropf and Robinson (2008). Such 'theories of complementarity' consider M&As to be investments that generate synergies via the joining of partnering-firm assets, as employing the best managerial talent and practices of both firms, allowing for novel combinations that generate organizational innovations, and retaining and incentivizing the efforts of target-firm managers and directors—all indicate the potential for superior operational performance. While mergers are akin to the transactions considered by Rhodes-Kropf and Robinson (2008), acquisitions in our context are akin to the M&A activities driven by the need to transfer particular assets and resources from one of the partnering firms to the other.

Acquisitions are then more simple in nature as compared to mergers since they generally involve a one-way transfer of knowledge, technology or other assets from one firm to another and are thus more in line with 'theories of resource reallocation' (Gort, 1969; Jovanovic and Rousseau, 2002). We submit that these debates over the true nature of M&A activity can be partially resolved by understanding that these two theories actually speak to what are distinct transaction types.

In addition to setting out these salient differences with respect to mergers vis-à-vis acquisitions, we also contribute to the growing literature on the importance of productivity as a fundamental source of value creation. While Maksimovic and Phillips (2001) first noted that research should examine the link between acquirer stock-market valuations and subsequent productivity gains, Li's (2013) study represents the first to actually link the productivity gains from M&A activity with stock returns. We extend this line of research by not only factoring how expected productivity gains can influence stock-market valuations, but by also considering how the (idiosyncratic) risk involved with these gains can have an impact. The literature on productivity effects might then be served by not only considering expected outcomes, but by also considering the variance in these expected outcomes, to fully factor the links between productivity changes and stock-market valuations.

We organize the remainder of the paper as follows. The next section introduces a theoretical model that differentiates mergers from acquisitions and generates formal predictions for empirical testing. The subsequent section describes our data, defines the variable constructs, sets out estimation strategies and presents the empirical results testing our theoretical predictions. The third substantive section takes into account self-selection effects by modelling and correcting for the selection into mergers versus acquisitions. The final section concludes.

2. Theoretical analysis

We introduce the simplest possible model that captures the post-transaction contribution differences between mergers and acquisitions. Consider two ex-ante symmetric firms, labeled as the 'acquirer' and the 'target', which have decided to engage in either a merger or an acquisition. Since the two partnering firms are ex-ante symmetric, we assume that in both cases they wield equal bargaining power when deciding upon the terms of the agreement.[3] In a 'merger', the two firms agree to a contract that splits the shares of the new entity equally while, in an '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 entity in an equal manner in a merger, whereas the acquirer gains full control over the target firm in an acquisition.[5] As a result, both partnering firms remain active in the post-transaction entity when a merger takes place, while only the acquirer remains active when an acquisition takes place.

We assume that the transaction's immediate objective is to secure operational-efficiency gains. These depend on the 'potential gains' available, $\theta \geq 0$, and on the extent to which these potential gains are 'realized' in the post-transaction environment. As argued by Farrell and Shapiro (2001), Rhodes-Kropf and

[3] While there exists a literature on bargaining and M&A activity (e.g., Berkovitch and Khanna, 1991), 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 merger, we label one partnering firm as the acquirer and the other as the target. While modelling the partnering firms as ex-post symmetric in a merger (and completely asymmetric in an acquisition) is somewhat extreme, our intuition and results should more-generally hold so long as partnering firms have more asymmetric rights and obligations in acquisitions as compared to mergers.

[5] Akin to Rajan and Zingales (1998), managers have the authority to make the key decisions for firms. In mergers, the top managers of both firms stay active and receive rents that depend on combined-entity profits, whereas with acquisitions, only the top managers in acquiring firms remain active and receive rents. While it is reasonable to expect that employees at all levels impart their own influence on the post-transaction 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.

Robinson (2008), Puranam et al. (2009) and others, each firm can contribute specific and hard-to-trade knowledge and resources to the combined entity. Yet, making such contributions involves a private sacrifice as they involve a cost, $c \geq 0$, for each partnering firm.

Following the discussion in Farrell and Shapiro (2001), the potential operational-efficiency gains obtained by the resulting entity can be divided into synergistic and non-synergistic gains. Through the contributions of *a single* partnering firm, the new entity can obtain non-synergistic gains $\frac{\theta}{d}$. Through the contributions of *both* partnering firms, the new entity can also obtain synergistic gains $\theta\left(1-\frac{2}{d}\right)$ (Agarwal et al., 2012). The synergistic gains, which derive from joint contributions, come in addition to the twice rendered non-synergistic gains ($2\frac{\theta}{d}$). Thus, the non-synergistic and synergistic gains add up to the full potential gains θ.[6] The parameter *d* captures the degree of complementarity between the partnering firms. If no synergies were to be present in the transaction, then $d = 2$. We, therefore, assume $d > 2$ as merger synergies are a key element in our setup. As *d* increases, the extra gains from exerting effort become larger when the partnering firm has also done so, and become smaller when the partnering firm has not exerted effort.

The net gains for each partnering firm depend not only upon the obtained operational-efficiency gains, but also upon the costs incurred in obtaining these gains. In a merger, the net gains depend upon whether the other partnering firm provides effort or not. Table 1 summarizes the net gains for each

[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 (non-synergistic) gains by selling the new system through the already existing warehousing and delivery operations from the other partner (Banal-Estañol and Seldeslachts, 2011).

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 when the other firm does not provide effort, then it is profitable to exert effort only so as long as $\left(\frac{\theta}{2d} - c\right) \geq 0$. Since $d > 2$, the effort decisions are characterized by strategic complementarity: i.e., exerting effort is more profitable when the other partnering firm also exerts effort.

[Insert Table 1 about here]

In the context of an acquisition, the acquirer compensates the target firm with a fixed-amount payment, thereby de-incentivizing the target firm from exerting post-transaction effort. Yet the acquirer exerts post-transaction effort so long as the non-synergistic gains 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 operational gains of $\frac{1}{2}\left(\frac{\theta}{d} - c\right)$ when it exerts effort and zero otherwise. When comparing the two transaction types, it is evident that partnering firms can potentially obtain larger net operational gains in mergers than in acquisitions, $\left(\frac{\theta}{2} - c\right) > \frac{1}{2}\left(\frac{\theta}{d} - c\right)$. However, an acquiring firm engaged in a merger has less incentive to exert effort when the other partner does not exert effort as compared to an acquirer engaged in an acquisition, $\left(\frac{\theta}{2d} - c\right) < \left(\frac{\theta}{d} - c\right)$.

[7] We assume post-transaction efforts to be non-contractible and chosen simultaneously. Indeed, actions in the post-transaction 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 post-transaction efforts are often modelled as if they were chosen simultaneously (Dessein et al., 2010), i.e., each partnering firm takes effort decisions without knowing what the other partnering firm is doing.

2.1. 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 post-transaction environment for mergers 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 operational-efficiency 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 non-effort represent possible equilibria in this strategic game. In the case of an acquisition, recall that target firms are paid a fixed amount up front; hence, target firms are not incentivized to engage in costly post-transaction efforts in acquisitions as they reap no rewards from such efforts. Yet, the acquirer exerts effort in an acquisition so long as the potential operational-efficiency 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 incentive to exert some effort in both transaction types; i.e., $\theta > \underline{\theta} \equiv max\left\{\frac{2dc}{d-1}, dc\right\}$. Second, in case of multiple equilibria, we assume that each of the two possible equilibrium outcomes is assigned an equal probability of being realized. This is one of the correlated equilibria of this game.[8] Summarizing the above discussion, we can generate the following proposition regarding the effort choices of partnering firms:

[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.

Proposition. Provided there exists incentive to exert effort in both transaction types, i.e., $\theta > \underline{\theta}$,

(ia) If $\underline{\theta} \leq \theta < 2dc$, then both the mutual exertion and non-exertion of effort by partnering firms represent equilibrium outcomes in a merger. 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 represents the unique equilibrium in a merger. 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 an acquisition. Each of the partnering firms obtains net gains of $\frac{1}{2}\left(\frac{\theta}{d} - c\right)$ with certainty.

2.2. Means & variances in operational-efficiency gains

We can now compare the performance outcomes of mergers vis-à-vis acquisitions. We do so while 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 former region, as shown in parts (ia) and (ii) of the proposition, acquiring firms engaged in mergers obtain strictly higher expected gains as compared to those firms engaged in acquisitions, $\frac{1}{2}\left(\frac{\theta}{2} - c\right) > \frac{1}{2}\left(\frac{\theta}{d} - c\right)$. Notice that the comparison is strict as we have assumed that synergies exist, i.e., $d > 2$. In this region, the variance of both transactions is identical at zero. In the latter region, as shown in parts (ib) and (ii) of the proposition, the acquiring firms in a merger again obtain strictly higher expected operational gains, $\left(\frac{\theta}{2} - c\right) > \frac{1}{2}\left(\frac{\theta}{d} - c\right)$. However, the acquiring firms engaged in mergers 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 acquisitions. It is the presence of

strategic uncertainty – i.e., the two equilibria in effort levels – which leads to mergers involving a positive variance. We can summarize these results in the following two predictions:

Prediction 1. The operational-efficiency gains obtained by acquiring firms engaged in mergers are strictly higher in expectation as compared to those obtained by firms engaged in acquisitions.

Prediction 2**.** The operational-efficiency gains obtained by acquiring firms engaged in mergers have greater variance as compared to those obtained by firms engaged in acquisitions.

The intuition behind these results is straightforward. Mergers involve a higher ceiling in 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 merger activity can lead to both partnering firms not exerting effort in the post-transaction environment. In an 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 synergistic gains. Therefore, mergers generate higher expected operational-efficiency gains on average as compared to acquisitions; however, mergers also exhibit a higher variance in terms of these expected gains as compared to acquisitions.

2.3. Financial-market reactions

We can also make predictions with regard to the reaction of financial markets to the two types of transactions. Specifically, we can compare the reaction of a representative investor in the acquiring firm to an announcement of a merger instead of an acquisition. We assume that the investor is risk-averse and penalizes idiosyncratic risk, thus she factors not only the expected operational gains of the combined entity

but also the variance in these gains.[9] For illustrative purposes, let us assume that this representative investor has 'mean-variance' preferences, i.e., 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 operational gains defined by part (ia) of the proposition, that a merger involves higher expected gains but also involves more variance when compared to an acquisition. As a result, her reaction to a merger announcement could be more-positive or less-positive as compared to her reaction to an 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 operational gains defined by part (ib) of the proposition, the reaction to a merger 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 mergers as compared to acquisitions, the model clearly indicates that this difference is less favorable towards a merger under high degrees of risk aversion. Indeed, for a given expectation and variance in the operational-efficiency gains, a higher coefficient of risk aversion lowers the utility of a merger relative to that of an acquisition due to the higher outcome variance involved with mergers on average. We can summarize this discussion in the following prediction:

[9] 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 CAPM in which the investors, for some exogenous reason, hold undiversified portfolios. Extensive evidence exists suggesting that individuals hold undiversified portfolios: e.g., 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.

Prediction 3. The financial-market reaction of acquiring-firm investors to mergers as compared to acquisitions shall involve an additional discount under high degrees of risk aversion.

3. Empirical analysis

Thomson Reuters 'Mergers & Acquisitions' database represents the main source of data for our empirical analysis. We start by obtaining information on all of 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'. By doing so, we go beyond the common practice in the literature to screen out all of the transactions that do not fall within the 'merger' category. Netter et al. (2011) point out that engaging in such a comprehensive data-screening approach is essential if researchers wish to avoid sampling biases. Moreover, the screening out of a number of transactions categorized as 'acquisitions' would clearly not be advisable in a study that wishes to differentiate merger from acquisition activities. We do, however, drop all of the transactions that are registered as 'acquisitions of partial interest', 'buybacks' and 'recapitalizations' as our theoretical priors do not yield clear expectations regarding these transaction types.

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 a number of control variables, and to create the firm-level productivity measure which constitutes our first dependent construct. In particular, we consider the pre-transaction and post-transaction TFP of the acquiring-firm to establish the degree to which the acquiring firm upgrades its operational efficiency. Taking then into account the transactions in which we observe both pre-transaction and post-transaction measures of productivity (as well as additional control constructs), our initial sample consists of 8,917 acquirers engaging in 38,706 M&A transactions over a twenty-four year period. Our data on M&A

activity are global in scope as the acquiring firms in our sample hail from 68 different nations: where 23.3% of our acquirers are based in the UK, 12.6% are based in the US, 8.7% based in France, 7.8% in Germany and 6% in Australia. Furthermore, 56% (44%) 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 a number of different industries as they manifest in 789 different four-digit SIC industries.

We match up our acquiring firms with data on the announcement date and the cumulative abnormal return 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 of transactions drops from a maximum of 38,706 transactions when considering operational-efficiency outcomes to a maximum of 34,368 transactions when considering stock-market outcomes. We also employ data on the VXO volatility index from the Chicago Board Options Exchange – and the related VRP measure from Zhou (2018) – to capture the risk aversion tendencies of financial markets. The VXO measure of global-risk-aversion is market-wide in nature and extends back to 1986. The VRP measure of global-risk-aversion, however, only dates back to the beginning of 1990 which results in the dropping of transactions taking place between 1986 and 1989. Accordingly, our sample of transactions drops to a maximum of 32,793 observations when employing Zhou's VRP measure of global-risk-aversion.

3.1. Dependent variable constructs

Testing our theoretical priors requires three different types of dependent-variable constructs. We require a measure of the operational-efficiency gains experienced by acquiring firms engaged in M&A activity to test the first prediction. We require a measure of the variance in operational-efficiency gains experienced by acquiring firms engaged in M&A activity to test the second prediction. Finally, we require

a standard measure capturing the stock-market reaction to the announcement of the transaction to test the third prediction.

First, a number of studies (Maksimovic and Phillips, 2001; Schoar, 2002; Maksimovic et al., 2011, 2013; Li, 2013) have employed TFP measures as a means to capture operational-efficiency improvements. Following the procedure employed in these studies, we construct a TFP measure to capture the operational gains experienced by acquiring firms engaged in M&A activities. In particular, 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 and 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. 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 four year post-transaction period and the sum of the annual TFP residuals in the four year pre-transaction period.

Table 2 reports descriptive statistics (mean and standard deviation) for the TFP growth measure broken down over the transaction types employed in the Thomson database. These descriptives provide some initial support for our first two theoretical priors. In terms of mergers involving larger operational gains, we see that the mean for TFP growth is higher for merger transactions as compared to the two types of acquisitions. And in terms of mergers involving more variance in operational gains, we see that the standard deviation for TFP-growth outcomes is larger for merger transactions than it is for the two types of acquisitions.

[Insert Table 2 about here]

Figure 1 also provides some indication that mergers are characterized by larger operational gains for acquirers. There we plot the distribution of the TFP growth for acquiring firms along with a measure that indicates the share of transactions which are mergers from the transactions that come to the right of that point in the distribution. Accordingly, 27% of all sampled transactions are considered mergers per the Thomson SDC classification, thus the share of mergers construct takes a value close to .27 on the left-side of the distribution where acquiring firms are experiencing productivity losses. However, the share of transactions characterized as mergers rises substantially on the right-side of the distribution. This indicates then that mergers are over-proportionately represented in those transactions where acquiring firms experience increases in TFP growth.

[Insert Figure 1 about here]

Our second theoretical prediction conjectures that acquiring firms engaged in merger activity will generally experience higher variance in operational-efficiency gains as compared to acquiring firms engaged in acquisition activity. 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 operational gains represents the dependent variable of interest. In particular, we compile our transaction-level data to create yearly measures of dispersion for 495 four-digit SIC industries over the data's 1986-2009 sample period—the number of four-digit industries drops from 789 to 495 here, as we require a sufficient number of sector-specific observations to calculate dispersion. This sub-sample based on industry-level data involves a maximum 3,640 industry-year observations with an average (median) of 7(6) transactions per year in these four-digit industries.[10] We

[10] Due to the selection process in creating different sub-samples that match up with our seven definitions of a merger, the number of observations varies across the seven regression estimations (explained in detail in the next sub-section).

capture dispersion by calculating the standard deviation in the transaction-level operational efficiency outcomes within the specific industry-year combinations.[11] While the estimation strategy sub-section provides additional details, the basic testing intuition here is to gather whether industries characterized by higher degrees of merger activity experience greater dispersion in operational-efficiency outcomes for the acquiring firms in these industries.

In line with this industry-level approach, figure 2 provides some indication that mergers are characterized by greater variance as compared to acquisitions. This figure plots the share of mergers 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 merger activity tend to have greater dispersion in acquiring-firm productivity growth outcomes.

[Insert Figure 2 about here]

Our third prediction conjectures that acquiring firms engaged in merger activity when financial markets are characterized by high degrees of risk aversion will experience relatively low stock-market valuations as compared to the acquiring firms engaged in 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 cumulative abnormal returns (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 so as to create valid inferences—see Halperin and Lusk (2013) for more details.

[11] While standard deviation represents the most obvious means to capture industry-level dispersion, we also employed additional means to capture dispersion in unreported empirical testing. Namely, we constructed Gini coefficients and percentile ratios to capture industry-level dispersion. These unreported empirical tests yield substantively-identical results to those reported in the manuscript in which the standard deviation is employed.

3.2. Main explanatory variable constructs

We require a variable construct that differentiates mergers from acquisitions to test all three of our theoretical priors. As already noted, we begin by adopting the classifications employed by Thomson in creating a dichotomous merger construct that takes the value of one when Thomson classifies the transaction as a 'merger' and takes the value zero when Thomson classifies the transaction as an 'acquisition of majority interest' or as an 'acquisition of assets' (a merger definition hereafter referred to as the SDC definition). Yet, Thomson's classification scheme is based less on the nature of the transaction and more on the amount of the target firm that is acquired (Netter et al., 2011). As a result, acquisitions of assets and of majority interest can be rightly classified as acquisitions; however, the 'merger' classification is less clear cut. In particular, Thomson's 'merger' category consists of true mergers but also consists of acquisitions constituting 100% of the target firm (Barnes et al., 2014). Thus while following the Thomson approach to categorizing transactions represents a good first cut at differentiating between mergers and acquisitions, it is important to underscore that the merger category will involve some measurement error as a number of acquisitions are incorrectly allocated to this sub-population. Allocating acquisitions to the 'merger' sub-population will ultimately make it more difficult to empirically establish that merger activity manifests characteristics that are statistically different as compared to acquisition activity. Nevertheless, the inexactness of the Thomson classification scheme suggests that alternative approaches to differentiating between merger and acquisition activity be undertaken.

As a start to alternatively classifying mergers and acquisitions, we follow the insight of Agrawal et al. (1992) who point out that equity financing is typical and cash financing is atypical of merger activity. This leads to the idea that the method of payment represents one means via which to differentiate mergers from acquisitions; moreover, such a distinction is also in line with our theoretical model. First, true mergers in our theory potentially involve the engagement and efforts of managers from both partnering firms; and

stock holdings on both sides of the transaction will clearly incentivize such behavior. The importance of paying with stock has been long recognized in the literature; e.g., Gort (1969) observed that the distinction between acquirer and target becomes blurred when transactions are consummated via the exchange of stock. Second, true acquisitions in our theory simply involve engagement and effort on the part of the acquiring firm; and paying off target-firm owners with cash clearly de-incentivizes target efforts. In this vein, Hartzell et al. (2004) find that target managers receiving cash payments are less likely to remain as managers and officers in the post-transaction entity. Betton et al. (2008) recognize these dynamics when they observe that paying with stock dilutes acquiring-firm control of the post-transaction entity and can ultimately lead to the realization of a merger-of-equals in which two-sided effort manifests. Accordingly, our second definition of merger activity involves classifying all those transactions in Thomson's 'merger' category in which targets are paid for fully in stock as mergers where the dichotomous merger construct takes the value of one, while all other transactions – i.e., those transactions in Thomson's 'merger' category in which targets are not fully paid for in stock, and all those transactions classified by Thomson as acquisitions of assets or majority interest – take the value of zero (hereafter referred to as the SDC-Stock definition).

The relative size of the target with respect to the acquirer has also been considered a proxy to differentiate between mergers and acquisitions. For instance, Netter et al. (2011) observe that acquisitions are generally characterized by transactions in which the relative size of the target firm is small in comparison to the acquiring firm. Gort (1969) also notes that when larger acquiring firms initiate the transaction, they tend to exercise significant control in the combined entity and retain substantial influence in terms of corporate identity and personnel. Hence, transactions with relatively-large acquiring firms tend to manifest characteristics that align with our view of what constitutes a true acquisition: i.e., where one-way effort is exerted by the acquiring firm in the post-transaction environment. In contrast, Bruner (2004) observes a tendency for both firms to exert influence when the partnering firms have roughly the same size

and can be considered equals. Furthermore, transactions between relative equals in terms of size and resources might also result in conflicts and challenges which in turn destroy value (Larsson and Finkelstein, 1999; Weber and Camerer, 2003; Hoberg and Phillips, 2017). Hence, transactions in which the acquiring and target firms are relatively equal in terms of size tend to manifest characteristics that align with our view of what constitutes a true merger: i.e., where two-way effort is possibly exerted by the partnering firms and a higher upside is reached, yet coordination failures can also lead to a lack of effort by both partnering firms and result in substantial failure. Accordingly, our third definition of merger activity involves classifying all those transactions in Thomson's 'merger' category in which the targets are relatively large (a target to acquirer size ratio above the 50^{th} percentile) as mergers where the dichotomous merger construct takes the value of one, while all other transactions – i.e., those transactions in Thomson's 'merger' category in which targets are relatively small and all those transactions classified by Thomson as acquisitions of assets or majority interest – take the value of zero (hereafter referred to as the SDC-Size definition).

While the above three categorizations take advantage of transactions classified by Thomson as 'acquisitions of assets' and 'acquisitions of majority interest' by assigning them to the acquisition category, the prevailing practice amongst scholars is to screen out these transaction types and simply focus on the 'merger' category. As pointed out by Netter et al. (2011), attempting to characterize the full nature of M&A activity via transaction samples that neglect certain acquisition types bears the risk of generating misleading findings. It is for this reason that our first three categorizations took advantage of all of the relevant transactions present in Thomson's database. Nevertheless, it behooves us to ensure that our categorizations and empirical results are robust to the standard sampling procedures employed in the literature. Accordingly, our next two merger categorizations follow the standard practice to simply consider those transactions categorized by Thomson as 'mergers'; i.e., we screen out all transactions that were not placed by Thomson in the 'merger' category. Yet as already pointed out, the 'merger' category is composed of

both true mergers and true acquisitions since acquisitions constituting 100% of the target firm are placed in this category. To remedy this, we again employ the practices above with respect to equity financing and relative size helping differentiate between merger and acquisition activities. Accordingly, our fourth merger definition involves classifying all those transactions in Thomson's 'merger' category in which targets are paid for fully in stock as mergers where the dichotomous merger construct takes the value of one, while the other transactions in Thomson's 'merger' category in which targets are not paid for fully in stock take the value of zero (hereafter referred to as the Standard-Stock definition). Furthermore, our fifth definition of merger activity involves classifying all those transactions in Thomson's 'merger' category in which the targets are relatively large (a target to acquirer size ratio above the 50^{th} percentile) as mergers where the dichotomous merger construct takes the value of one, while all other transactions in Thomson's 'merger' category with relatively-small targets take the value of zero (hereafter referred to as the Standard-Size definition).

Our last two categorizations of merger activity fully depart from the Thomson SDC classification scheme instead of attempting to enhance Thomson's categorizations to better identify mergers and acquisitions. Here, we go back to the principal insight that payment (equity versus cash) closely aligns with our conceptualization of mergers (where there is potential for two-way effort) and acquisitions (where there is certainty with regard to one-way effort). Accordingly, our sixth definition of merger activity involves allocating all those transactions in which targets are paid for with at least some amount of stock to the merger category – i.e., where the dichotomous merger construct takes the value of one – while all other transactions take the value of zero (hereafter referred to as the Stock-Swap definition). Furthermore, our seventh definition of merger activity involves simply retaining all the transactions which were completed by paying fully in stock or by paying fully in cash; thus, all of the murky-middle deals in which both stock and cash were employed as a payment means are omitted. In this case, all those transactions in which targets

were fully paid for with stock are categorized as mergers where the dichotomous merger construct takes the value of one, while all those transactions in which targets were fully paid for with cash are categorized as acquisitions where the dichotomous merger construct takes the value of zero (hereafter referred to as the Stock-vs-Cash definition). Table 3 provides descriptive statistics for these seven classifications of merger activity.

[Insert Table 3 about here]

3.3. Additional variable constructs

We also require information on the degree of risk aversion which best characterizes financial markets to test our third prediction. The Chicago Board Options Exchange (CBOE, 2004) compiles a volatility index (referred to as the 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 initially employ the VXO index as a measure of global-risk-aversion to test the a priori that investors penalize merger activities with respect to acquisition 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.

While the VXO measure represents an effective first cut at empirically capturing global-risk-aversion, this index ultimately represents the market's expectation regarding volatility in the S&P 100 over the subsequent 30 days. As such, the 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 recent studies (Jackwerth, 2000; Carr and Wu, 2009; 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. The essence behind these techniques is that the difference between the implied and expected volatilities can be interpreted as an indicator of the risk aversion tendencies of financial markets. To ensure that our empirical results are robust to employing a more advanced means to capture global-risk-aversion, we use Zhou's (2018) Variance Risk Premium (VRP) measure. Zhou's technique follows directly from Bollerslev et al. (2011) and is based on the CBOE's VIX index and actual volatility in the S&P 500 index. Accordingly, we also employ the VRP index to yield a more comprehensive measure of global-risk-aversion. This does, however, come at the cost of necessitating the dropping of M&A transactions taking place between 1986 and 1989 since the relevant VIX index only extends back through 1990. [12]

We also require a number of control variables to make sounder causal inferences by mitigating the risk of omitting potentially confounding factors. While we include a set of transaction-level control variables, we begin here by introducing the set of industry-level controls. Specifically, 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 additional industry-level control when testing our first prediction with respect to whether acquiring firms engaged in merger activity experience higher operational-efficiency gains on average. To make stronger causal inferences regarding the productivity upgrading experienced by acquiring firms, it behooves us to control for any industry-level trends in terms of productivity changes. Thus, we control for the average productivity gains for all firms sharing the same four-digit industry

[12] The relevant VIX and VXO (where we use the daily closing price) measures are downloadable at: http://www.cboe.com/products/vix-index-volatility/vix-options-and-futures/vix-index/vix-historical-data.

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 and challenges that domestic transactions do not involve; 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) seminal 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 for whether a tender offer was employed in the transaction (hereafter referred to as Tender-Offer).[13] Third, whether the partnering firms in the transaction are characterized by substantial overlap in terms of industries served – often referred to as related or horizontal transactions – represents a common control variable in studies of value creation (e.g., Moeller et al., 2005; Li, 2013) 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, 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

[13] While tender offers could be considered somewhat akin to acquisitions, we should clarify that the distinction between mergers and acquisitions is quite a bit different than the distinction between mergers and tender offers (Jensen and Ruback, 1983; Agrawal et al., 1992; Betton et al, 2009). For example, Comment and Jarrell (1987) and Betton et al. (2008) point out that tender offers are often employed in transactions that are best categorized as true mergers.

productivity. Accordingly, we control for whether the target firm is publicly-traded with a dichotomous construct (hereafter referred to as Public-Target). Finally, 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 with a dichotomous construct in the productivity equations (hereafter referred to as Public-Acquirer). For all of the variables outlined above, table 3 presents descriptive and summary statistics that are based on the largest relevant sample from our regression estimations.

3.4. Estimation strategies

Our analysis involves three clear-cut theoretical predictions, thus it is seemingly prudent to dispense with any additional univariate testing and proceed directly to our multivariate econometric approach. To establish stronger causal inferences, we employ all of the available fixed effects (e.g., industry, year, acquirer-nation, and target-nation) when estimating the three regression specifications that test our theoretical priors.

We empirically test prediction 1 while employing all of our available transaction-level data concerning M&A activities. Specifically, the following regression specification is estimated across our seven different definitions of a merger:

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

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

$$Disp(\textit{Productivity-Growth})_{i,t} = b_0 + b_1 \frac{Mergers}{Transactions}_{i,t} + b_2 Y_{i,t} + \eta_i + \eta_t + \varepsilon_{i,t}, \qquad (2)$$

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 derive from within-industry changes in the tendency for mergers – as opposed to acquisitions – to manifest.

We empirically test prediction 3 by again employing all of the available transaction-level data on M&A activities. The following regression specification is estimated across our seven merger definitions to test our third theoretical prior:

$$\textit{Acquirer-CAR}_k = c_0 + c_1 Merger_k * HighRiskAversion_d + c_2 Merger_k +$$
$$c_3 RiskAversion_d + c_4 X_k + c_5 Y_i + \eta_i + \eta_t + \eta_q + \eta_g + \varepsilon_k, \qquad (3)$$

where *d* – referring to the day (month) of the transaction announcement for the VXO (VRP) measure of risk aversion – represents new notation, but otherwise the same notations from above are employed. It is the interaction between the merger construct and the measure of high risk aversion that tests our theoretical prior, as our model predicts that mergers should be increasingly discounted by markets when risk aversion levels are generally high. We estimate this regression specification for both the VXO and VRP measures of global-risk-aversion for the seven different definitions of a merger.

3.5. Empirical results

Tables 4-7 present the results from comprehensive empirical testing of our theoretical predictions: i.e., mergers are characterized by higher operational-efficiency gains, higher variance in operational-efficiency outcomes, and lower stock-market valuations when markets exhibit high degrees of risk aversion. The 28 regressions contained in these four tables appear to be reasonably well specified; furthermore, the transaction-level and industry-level control variables generally manifest significance and intuitive coefficient estimates. In light of the scale of the testing (four tables with seven regression estimations in each table), we focus our discussion of the empirical results on the main variables of interest for brevity. Accordingly, we take a table by table approach to discussing the empirical results while focusing on the variables that specifically test our three predictions.

Table 4 presents the results that consider the impact of M&A activities on the TFP growth experienced by acquiring firms in the years subsequent to the transaction. The merger construct represents the focal variable of interest, and the coefficient estimates for this variable are positive and significant at the 1% level in all seven regressions: i.e., across the seven different means to categorize merger activity. Accordingly, the evidence suggests that mergers are superior as compared to acquisitions in terms of generating productivity gains for acquiring firms. The coefficient estimates range in values from 0.16 to

0.42; given that TFP growth is calculated as a difference, this indicates that acquiring firms engaged in mergers experience TFP gains that are some 1.6%-4.2% higher than the TFP gains experienced by acquiring firms engaged in acquisitions. These results conform to our first prediction with respect to mergers being characterized by higher operational-efficiency gains on average as compared to acquisitions.

[Insert Table 4 about here]

Table 5 presents the results that consider whether sectors experiencing higher shares of merger activity also experience higher degrees of dispersion in term of TFP outcomes for acquiring firms. The Share-of-Mergers variable represents the focal variable of interest, and the coefficient estimates for this variable are positive and significant at the 1% level in six of the seven regressions. Only under the Standard-Size definition of a merger does a non-statistically significant coefficient estimate manifest. The statistically-significant coefficient estimates range from 0.052 to 0.143; given an average value for dispersion of 0.202 in our sample, these coefficient estimates suggest that altering the nature of transactions in an industry from pure-acquisition activities to pure-merger activities would increase dispersion by something between 26 and 71% on average. These empirical results conform to our second prediction with respect to merger activities being characterized by greater variance in terms of operational-efficiency outcomes as compared to acquisition activities.

[Insert Table 5 about here]

Table 6 presents the empirical results that consider the impact of M&A activities on the stock-market valuations of acquiring firms. The interaction of the merger construct 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 merger activities as compared to acquisition activities when markets are characterized by high degrees of risk aversion. The coefficient estimate for this interaction term is indeed negative and

significant in all seven regressions: significant at the 1% level in six regressions, and at the 5% level in the regression employing the Standard-Stock definition of a merger. Accordingly, the evidence suggests that merger activities are indeed discounted when financial markets exhibit high degrees of risk aversion. The coefficient estimates range in values from -0.471 to -1.011, thus indicating that acquiring firms engaged in merger activities during periods of high risk aversion experience additional stock-market valuation discounts ranging from 0.47 to 1.01 percentage points on average. These empirical results conform to our third prediction where high-variance merger activities require an amount of compensation on the part of investors when financial markets are characterized by high degrees of risk aversion.

[Insert Table 6 about here]

Table 7 presents the empirical results that consider the impact of M&A activities on the stock-market valuations of acquiring firms while employing the VRP measure of global-risk-aversion. The interaction between the merger construct and the VRP measure is again the focal variable of interest. The coefficient estimate for this interaction term is negative in all seven regressions and statistically significant, at the 5% and 10% levels, in five of those seven regressions. Only in the regressions employing the SDC and the Stock-Swap definitions of a merger are the negative coefficient estimates not statistically significant. The significant coefficients range in value from -0.43 to -0.745; thus indicating that acquiring firms engaged in merger activities during periods of high risk aversion experience additional stock-market valuation discounts ranging from 0.43 to 0.75 percentage points on average. Accordingly, these results also conform to our third prediction with respect to the discounting of merger activities vis-à-vis acquisition activities when financial markets are characterized by high degrees of risk aversion.

[Insert Table 7 about here]

4. Self-selection into mergers and acquisitions

Our empirical analysis takes a comprehensive approach to estimating the performance differences between mergers and acquisitions, as we form well-specified regression equations with a number of transaction- and industry-level control variables that also involve a full set of fixed effects (industry, year, acquirer-nation and target-nation fixed effects). Nevertheless, our empirical analysis until this point has implicitly assumed that managerial decisions with regard to choosing between mergers and acquisitions are not predicated on the outcome variables. Yet 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 merger 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 merger vis-à-vis acquisition choice and the ultimate performance outcomes – i.e., productivity upgrading and stock-market reactions – can lead to biased coefficient estimates as the error term potentially correlates with the explanatory variable of interest.[14]

To correct for any self-selection bias in our regression estimations that distinguish between mergers and acquisitions in terms of productivity-upgrading (prediction 1) and stock-market reactions (prediction 3), we employ an endogenous-treatment procedure: a latent variable approach which derives from Heckman's (1974) seminal work. Specifically, we undertake a full information maximum likelihood (FIML) estimation that delivers consistent and asymptotically efficient coefficient estimates so long as the

[14] Despite the existence of early research (e.g., Eckbo et al., 1990) that was mindful of the self-selection issue and advised remedial methods, Betton et al.'s (2008) observation that corrections for this issue are not consistently implemented still holds.

error terms in the main and selection equations are characterized by bivariate normality.[15] The empirical tests for the second prediction, however, are of a different nature, as the share of merger 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-merger-activity construct by employing the standard IV approach.

Operationalizing both of the above procedures – endogenous treatment and IV estimation – requires instruments that affect the proclivity of managers to employ mergers over acquisitions so as to properly model the selection process. Yet in addition to explaining variation in the potentially endogenous merger constructs, a greater issue involves the excludability of such instruments. Namely, the instruments must identify variation in the propensity to employ merger activities that is uncorrelated with the error terms in the main regression equations. To this end, we follow the common practice to take advantage of industry-level conditions and shocks (e.g., Campa and Kedia, 2002) to identify exogenous variation in the merger constructs—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 manifestation of mergers over acquisitions but does not directly affect the productivity upgrading and value reactions manifest in 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 such as the choice between mergers and acquisitions. Moreover, it is not unreasonable to assume that industry expansions do not directly affect the productivity upgrading

[15] For more details regarding this particular methodological approach, please see Clougherty et al. (2016).

and value reactions manifest in acquiring firms. In terms of productivity upgrading, the actual productivity growth experienced by acquiring firms in the four years subsequent to the transaction is unlikely to be directly affected by industry-level expansions at the time of announcement. Furthermore, Ang and Kohers (2001) support 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).[16]

Our second exclusion restriction is that the proclivity for industry peers to employ mergers over acquisitions 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 merger activity taking place in an industry as an instrument is based on the premise that the proclivity of a reference group to employ mergers represents an exogenous market condition, which can influence acquiring-firm decisions regarding the choice between transaction types. 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 modelling the decision of firms to self-select into diversification status. We capture the tendency for an industry to be characterized by mergers as opposed to acquisitions at the four-digit industry level by taking the yearly count of merger transactions and dividing by the yearly count of all M&A transactions in the relevant sector (referred to as Share-of-Mergers).

[16] 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.

We should point out, however, that the share-of-mergers construct can only be employed as an instrument in our estimations that distinguish between mergers and acquisitions in terms of productivity upgrading (prediction 1) and stock-market reactions (prediction 3)—i.e., 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 merger activity taking place in the industries that are non-focal to the relevant sector (referred to as Non-Focal Share-of-Mergers). While this third exclusion restriction is essential to effectively instrument via the standard IV approach for our tests of the second prediction, this can be included as an additional instrument in our estimations that employ endogenous-treatment procedures to test the first (productivity upgrading) and third (stock-market reactions) predictions with respects to mergers vis-à-vis acquisitions.

We report diagnostics which indicate that our exclusion restrictions are acceptable as we appear to have a workable identification in our empirical context. First, our three instruments generally manifest strength in their ability to explain variation in the proclivity of managers to employ mergers over acquisitions. The share-of-mergers constructs for both the focal and non-focal industry indicate strong significance when employed in the four tables that model the selection into mergers (tables 8-11). The expansion-year construct is less robust across the different estimations, though it does explain some variation in merger tendencies and is essential for undertaking over-identification tests. The F-tests reported in table 9 also attest 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 are generally consistent – i.e., only significant in three out of the seven estimations in table 9 – with the prior that the instruments are valid and excludable as they do not correlate with the error terms.

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, athrho – the hyperbolic tangent of ρ ($atanh\ \rho\ = \frac{1}{2}ln\left(\frac{1+\rho}{1-\rho}\right)$) – 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 – only manifests significance in seven out of 21 estimations in tables 8, 10 and 11. Furthermore, the Durbin-Wu-Hausman (DWH) test – which can be employed in the IV estimations – does not manifest significance in the seven estimations reported in table 9. This convergence in the coefficient estimates for the instrumented and non-instrumented share-of-mergers construct suggests that endogeneity is not a severe issue in our empirical context. For comprehensiveness, we also report lnsigma – the adjusted standard error for the main equation which is given by $\hat{\sigma}_{\varepsilon}^{2}$ – in all of the endogenous-treatment estimations.

While the above addresses the soundness of our methodological approach to model and correct for the selection into mergers and acquisitions, we move now to a discussion of the empirical results for our variables of principal interest. Here, we report four tables of empirical results (8-11) that appropriately model the selection into mergers over acquisitions but otherwise mirror in substance the main equations of interest that were employed in the four tables (4-7) in which selection was not considered. Striking from this integrated estimation approach is that our core findings regarding the tendencies of mergers vis-à-vis acquisitions (higher operational-efficiency outcomes, higher variance in these outcomes, and lower stock-market valuations when markets are risk averse) all continue to be borne out when self-selection into mergers versus acquisitions is properly modelled.

Our first theoretical prior – acquiring firms in mergers are characterized by higher operational-efficiency gains – is tested in table 8. Akin to the main empirical results reported in table 4, we find that the merger construct is positive and significant across the seven estimations involving different definitions of merger activity. Accordingly, these empirical results, which model and control for the selection process,

conform to our first prediction where mergers, as compared to acquisitions, are deemed to be characterized by higher operational-efficiency gains for acquiring firms on average.

[Insert Table 8 about here]

Our second theoretical prior – acquiring firms in mergers are characterized by higher variance in operational-efficiency outcomes – is empirically tested in table 9 where dispersion in operational-efficiency outcomes is captured via the industry-level standard deviation in acquiring-firm TFP growth. Akin to the main empirical results reported in table 5, the merger construct is positive in all of the estimations and statistically significant in four out of the seven estimations. This drop in robustness could be partly driven by the presence of considerably smaller estimation samples (ranging from 525 to 3640 observations).[17] Accordingly, these empirical results which account for endogeneity in the share-of-mergers construct generally conform to our second prediction where mergers, as compared to acquisitions, are deemed to be characterized by higher variance in operational-efficiency outcomes on average.

[Insert Table 9 about here]

Our third theoretical prior – acquiring firms in mergers are characterized by an additional discount in stock-market reactions during periods of high risk aversion – is empirically tested in tables 10 and 11 where global-risk-aversion is respectively captured via the VXO and VRP indexes. Table 10 reports the empirical results for the estimations in which the VXO measure is employed and in which the selection into mergers is modelled via an endogenous-treatment procedure. Akin to the main empirical results reported in table 6, we find that the interaction between the merger construct and high global-risk-aversion yields a negative and significant coefficient estimate across the seven estimations involving different definitions of

[17] In line with the small-sample explanation, unreported IV estimations that involve a more-simple labor-productivity growth measure (with estimation samples ranging from 1424 to 7267 observations) yield considerably stronger support for this prediction.

a merger. Table 11 reports the results for the estimations in which the VRP measure is employed while modelling the selection into mergers via an endogenous-treatment procedure. Akin to the results reported in table 7, we find that the interaction between the merger construct and high global-risk-aversion yields a negative and significant coefficient estimate in five of the seven estimations involving different merger definitions. Accordingly, these empirical results again conform to our third prediction where merger activities generally involve an additional discount with respect to acquisition activities when financial markets are characterized by high degrees of risk aversion.

[Insert Table 10 & 11 about here]

5. Conclusion

We present a theoretical model that differentiates between mergers and acquisitions that yields testable predictions with respect to the observable differences between these two transaction types. Our theory indicates that acquiring firms engaged in mergers will experience higher operational-efficiency gains on average as compared to acquiring firms engaged in acquisitions. Crucial to this result is that mergers potentially involve the full efforts and contributions of both partnering firms in the post-transaction environment while acquisitions simply involve the efforts of acquiring firms. Mergers accordingly provide a higher ceiling in terms of potential operational-efficiency outcomes. Our model also generates the prior that acquiring firms engaged in mergers will be characterized by higher variance in terms of actually realizing these gains. Residing behind this result is that acquisitions involve more certainty with respect to operational-efficiency outcomes, while the post-transaction efforts of partnering firms engaged in mergers are best characterized as a coordination game in which both two-sided effort and lack-of-effort are possible outcomes.

In line with Maksimovic and Phillips (2001) and Li (2013), we also consider how financial markets evaluate these transactions, as the higher-mean and higher-variance tendencies of mergers vis-à-vis acquisitions involve countervailing effects. Specifically, higher expected operational-efficiency outcomes suggest higher stock-market valuations for mergers; though, higher variance in outcomes suggest lower stock-market valuations for mergers as compared to acquisitions. Supposing, however, that investors reward the relatively higher expectations and discount the relatively higher (idiosyncratic) risk involved with mergers as compared to acquisitions, financial markets will then tend to discount mergers vis-à-vis acquisitions under high degrees of risk aversion as compensation is required for the greater outcome variance that is characteristic of merger activity.

Employing data on up to 38,706 transactions covering the 1986-2009 period, we find strong empirical support for our three theoretical predictions with regard to observable performance differences between merger and acquisition activities. Our empirical setup employs seven different classifications for distinguishing between mergers and acquisitions so as to underscore the robustness of our results. In addition to estimating well-specified regression specifications that employ all of the available fixed effects (e.g., industry, year, acquirer-nation, and target-nation) for all seven definitions of a merger transaction in testing our three theoretical predictions, we also undertake endogenous-treatment procedures and IV estimations to directly address the self-selection-based endogeneity issue. These additional empirical tests – which model and correct for selection into the transaction mode – corroborate our main empirical findings. In particular, acquiring firms engaged in merger activity experience TFP gains that are substantially higher as compared to the gains experienced by acquiring firms engaged in acquisitions. Furthermore, sectors experiencing higher degrees of merger, as compared to acquisition, activities tend to experience greater dispersion in operational-efficiency outcomes for acquiring firms. And finally, financial markets penalize

acquirers engaged in merger activities relatively more than acquirers engaged in acquisitions when markets are characterized by high levels of risk aversion.

With the above as a backdrop, it is fair to observe that the majority of empirical scholarship fails to differentiate between mergers and acquisitions. Despite noteworthy cautions to the empirical literature (e.g., Netter et al., 2011), authors generally employ either the term 'merger' or 'acquisition' in characterizing their transaction samples when in fact these samples are actually composed of both mergers and acquisitions (Betton et al., 2008; Barnes et al., 2014). Our analysis suggests that mergers and acquisitions represent distinct transaction types that involve varied performance outcomes with different risk and return characteristics. Thus, we follow through on Netter et al.'s (2011) observation that mergers and acquisitions involve different structures and have varying effects on participants by providing observable differences in these two transaction types. Specifically, we are able to theoretically and empirically demonstrate that the distinction between mergers and acquisitions affects the first and second moments of the distribution in operational-efficiency outcomes for acquiring firms, and that financial markets attach an additional discount to merger activities when markets exhibit high degrees of risk aversion. The main contention of this manuscript is then simple but important: a complete understanding of M&A activities must distinguish between mergers and acquisitions.

References

Agarwal, R., Anand, J., Bercovitz, J., and Croson, R., 2012. Spillovers across organizational architectures: The role of prior resource allocation and communication in post-acquisition coordination outcomes. Strategic Management Journal 33, 710–733.

Agrawal, A., Jaffe, J., and Mandelker, G., 1992. The post-merger performance of acquiring firms: a re-examination of an anomaly. Journal of Finance 47, 1605–1621.

Ang, J., and Kohers, N., 2001. The take-over market for privately held companies: The US experience. Cambridge Journal of Economics 25, 723–748.

Asquith, P., 1983. Merger bids, uncertainty, and stockholder returns. Journal of Financial Economics 11, 51–83.

Banal-Estañol, A., and Seldeslachts, J., 2011. Merger failures. Journal of Economics & Management Strategy, 20, 589-624.

Barber, B., and Odean, T., 2000. Trading is hazardous to your wealth: the common stock investment performance of individual investors. Journal of Finance 55, 773–806.

Barnes, B., Harp, N., and Oler, D., 2014. Evaluating the SDC mergers and acquisitions database. The Financial Review 49, 793–822.

Bekaert, G., Hoerova, M., and Lo Duca, M., 2013. Risk, uncertainty and monetary policy. Journal of Monetary Economics 60, 771–788.

Benartzi, S., and Thaler, R., 2001. Naive diversification strategies in defined contribution saving plans. American Economic Review 91, 79–98.

Berkovitch, E., and Khanna, N., 1991. A theory of acquisition markets: mergers versus tender offers, and golden parachutes. The Review of Financial Studies 4, 149–174.

Betton, S., Eckbo, B., and Thorburn, K., 2008. Corporate takeovers. In: Eckbo, B.(Ed.), Handbook of Empirical Corporate Finance, Volume II. Elsevier B.V., The Netherlands, pp. 290-427.

Betton, S., Eckbo, B., and Thorburn, K., 2009. Merger negotiations and the toehold puzzle. Journal of Financial Economics 91, 158–178.

Bloom, N., 2014. Fluctuations in uncertainty. Journal of Economic Perspectives 28, 153–176.

Bollerslev, T., Gibson, M., and Zhou, H., 2011. Dynamic estimation of volatility risk premia and investor risk aversion from option-implied and realized volatilities. Journal of Econometrics 160, 235–245.

Bruner, R., 2004. Where M&A pays and where it strays: a survey of the research. Journal of Applied Corporate Finance 16, 63–76.

Campa, J., and Kedia, S., 2002. Explaining the diversification discount. Journal of Finance 57, 1731–1762.

Carr, P., and Wu, L., 2009. Variance risk premiums. Review of Financial Studies 22, 1311–1341.

CBOE, 2004, The CBOE volatility index – VIX, Chicago Board Options Exchange, white paper. Available at https://www.cboe.com/micro/vix/vixwhite.pdf.

Chatterjee, S., 1992. Sources of value in takeovers: synergy or restructuring-implications for target and bidder firms. Strategic Management Journal 13, 267–286.

Clougherty, J., Duso, T., and Muck, J., 2016. Correcting for self-selection based endogeneity in management research: review, recommendations and simulations. Organizational Research Methods 19, 286–347.

Comment, R., and Jarrell, G., 1987. Two-tier and negotiated tender offers: the imprisonment of the free-riding shareholder. Journal of Financial Economics 19, 283–310.

Coudert, V., and Gex, M., 2008. Does risk aversion drive financial crises? Testing the predictive power of empirical indicators. Journal of Empirical Finance 15, 167–184.

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

Devos, E., Kadapakkam, P., and Krishnamurthy, S., 2008. How do mergers create value? A comparison of taxes, market power, and efficiency improvements as explanations for synergies. Review of Financial Studies 22, 1179–1211.

Eckbo, B., Maksimovic, V., and Williams, J., 1990. Consistent estimation of cross-sectional models in event studies. Review of Financial Studies 3, 343–365.

Farrell, J., and Shapiro, C., 2001. Scale economies and synergies in horizontal merger analysis. Antitrust Law Journal 68, 685–710.

French, K. R., Schwert, G. W., and Stambaugh, R. F. 1987. Expected stock returns and volatility. Journal of Financial Economics 19, 3–29.

Goetzmann, W., and Kumar, A., 2008. Equity portfolio diversification. Review of Finance, 433–463.

Gort, M., 1969. An economic disturbance theory of mergers. Quarterly Journal of Economics 83, 624–642.

Goyal, A., and Santa-Clara, P., 2003. Idiosyncratic risk matters! The Journal of Finance 58, 975–1007.

Halperin, M., and Lusk, E., 2013. Events and Eventus: understanding and facilitating event studies. Journal of Business & Finance Librarianship 18, 1–13.

Hartzell, J., Ofek, E., and Yermack, D., 2004. What's in it for me? CEOs whose firms are acquired. The Review of Financial Studies 17, 37–61.

Heckman, J., 1974. Shadow prices, market wages, and supply. Econometrica 42, 679–694.

Hoberg, G., and Phillips, G., 2017. Product integration and merger success. Unpublished working paper. Available at SSRN: https://ssrn.com/abstract=2933283.

Jackwerth, J., 2000. Recovering risk aversion from option prices and realized returns. Review of Financial Studies 13, 433–451.

Jensen, M., and Ruback, R., 1983. The market for corporate control: the scientific evidence. Journal of Financial Economics 11, 5–50.

Jovanovic, B., and Rousseau, P., 2002. The Q-theory of mergers. American Economic Review 92, 198–204.

Larsson, R., and Finkelstein, S., 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 Prabhala, N., 2007. Self-selection models in corporate finance. In: Eckbo, B. (Ed.), Handbook of Corporate Finance, Volume I. North-Holland, The Netherlands, pp. 37-86.

Li, X., 2013. Productivity, restructuring, and the gains from takeovers. Journal of Financial Economics 109, 250–271.

Mailath, G., Nocke, V., and Postlewaite, A., 2004. Business strategy, human capital, and managerial incentives. Journal of Economics and Management Strategy 13, 617–633.

Maksimovic, V., and Phillips, G., 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 Phillips, G., 2002. Do conglomerate firms allocate resources inefficiently across industries? Theory and evidence. Journal of Finance 57, 721–767.

Maksimovic, V., Phillips, G., and Prabhala, N., 2011. Post-merger restructuring and the boundaries of the firm. Journal of Financial Economics 102, 317–343.

Maksimovic, V., Phillips, G., and Yang, L., 2013. Private and public merger waves. Journal of Finance 68, 2177–2217.

Martin, K., and McConnell, J., 1991. Corporate performance, corporate takeovers, and management turnover. Journal of Finance 46, 671–687.

Mastracchio Jr., N., and Zunitch, V., 2002. Differences between mergers and acquisitions. Journal of Accountancy 194, 38–41.

Matsusaka, J., 1993. Target profits and managerial discipline during the conglomerate merger wave. Journal of Industrial Economics 41, 179–189.

Merton, R., 1987. A simple model of capital market equilibrium with incomplete information. Journal of Finance 42, 483–510.

Moeller, S., Schlingemann, F., and Stulz, R., 2005. Wealth destruction on a massive scale? A study of acquiring-firm returns in the recent merger wave. Journal of Finance 60, 757–782.

Morck, R., Shleifer, A., and Vishny, R., 1998. Characteristics of targets of hostile and friendly takeovers. In: Auerbach, A. (Ed.), Corporate Takeovers: Causes and Consequences. University of Chicago Press, Chicago, pp. 101-136.

Netter, J., Stegemoller, M., and Wintoki, M., 2011. Implications of data screens on merger and acquisition analysis: a large sample study of mergers and acquisitions from 1992 to 2009. Review of Financial Studies 24, 2316–2357.

Pan, J., and Singleton, K., 2008. Default and recovery implicit in the term structure of sovereign CDS spreads. Journal of Finance 63, 2345–2384.

Puranam, P., Singh, H., and Chaudhuri, S., 2009. Integrating acquired capabilities: when structural integration is (un)necessary. Organization Science 20, 313–328.

Rajan, R., and Zingales, L., 1998. Power in a theory of the firm. Quarterly Journal of Economics 113, 387–432.

Rhodes-Kropf, M., and Robinson, D., 2008. The market for mergers and the boundaries of the firm. Journal of Finance 63, 1169–1211.

Schoar, A., 2002. Effects of corporate diversification on productivity. Journal of Finance 57, 2379–2403.

Vaara, E., 2003. Post-acquisition integration as sensemaking: glimpses of ambiguity, confusion, hypocrisy, and politicization. Journal of Management Studies 40, 859–894.

Weber, R., and Camerer, C., 2003. Cultural conflict and merger failure: an experimental approach. Management Science 49, 400–415.

Wulf, J., 2004. Do CEOs in mergers trade power for premium? Evidence from mergers of equals. Journal of Law, Economics & Organization 20, 60–101.

Zhou, H., 2018. Variance risk premia, asset predictability puzzles, and macroeconomic uncertainty. Annual Review of Financial Economics 10, 481-497.

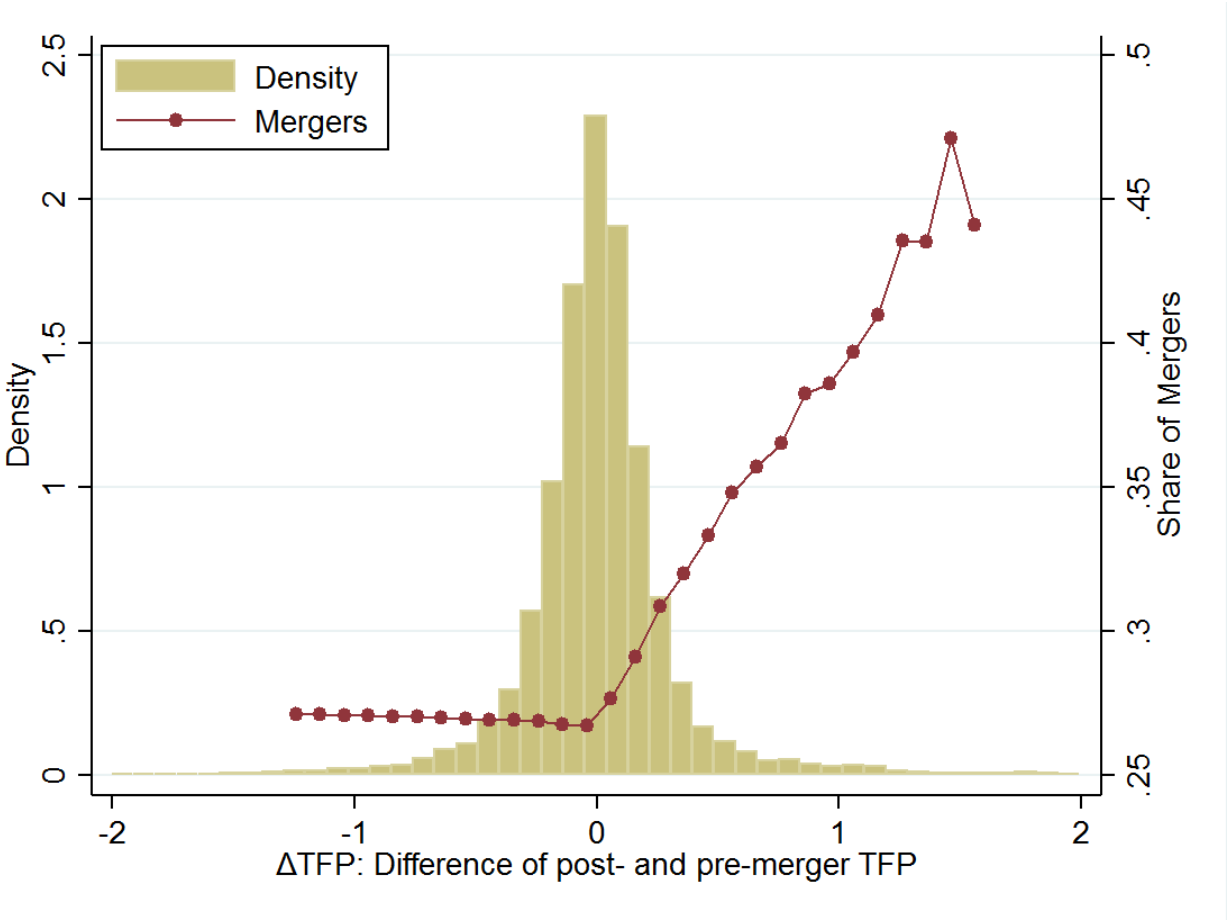

Fig. 1. Density of acquiring-firm TFP growth outcomes and share of merger activity.

This graph reports the distribution of TFP growth outcomes for acquiring firms along with a measure indicating the share of mergers for all transactions which manifest to the right of that point in the distribution.

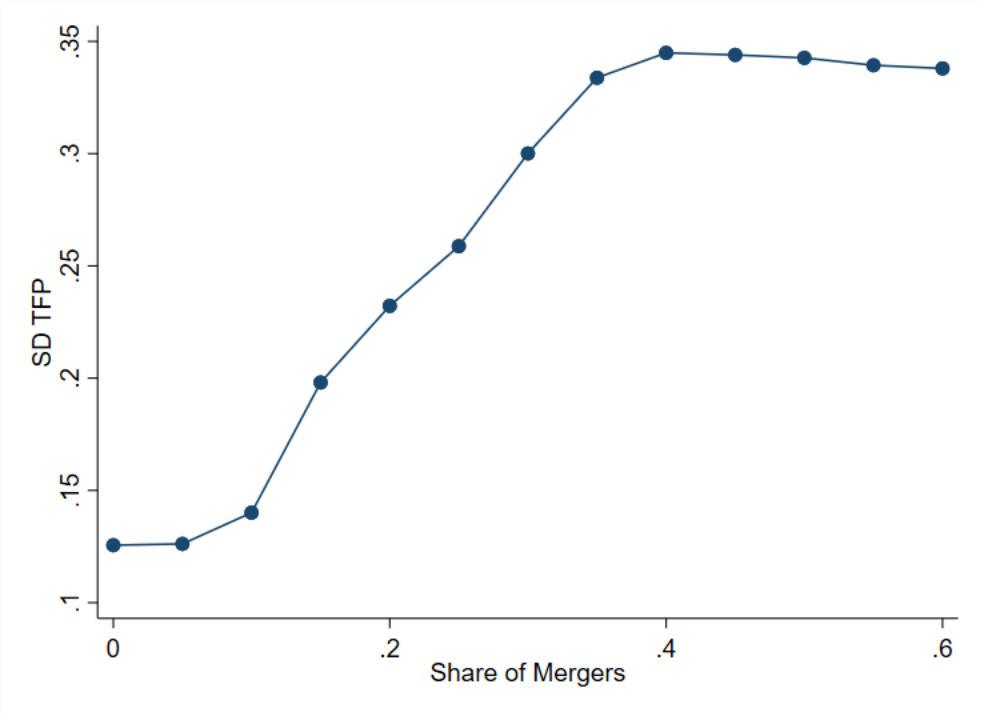

Fig. 2. Share of mergers and standard deviation in TFP growth at the industry level.

This graph reports a plot of industry-level measures capturing the share of mergers amongst all transactions in the focal industry against the standard deviation in acquiring-firm TFP growth outcomes manifest in the focal industry.

Table 1
Net gains for each partnering firm as a function of the realized efforts in a merger.

We report the net gains for each partnering firm in a merger 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 operational-efficiency gains, but also the costs involved with respect to obtaining operational gains.

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

Table 2
Descriptive statistics for TFP growth by SDC transaction type.

We report descriptive statistics (mean, standard deviation and observation numbers) for the TFP-Growth experienced by acquiring firms in our sample of M&A transactions where these descriptive statistics are broken down by the three transaction types reported by SDC Thomson.

	TFP-Growth		
Transaction Type	*Mean*	*Std. Dev.*	*Obs.*
'Mergers'	0.019	0.321	10501
'Acquisitions of Majority Interest'	0.010	0.297	7351
'Acquisitions of Assets'	0.013	0.275	20854
Total Transactions	0.014	0.292	38706

Table 3
Descriptive statistics for the variable constructs.

We report summary statistics (observation numbers, mean, standard deviation, minimum, and maximum) in this table for the variables used in the regression estimations while employing the largest possible sample.

	Obs.	Mean	Std. Dev.	Min	Max
Dependent Variable Constructs					
TFP-Growth	38706	0.014	0.29	-1.24	1.64
Acquirer-CAR	34368	0.61	5.5	-18	25
Merger Variable Constructs (7 classifications)					
SDC	38706	0.27	0.44	0	1
SDC-Stock	38706	0.05	0.21	0	1
SDC-Size	31855	0.06	0.23	0	1
Standard-Stock	10506	0.18	0.38	0	1
Standard-Size	3655	0.48	0.50	0	1
Stock-Swap	38706	0.14	0.35	0	1
Stock-vs-Cash	12304	0.19	0.40	0	1
Transaction-Level Control Variables					
Cross-Border	38706	0.44	0.5	0	1
Tender-Offer	38706	0.03	0.2	0	1
Horizontal	38706	0.30	0.5	0	1
Public-Target	38706	0.11	0.3	0	1
Public-Acquirer	38706	0.94	0.2	0	1
Industry-Level Control Variables					
Industry-ΔTFP (log)	38706	-0.002	0.6	-46	21
Industry-Assets (log)	38706	18.59	2.5	6	24
Industry-Sales (log)	38706	17.97	1.9	6	22
Industry-Income (log)	38706	14.82	2.3	2	19
Industry-Employees (log)	38706	12.39	1.7	1	15
Industry-Debt (log)	38706	16.71	2.4	2	22
Global-Risk-Aversion Measures					
VXO	34368	21.21	8.6	9	150
VRP	32793	18.74	13.9	-10	81

Table 4

Regressions on acquiring-firm TFP growth.

We report regressions that test whether mergers exhibit higher levels of TFP-growth for acquiring firms engaged in merger as compared to acquisition activities. The seven regression estimations reflect the seven different definitions of a merger transaction. In addition to the full set of transaction-level and industry-level controls, all of our estimations control for industry, year, acquirer-nation and target-nation specific fixed effects. The standard errors are reported in parentheses; and *, **, *** respectively represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

	SDC	SDC-Stock	SDC-Size	Standard-Stock	Standard-Size	Stock-Swap	Stock-vs-Cash
Merger	0.016***	0.033***	0.031***	0.025***	0.042***	0.031***	0.039***
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)
Industry-ΔTFP	-0.032***	-0.032***	-0.029***	-0.087***	-0.077***	-0.032***	-0.020**
	(0.00)	(0.00)	(0.00)	(0.01)	(0.03)	(0.00)	(0.01)
Cross-Border	0.000	0.000	0.000	0.005	0.011	0.001	0.006
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Tender-Offer	0.019**	0.022**	0.018*	0.022*	0.030*	0.022**	0.015
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Horizontal	0.005	0.005	0.004	0.005	-0.001	0.005	0.007
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Public-Target	-0.019***	-0.018***	-0.022***	-0.033***	-0.049***	-0.019***	-0.026***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Public-Acquirer	0.005	0.004	0.000	0.011	-0.045	0.003	0.018
	(0.01)	(0.01)	(0.01)	(0.02)	(0.03)	(0.01)	(0.01)
Industry-Assets	0.066***	0.066***	0.060***	0.028	-0.008	0.064***	0.049**
	(0.01)	(0.01)	(0.01)	(0.02)	(0.04)	(0.01)	(0.02)
Industry-Sales	-0.057***	-0.058***	-0.058***	-0.027	-0.027	-0.057***	-0.030
	(0.01)	(0.01)	(0.01)	(0.02)	(0.04)	(0.01)	(0.02)
Industry-Income	-0.017***	-0.017***	-0.016***	-0.020***	-0.020***	-0.017***	-0.016***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Industry-Employees	-0.007	-0.007	-0.004	0.002	0.027	-0.007	-0.004
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Industry-Debt	0.011**	0.011**	0.011*	0.027**	0.038*	0.011**	0.016
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Constant	0.245	0.247	0.295*	0.137	-0.063	0.250	-0.040
	(0.15)	(0.15)	(0.15)	(0.42)	(0.41)	(0.15)	(0.28)
Observations	38706	38706	31855	10506	3655	38706	12304

Table 5

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

We report regressions that test whether industries characterized by higher shares of merger activity (as compared to acquisition activity) exhibit higher dispersion in the operational-efficiency gains – as measured by TFP-growth – experienced by acquiring firms. The seven regression estimations reflect the seven different definitions of a merger transaction. In addition to the full set of industry-level controls, all of our estimations control for industry and year specific fixed effects. The standard errors are reported in parentheses; and *, **, *** respectively represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

	SDC	SDC-Stock	SDC-Size	Standard-Stock	Standard-Size	Stock-Swap	Stock-vs-Cash
Share-of-Mergers	0.052***	0.143***	0.075***	0.118***	0.034	0.121***	0.105***
	(0.01)	(0.03)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)
Industry-Assets	0.002	0.002	-0.003	-0.006	-0.112	-0.002	-0.097***
	(0.02)	(0.02)	(0.02)	(0.04)	(0.08)	(0.02)	(0.03)
Industry-Sales	0.021	0.022	0.023	0.033	0.202**	0.025	0.053*
	(0.02)	(0.02)	(0.02)	(0.04)	(0.08)	(0.02)	(0.03)
Industry-Income	-0.003	-0.003	-0.005	-0.002	-0.008	-0.004	-0.004
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Industry-Employees	-0.015	-0.015	-0.017	0.007	-0.021	-0.016	0.019
	(0.01)	(0.01)	(0.01)	(0.03)	(0.05)	(0.01)	(0.02)
Industry-Debt	-0.002	-0.002	0.003	0.005	0.021	-0.001	0.021
	(0.01)	(0.01)	(0.01)	(0.02)	(0.04)	(0.01)	(0.02)
Constant	-0.039	-0.054	-0.010	-0.446	-1.285	-0.043	0.407
	(0.17)	(0.17)	(0.17)	(0.43)	(0.84)	(0.17)	(0.32)
Observations	3640	3640	3312	1440	515	3640	1642

Table 6

Regressions on acquiring-firm CARs in which the VXO index is employed to capture global-risk-aversion.

We report regressions that test whether acquiring firms undertaking mergers during periods characterized by high-risk-aversion experience an additional discount in terms of stock-market reactions to the announcement. The seven regression estimations reflect the seven different definitions of a merger transaction. In addition to the full set of transaction-level and industry-level controls, all of our estimations control for industry, year, acquirer-nation and target-nation specific fixed effects. The standard errors are reported in parentheses; and *, **, *** respectively represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

	SDC	SDC-Stock	SDC-Size	Standard-Stock	Standard-Size	Stock-Swap	Stock-vs-Cash
Merger * High-Risk-Aversion	-0.470***	-0.876***	-1.011***	-0.671**	-1.049***	-0.441***	-0.620***
	(0.13)	(0.23)	(0.24)	(0.29)	(0.34)	(0.16)	(0.24)
Merger	0.382***	-0.121	0.477**	-0.393*	0.388	0.447***	-0.247
	(0.10)	(0.18)	(0.19)	(0.23)	(0.27)	(0.12)	(0.19)
VXO	0.015***	0.013**	0.015***	0.023*	0.044**	0.014***	0.029***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Cross-Border	0.175	0.157	0.138	0.260	-0.097	0.180	0.011
	(0.13)	(0.13)	(0.14)	(0.27)	(0.45)	(0.13)	(0.22)
Tender-Offer	1.233***	1.086***	1.386***	1.059***	1.444***	1.302***	1.334***
	(0.21)	(0.21)	(0.23)	(0.26)	(0.31)	(0.21)	(0.28)
Horizontal	0.099	0.102	0.101	-0.099	-0.217	0.094	0.295**
	(0.07)	(0.07)	(0.07)	(0.14)	(0.22)	(0.07)	(0.12)
Public Target	-1.566***	-1.318***	-1.537***	-1.811***	-2.365***	-1.558***	-1.578***
	(0.11)	(0.11)	(0.13)	(0.15)	(0.23)	(0.11)	(0.16)
Industry-Assets	-0.187	-0.190	-0.236	-0.276	-0.417	-0.180	-0.112
	(0.21)	(0.21)	(0.23)	(0.48)	(0.75)	(0.21)	(0.39)
Industry-Sales	-0.391*	-0.372*	-0.283	-0.212	-0.298	-0.393*	-0.334
	(0.21)	(0.21)	(0.23)	(0.48)	(0.74)	(0.21)	(0.40)
Industry-Income	-0.017	-0.018	-0.013	-0.178*	-0.213	-0.017	0.020
	(0.05)	(0.05)	(0.05)	(0.11)	(0.16)	(0.05)	(0.08)
Industry-Employees	0.113	0.097	0.027	0.255	0.046	0.113	0.017
	(0.14)	(0.14)	(0.14)	(0.34)	(0.51)	(0.14)	(0.25)
Industry-Debt	0.100	0.099	0.080	0.085	0.105	0.101	0.026
	(0.11)	(0.11)	(0.11)	(0.25)	(0.41)	(0.11)	(0.20)
Constant	7.271	7.127	7.057	7.347	12.789	7.227	4.019
	(5.87)	(5.87)	(5.87)	(7.65)	(7.98)	(5.87)	(5.60)
Observations	34368	34368	29749	9089	4470	34368	12744

Table 7

Regressions on acquiring-firm CARs in which the VRP index is employed to capture global-risk-aversion.

We report regressions that test whether acquiring firms undertaking mergers during periods characterized by high-risk-aversion experience an additional discount in terms of stock-market reactions to the announcement. The seven regression estimations reflect the seven different definitions of a merger transaction. In addition to the full set of transaction-level and industry-level controls, all of our estimations control for industry, year, acquirer-nation and target-nation specific fixed effects. The standard errors are reported in parentheses; and *, **, *** respectively represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

	SDC	SDC-Stock	SDC-Size	Standard-Stock	Standard-Size	Stock-Swap	Stock-vs-Cash
Merger * High-Risk-Aversion	-0.026	-0.432*	-0.523**	-0.504*	-0.749**	-0.019	-0.473*
	(0.13)	(0.24)	(0.25)	(0.29)	(0.36)	(0.16)	(0.24)
Merger	0.170	-0.364*	0.320	-0.513**	0.299	0.215*	-0.330*
	(0.10)	(0.19)	(0.20)	(0.24)	(0.28)	(0.12)	(0.20)
VRP	-0.001	-0.001	-0.003	0.010	0.009	-0.001	0.003
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Cross-Border	0.218*	0.199	0.192	0.292	-0.029	0.224*	0.074
	(0.13)	(0.13)	(0.14)	(0.28)	(0.47)	(0.13)	(0.23)
Tender-Offer	1.300***	1.171***	1.463***	1.226***	1.677***	1.390***	1.525***
	(0.23)	(0.23)	(0.24)	(0.28)	(0.34)	(0.23)	(0.30)
Horizontal	0.082	0.085	0.080	-0.089	-0.204	0.079	0.281**
	(0.07)	(0.07)	(0.08)	(0.15)	(0.23)	(0.07)	(0.12)
Public-Target	-1.653***	-1.386***	-1.654***	-1.857***	-2.439***	-1.632***	-1.648***
	(0.12)	(0.11)	(0.14)	(0.16)	(0.24)	(0.11)	(0.17)
Industry-Assets	-0.141	-0.154	-0.156	-0.422	-0.483	-0.143	-0.142
	(0.23)	(0.23)	(0.24)	(0.51)	(0.81)	(0.23)	(0.41)
Industry-Sales	-0.568**	-0.539**	-0.488**	-0.329	-0.639	-0.568**	-0.378
	(0.23)	(0.23)	(0.24)	(0.50)	(0.80)	(0.23)	(0.42)
Industry-Income	-0.008	-0.010	-0.003	-0.194*	-0.215	-0.007	0.028
	(0.05)	(0.05)	(0.05)	(0.11)	(0.17)	(0.05)	(0.09)
Industry-Employees	0.108	0.090	0.028	0.180	0.008	0.108	0.035
	(0.15)	(0.15)	(0.15)	(0.36)	(0.55)	(0.15)	(0.26)
Industry-Debt	0.166	0.164	0.137	0.248	0.299	0.169	0.114
	(0.11)	(0.11)	(0.12)	(0.27)	(0.44)	(0.11)	(0.22)
Constant	9.109	9.029	9.005	11.160	18.678**	9.083	3.616
	(6.00)	(5.99)	(6.00)	(7.97)	(8.64)	(6.00)	(6.15)
Observations	32793	32793	28311	8697	4215	32793	12105

Table 8

Endogenous-treatment procedure for acquiring-firm TFP growth.

We report endogenous-treatment procedures that test whether acquiring firms engaged in mergers exhibit higher TFP-growth while modelling and controlling for selection into Mergers via a first-stage equation. The seven estimations reflect the seven merger definitions. In addition to transaction-level and industry-level controls (which are repressed for brevity), all estimations control for industry, year, acquirer-nation and target-nation specific fixed effects. The standard errors are reported in parentheses; and *, **, *** respectively represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

	SDC	SDC-Stock	SDC-Size	Standard-Stock	Standard-Size	Stock-Swap	Stock-vs-Cash
Second stage: Productivity Equations							
Merger	0.019**	0.064***	0.040**	0.044***	0.034**	0.030***	0.041***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Industry-ΔTFP	-0.032***	-0.032***	-0.029***	-0.086***	-0.077***	-0.032***	-0.020**
	(0.00)	(0.00)	(0.00)	(0.01)	(0.02)	(0.00)	(0.01)
Cross-Border	0.000	0.000	0.000	0.005	0.011	0.001	0.006
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Tender-Offer	0.019**	0.023**	0.018*	0.022*	0.030**	0.022**	0.015
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Horizontal	0.005	0.005	0.004	0.005	-0.001	0.005	0.007
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Public-Target	-0.019***	-0.018***	-0.022***	-0.033***	-0.049***	-0.019***	-0.026***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Public-Acquirer	0.005	0.004	0.000	0.011	-0.045*	0.003	0.018
	(0.01)	(0.01)	(0.01)	(0.02)	(0.03)	(0.01)	(0.01)
Constant	0.360**	0.357**	0.444**	0.389	0.650*	0.368**	0.388
	(0.17)	(0.17)	(0.18)	(0.40)	(0.38)	(0.17)	(0.30)
First stage: Selection Equations							
Share-of-Mergers	3.506***	5.837***	5.655***	3.913***	3.853***	4.444***	3.772***
	(0.05)	(0.11)	(0.12)	(0.09)	(0.12)	(0.07)	(0.07)
Non-Focal Share-of-Mergers	0.677***	-2.300***	4.535***	-1.331***	-0.527	-1.142***	-1.538***
	(0.26)	(0.83)	(1.41)	(0.28)	(0.48)	(0.32)	(0.33)
Expansion-Year	0.017	0.052**	0.045*	0.036	-0.009	0.040**	0.062**
	(0.02)	(0.03)	(0.03)	(0.04)	(0.05)	(0.02)	(0.03)
Constant	-1.879***	-2.145***	-2.431***	-1.728***	-1.654***	-1.781***	-1.618***
	(0.07)	(0.05)	(0.09)	(0.06)	(0.25)	(0.05)	(0.07)
athrho: $\hat{\rho}$	-0.007	-0.059**	-0.020	-0.044	0.031	0.002	-0.005
lnsigma: $\hat{\sigma}_{\varepsilon}^{2}$	-1.287***	-1.287***	-1.339***	-1.215***	-1.461***	-1.288***	-1.273***
Observations	38706	38706	31855	10506	3655	38706	12304

Table 9

IV Regressions on industry-level standard deviation in TFP-growth outcomes for acquiring firms.

We report IV estimations that test whether industries characterized by higher shares of merger activity (as compared to acquisition activity) exhibit higher dispersion in the operational-efficiency gains – as measured by TFP-growth – experienced by acquiring firms. The seven regression estimations reflect the seven different definitions of a merger transaction in which the different share-of-merger constructs are instrumented for. In addition to the full set of industry-level controls, all of our estimations control for industry and year specific fixed effects. The standard errors are reported in parentheses; p-values reported in brackets; and *, **, *** respectively represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

	SDC	SDC-Stock	SDC-Size	Standard-Stock	Standard-Size	Stock-Swap	Stock-vs-Cash
Share-of-Mergers	0.082***	0.156**	0.056	0.033	0.018	0.131***	0.091*
	(0.03)	(0.07)	(0.05)	(0.06)	(0.06)	(0.04)	(0.05)
Industry-Assets	0.004	0.003	-0.003	-0.004	-0.116*	-0.001	-0.096***
	(0.02)	(0.02)	(0.02)	(0.04)	(0.06)	(0.02)	(0.03)
Industry-Sales	0.021	0.021	0.022	0.031	0.199***	0.024	0.051*
	(0.02)	(0.02)	(0.02)	(0.04)	(0.07)	(0.02)	(0.03)
Industry-Income	-0.004	-0.003	-0.004	-0.002	-0.007	-0.003	-0.005
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Industry-Employees	-0.015	-0.015	-0.018*	0.012	-0.019	-0.014	0.021
	(0.01)	(0.01)	(0.01)	(0.02)	(0.04)	(0.01)	(0.02)
Industry-Debt	-0.003	-0.002	0.004	0.004	0.022	-0.000	0.022
	(0.01)	(0.01)	(0.01)	(0.02)	(0.03)	(0.01)	(0.02)
Constant	-0.244	-0.212	0.015	-0.558	-1.220*	-0.238	1.154***
	(0.17)	(0.17)	(0.16)	(0.35)	(0.68)	(0.17)	(0.28)
Observations	3640	3640	3312	1440	515	3640	1642
F-test	509.40	403.64	666.66	160.05	73.82	490.58	245.40
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Sargan	4.271	4.441	1.117	0.478	0.501	3.740	0.027
	[0.039]	[0.035]	[0.291]	[0.489]	[0.479]	[0.053]	[0.871]
DWH-test	2.369	0.049	0.081	0.680	0.003	0.541	0.065
	[0.124]	[0.825]	[0.777]	[0.409]	[0.955]	[0.462]	[0.799]

Table 10

Endogenous-treatment procedure for acquiring-firm CARs in which VXO captures global-risk-aversion.

We report endogenous-treatment procedures that test whether acquiring firms undertaking mergers during periods of high-risk-aversion experience an additional discount in terms of stock-market reactions while modelling and controlling for the selection into Mergers via a first-stage equation. The seven estimations reflect the seven different definitions of a merger transaction. In addition to the full set of transaction-level and industry-level controls (which are repressed for brevity), all of our estimations control for industry, year, acquirer-nation and target-nation specific fixed effects. The standard errors are reported in parentheses; and *, **, *** respectively represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

	SDC	SDC-Stock	SDC-Size	Standard-Stock	Standard-Size	Stock-Swap	Stock-vs-Cash
Second stage: CARs Equations							
Merger * High-Risk-Aversion	-0.472***	-0.873***	-0.995***	-0.661**	-1.018***	-0.441***	-0.621***
	(0.13)	(0.23)	(0.24)	(0.27)	(0.32)	(0.15)	(0.23)
Merger	0.321*	0.034	0.817***	-0.033	0.888***	0.446**	-0.268
	(0.18)	(0.25)	(0.27)	(0.30)	(0.33)	(0.18)	(0.25)
VXO	0.015***	0.013***	0.015***	0.023**	0.044***	0.014***	0.029***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Cross-Border	0.175	0.157	0.139	0.261	-0.086	0.180	0.011
	(0.13)	(0.13)	(0.13)	(0.26)	(0.42)	(0.13)	(0.21)
Tender-Offer	1.235***	1.085***	1.368***	1.070***	1.440***	1.302***	1.335***
	(0.21)	(0.21)	(0.22)	(0.25)	(0.29)	(0.21)	(0.27)
Horizontal	0.098	0.102	0.102	-0.096	-0.220	0.094	0.295**
	(0.07)	(0.07)	(0.07)	(0.14)	(0.20)	(0.07)	(0.12)
Public-Target	-1.567***	-1.316***	-1.533***	-1.804***	-2.369***	-1.558***	-1.579***
	(0.11)	(0.11)	(0.13)	(0.14)	(0.22)	(0.11)	(0.15)
Constant	1.040	0.873	0.613	-0.725	0.576	1.001	-3.413
	(6.13)	(6.13)	(6.09)	(8.81)	(8.35)	(6.13)	(5.58)
First stage: Selection Equations							
Share-of-Mergers	3.699***	6.101***	5.827***	3.988***	3.990***	4.498***	4.129***
	(0.06)	(0.11)	(0.12)	(0.09)	(0.11)	(0.07)	(0.07)
Non-Focal Share-of-Mergers	-1.585***	7.361***	2.021	1.262***	0.122	1.940***	0.647**
	(0.24)	(0.79)	(1.26)	(0.29)	(0.43)	(0.32)	(0.32)
Expansion-Year	0.005	-0.009	0.031	-0.033	0.014	0.010	-0.108***
	(0.02)	(0.02)	(0.02)	(0.03)	(0.05)	(0.02)	(0.03)
Constant	-1.313***	-2.579***	-2.179***	-2.150***	-2.148***	-2.152***	-2.033***
	(0.06)	(0.06)	(0.08)	(0.07)	(0.23)	(0.05)	(0.07)
athrho: $\hat{\rho}$	0.008	-0.017	-0.039*	-0.049*	-0.085**	0.000	0.003
lnsigma: $\hat{\sigma}_{\varepsilon}^{2}$	1.678***	1.678***	1.665***	1.735***	1.727***	1.678***	1.708***
Observations	34368	34368	29749	9089	4470	34368	12744

Table 11

Endogenous-treatment procedure for acquiring-firm CARs in which VRP captures global-risk-aversion.

We report endogenous-treatment procedures that test whether acquiring firms undertaking mergers during periods of high-risk-aversion experience an additional discount in terms of stock-market reactions while modelling and controlling for the selection into Mergers via a first-stage equation. The seven estimations reflect the seven different definitions of a merger transaction. In addition to the full set of transaction-level and industry-level controls (which are repressed for brevity), all of our estimations control for industry, year, acquirer-nation and target-nation specific fixed effects. The standard errors are reported in parentheses; and *, **, *** respectively represent statistically significant coefficient estimates at the 10%, 5% and 1% levels.

	SDC	SDC-Stock	SDC-Size	Standard-Stock	Standard-Size	Stock-Swap	Stock-vs-Cash
Second stage: CARs Equations							
Merger * High-Risk-Aversion	-0.027	-0.438*	-0.522**	-0.526*	-0.743**	-0.018	-0.473**
	(0.13)	(0.23)	(0.25)	(0.28)	(0.33)	(0.16)	(0.24)
Merger	0.063	-0.189	0.738**	-0.113	0.961***	0.192	-0.340
	(0.20)	(0.27)	(0.30)	(0.33)	(0.35)	(0.19)	(0.27)
VRP	-0.001	-0.001	-0.003	0.010	0.008	-0.001	0.003
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Cross-Border	0.218*	0.199	0.194	0.295	-0.010	0.224*	0.074
	(0.13)	(0.13)	(0.14)	(0.27)	(0.44)	(0.13)	(0.22)
Tender-Offer	1.302***	1.170***	1.452***	1.235***	1.676***	1.390***	1.526***
	(0.23)	(0.23)	(0.24)	(0.27)	(0.32)	(0.23)	(0.29)
Horizontal	0.082	0.085	0.082	-0.085	-0.208	0.079	0.281**
	(0.07)	(0.07)	(0.08)	(0.14)	(0.21)	(0.07)	(0.12)
Public-Target	-1.655***	-1.384***	-1.649***	-1.850***	-2.443***	-1.632***	-1.648***
	(0.12)	(0.11)	(0.13)	(0.15)	(0.22)	(0.11)	(0.16)
Constant	2.325	2.155	2.001	1.592	4.288	2.295	-3.075
	(6.22)	(6.21)	(6.18)	(8.99)	(8.68)	(6.22)	(5.73)
First stage: Selection Equations							
Share-of-Mergers	3.665***	6.149***	5.904***	3.965***	3.951***	4.491***	4.097***
	(0.06)	(0.11)	(0.13)	(0.09)	(0.11)	(0.07)	(0.08)
Non-Focal Share-of-Mergers	-1.768***	7.093***	2.804**	1.251***	0.231	1.559***	0.584*
	(0.25)	(0.83)	(1.31)	(0.29)	(0.45)	(0.35)	(0.35)
Expansion-Year	0.006	-0.010	0.019	-0.037	0.013	0.007	-0.115***
	(0.02)	(0.02)	(0.03)	(0.04)	(0.05)	(0.02)	(0.03)
Constant	-1.251***	-2.561***	-2.219***	-2.131***	-2.187***	-2.084***	-2.003***
	(0.07)	(0.06)	(0.08)	(0.08)	(0.23)	(0.06)	(0.08)
athrho: $\hat{\rho}$	0.013	-0.018	-0.045*	-0.050*	-0.105***	0.003	0.001
lnsigma: $\hat{\sigma}_{\varepsilon}^{2}$	1.689***	1.689***	1.676***	1.746***	1.740***	1.689***	1.719***
Observations	32793	32793	28311	8697	4215	32793	12105