Getting Away With Merger: Proximity and Acquisition Activity*

Zonghe Guo   Rik Sen†   Robert Tumarkin

October 25, 2022

Abstract

Mergers and acquisitions (M&A) exhibit a pronounced proximity effect, with half of all announced transactions in the continental U.S. involving firms that are less than 300 miles apart. Using the introduction of new flights between urban centers as a quasi-natural shock, we find that proximity induces M&A. The results suggest that information flow, particularly during the due diligence stage, is improved, helping firms complete deals and penetrate organizational opacity. While historical factors that influence M&A may relate to geographic proximity, our results indicate that travel is a more important determinant and that communication and travel infrastructure can create significant business value.

JEL classification: G34
Keywords: Acquisition, Governance, Merger, Proximity, Takeover.

*All authors are with UNSW Sydney. We thank participants at the 2022 Queensland Corporate Finance Conference.
†Corresponding Author. rik.sen@unsw.edu.au. UNSW Business School, Level 3, UNSW Australia, Sydney NSW 2052, Australia.

1. Introduction

Mergers and acquisitions (M&A) are among the most substantive ways corporations can transform themselves. In a single transaction, a business gains access to human capital, technology, intellectual property, and other critical business resources. Around one in four firms covered by the Center for Research in Security Prices (CRSP) is absorbed into another firm over a ten year period. Corporate decision makers cite a host of strategic and tactical considerations, both tangible and intangible, as rationale for undertaking such difficult and complex transactions.

Interestingly, geographic proximity appears to be one such consideration. Merger activity exhibits a strong univariate correlation with the distance between two firms, such that half of all announced deals in our U.S. data occur between firms that are less than 300 miles (approximately 480 kilometers) apart.

One possible explanation for this correlation is based on historical factors: geographic distance may serve as a proxy variable for important, long-standing business and social characteristics that determine corporate compatibility. For instance, firms located close to one another may share a common anthropological background, which managers believe can yield improved post-merger integration and performance. Such compatibility may arise, for example, from corporate values (Bereskin, Byun, Officer, and Oh 2018; Chatterjee, Lubatkin, Schweiger, and Weber 1992), human capital, (Lee, Mauer, and Xu 2018) product markets (Hoberg and Phillips 2010), regulatory standards (Erel, Liao, and Weisbach 2012), and technological capacity (Bena and Li 2014).

Alternatively, the increased likelihood of M&A for firms located near one another may derive from non-historical factors. Predicted post-merger organizational and operational efficiencies may arise if easy travel between sites improves communication and reduces operational costs. Proximity may also increase the incidence of mergers if managers simply prefer to acquire firms that are nearby because it is easier to meet and negotiate.

In this paper, we evaluate the extent to which these two categories of explanations contribute to the strong relation between inter-firm distance and M&A likelihood. Researchers have focused on identifying historical factors that determine merger incidence rates and outcomes. Yet, if the cumulative effect of historical factors stemming from proximity is less significant than that of non-historic ones, as our results suggest, then research has de-emphasized an important category of merger determinants. These include factors related to communication and travel infrastructure, which have the potential to create value for business in general, not just through M&A.

The following thought experiment illuminates our approach to differentiate between the historical and non-historical explanations underlying the M&A activity-proximity link. Imagine that one could change the distance between firms, keeping everything else constant. Doing so would only alter non-historical characteristics of firm proximity. Should the likelihood of firms merging vary, then clearly the historical reasons can not fully explain the M&A activity-proximity link.

We take advantage of a setting that comes close to this thought experiment. Proximity between two firms can be measured by both geographical distance and travel time. Although the distance between firms cannot be exogenously changed, the travel times between them can change for plausibly exogenous reasons — in particular, due to the introduction of new airline routes.

Our analysis first establishes a correlation between merger activity and proximity, both in terms of geographic distance and travel. As acquiring firms do not provide information on targets that were considered and rejected, we carefully construct a set of counterfactual deals for each announcement that mimic the strategic and tactical realities of the announced deal. Actual announcements are three hundred miles closer on average, and they take one and a quarter hours less to reach via optimal travel itineraries that combine air and automotive travel.

We then examine activity levels, defined as the number of deals between regions surrounding an urban center. We use the U.S. Census Bureau's definition of a Core Based Statistical Area (CBSA), which are designed to encapsulate geographic regions with an economically and socially integrated population. For each pair of acquirer CBSA-target CBSA in the continental U.S., we compute the annual number of deals for acquirers located in the acquirer CBSA and targets based in the target CBSA. This data is directional, recognizing that regions may have characteristics that differentially affect acquirers and targets.

Regression analysis indicates travel-based proximity is more statistically relevant determinant of acquisition activity than geographic proximity. While both proximity measures are related to activity individually, the statistical relevance of geographic proximity disappears when travel-based proximity is included in the regression.

We then use new flight introductions as a plausibly exogenous shock to proximity to examine causality. We use event time, difference in differences regressions, comparing acquirer CBSA-target CBSAs that were first connected by direct flights at some time during our sample period to peer CBSA pairs that did not permit direct flights. The results suggest that the observed relation between proximity and deals is causal: proximity induces mergers and acquisitions. A new direct flight between CBSAs that are not close enough for driving increases activity by 32%.

Proximity may fundamentally alter deal characteristics, by improving communication and information flow between parties, for example. Alternatively, corporate decision makers may simply prefer to acquire nearby firms. If proximity drives M&A due to information flow, we expect new flight introductions would lead to a relative increase in completed deals versus non-completed ones. Completed non-completed deals should increase proportionally if the proximity-acquisition activity relation reflects managerial convenience.

The results indicate that proximity affects fundamental deal characteristics. Completed deals increase by 29% after a new flight is introduced. Supporting evidence is found by examining the effects of new flights at different points in time. New flights increase deal activity more significantly in the early part of our sample, when communication technology was less developed, than in the later part, when Internet use was widespread. Finally, our evidence suggests that improvements to communication most strongly affect the due diligence process and not post-merger integration.

Our most significant contribution to research on M&A is finding evidence of a causal relation. Our empirical technique controls uses difference in differences, forming cohorts that permit benchmarking CBSAs that become connected by a direct flight with similar CBSAs that do not. Identification requires that the flight introduction is plausibly exogeneous. A parallel trend test suggests that the cohort consisting of affected and peer experience similar acquisition levels before the flight introduction. Concerns that the flight introduction predicts future economic activity are allayed by the fact that the airline industry has small margins and cannot sustain loss-leading routes that are currently unprofitable in anticipation of future profitability.

This paper also address several unresolved issues in the existing literature. Uysal, Kedia, and Panchapagesan (2008) examine mergers of firms within 100 miles of each other. Their results indicate that acquirers in such transactions earn higher abnormal stock returns and a greater share of the acquisition surplus than acquirers in deals between firms located far from one another. Chakrabarti and Mitchell (2013) and Chakrabarti and Mitchell (2016) hypothesize that search costs increase with distance and that proximity can help firms exchange information. Their evidence examining the chemical industry finds a strong relation between geographic distance and M&A transactions.

These papers generally argue that proximity helps firms gather information. Yet, it is not clear if these informational advantages arise due to historical factors related to proximity. For instance, employees of firms located close to one another may share a common history and cultural values, which may help them communicate with one another. Our results suggest this explanation is not complete. Proximity aids in information transfer in general – shared communal values are not necessary precondition.

In related research, Erel, Liao, and Weisbach (2012) find evidence whereby proximity accentuates or attenuates other factors related to M&A acquisitions in a cross-border study. Their empirical method uses regional fixed effects that prevent analyzing geographic distance measure on its own.

Our tests suggest that regional fixed effects should be included in the empirical specification. Hence, by analyzing a time-varying measure of proximity, we can test proximity itself as an explanatory variable while including time-constant regional effects, contributing evidence of a first-order relation between proximity and M&A activity.

2. Data

We examine the relations among geographic proximity, travel proximity, and deal activity and characteristics. Our sample contains M&A announcements from Refinitiv's SDC Platinum U.S. Mergers and Acquisitions database (SDC). SDC is our primary source for deal, acquirer, and target characteristics. We supplement this with financial data from Standard & Poor's Compustat and stock return data from CRSP in those empirical settings that require information not available from SDC.

2.1. Geographic data

Our hypotheses propose that geographic location may serve as a proxy variable for important, long-standing business and social characteristics that determine corporate compatibility in M&A. Thus, our empirical tests require mapping acquirers and targets to regions delineated by shared characteristics. We use the core based statistical areas (CBSAs) defined by the U.S. Office of Management and Budget, which, per Census Bureau standards, encapsulate geographic regions with an economically and socially integrated population.

The empirical tests use an identification strategy that requires consistent geographic region definitions. However, CBSA geographic boundaries have evolved since their introduction in 1950.[1] To maintain consistency across time, we use the geographies from the 2010 Census for all years in our study. These geographies extend from 2010 to the end of our sample time period. We believe that changing CBSA geographic boundaries is not a material concern as our regions are

[1]CBSA terminology has also evolved over time. These regions have been referred to as standard metropolitan areas, standard metropolitan statistical areas, and metropolitan areas.

designed to capture common business and social characteristics. Metropolitan areas have, in general, expanded over our sample period from 1980 through 2018. Thus, by using the latest geographies, we are working within our empirical objective and recognizing how peripheral communities share a common history with their affiliated CBSA. Per the 2010 standards used for our regions, CBSAs are categorized into metropolitan and micropolitan groups.[2] Metropolitan CBSAs have at least one urban area with a population of at least 50,000 inhabitants. Micropolitan CBSAs have at least one urban area with a population of 10,000 or more inhabitants, but no urban areas with at least 50,000 inhabitants.

In hierarchical businesses, SDC provides the division or subsidiary involved in the acquisition. Divisions and subsidiaries are linked to an "immediate" and an "ultimate" parent, representing the next and top-most business entities in the corporate hierarchy, respectively. As our concern is the proximity-based compatibility for the deal, we focus on the listed acquirer and target business entities identified by SDC, and not the immediate or ultimate parents, for each deal.

We identify the CBSA for an acquirer or target using data provided by the U.S. Department of Housing and Urban Development (HUD). Each firm's ZIP code is mapped to its CBSA using the HUD-USPS ZIP Code Crosswalk data. When the ZIP code is missing, we use the city and state information to identify the ZIP code and, transitively, the CBSA. In a small number of cases, a ZIP code may extend outside a single CBSA. When a ZIP code spans two or more CBSAs, we assign all firms in a ZIP code to that CBSA that has the most business addresses.

2.2. Travel data

The U.S. Department of Transportation's Bureau of Transportation Statistics (BTS) compiles data of monthly air traffic. BTS provides data in its T-100 Domestic Segments Database, which begins in 1990, and the ER-586 Service Segment Database, which covers the period from 1977 through 1989. For each month, data is grouped by routes (segments). Route are defined by three

[2] See Federal Register/Vol. 75, No. 123.

items: the carrier, the origin airport, and the destination airport. Routes consider only direct flight segments; a travel itinerary with multiple connections would be broken into constituent routes for statistical analysis. Routes are also directional, such that a carrier's route from airport A to airport B is distinct to a route from airport B to airport A. For each month and carrier, these directed route data contains information on the number of scheduled departures, number of actual departures, total enplaned passengers, and duration from ramp pushback to plane parking (ramp-to-ramp time).

Our analysis requires two variables that derive from this flight data. The first is an annual indicator that identifies when two CBSAs are connected by regular direct flights. We consider an origin CBSA to be connected to a destination CBSA when there are least eight flights for every month of a calendar year. Flights may begin in any airport located with the origin CBSA and terminate in any airport in destination CBSA.

The second variable in our analysis is an estimate of the travel time between CBSAs. Travel times are determined annually based on optimal routes between CBSAs using Dijkstra's algorithm, a well-known procedure to find the shortest between nodes in a graph. We consider only those CBSAs located within the continental U.S. and use a directed graph, which allows for the optimal route from one CBSA to another to differ from the optimal return route.

We seed the algorithm with the lesser of the estimated driving time and the estimated flight time, when a regular, direct flight from the origin to the destination CBSA exists. If there is no valid flight, we simply use the estimated driving time. Drive time is based on the great-circle distance between the two CBSA's geographic centroid, assuming an average speed of sixty miles per hour. For air travel, we consider only those CBSAs that are connected per our requirement that there are least eight flights for every month of a calendar year. The estimated flight time used in our analysis is equal to the median flight length over all flights plus two hours for travel to and from the airport.

We then apply the path search component of the algorithm to find the optimal route between each pair of CBSAs in the continental U.S. Routes may consist of any number of driving and flight segments, and these segments may appear in any order. For example, it may be optimal to fly from an origin CBSA to stopover CBSA, drive to an airport in a different CBSA, and finally fly to the final destination CBSA. As flight segments are all based on median flight times plus two hours, sequential flight segments are assumed to have a two hour layover.

2.3. Summary statistics

Table 1 presents summary statistics on the sample. There are nearly 151,000 acquisition announcements over our sample period from January 1, 1980 through December 31, 2018 for which we can identify the CBSA of the acquiring and target firm. Observation counts differ across variables depending on data availability in SDC, Compustat, or CRSP, as relevant. Most deals are friendly (78% of the sample) and non-diversifying (60% of the sample). Deal values are highly skewed, with a median value of $30 million but an average value of $408 million. Acquiring firms are, on average, larger than target firms as measured by market capitalization and total assets. They also have better valuations; the average acquirer Tobin's q is 4.42 while the average target's q is 2.62. Target firms are most likely to be privately owned (70% of the sample), while acquiring firms are more likely to be public (56% of the sample).

The average CBSA centroid distance between two firms that engage in an acquisition is 1,045 miles. The distribution is skewed with a median distance of 487 miles, indicating that a large fraction of the firms are geographically close to one another. The distribution of optimal travel times is not as skewed. The average and median optimal travel time are 3.25 and 3.35 hours, respectively.

3. Econometric approach

Our analysis must recognize a fundamental aspect of M&A activity: transactions do not have observable counterfactuals. Acquirer acquisition announcements do not list alternate targets that were considered and rejected. Hence, testing the relation between proximity and deal activity requires constructing counterfactual reference sets.

3.1. Counterfactual deals

Testing the relation between proximity and deal activity requires a counterfactual reference set of potential deals.Not all firms are suitable targets for an acquisition; firms that have never been targeted may have unobserved characteristics that make them unattractive to acquirers. Similarly, not every acquiring firm has an appropriate peer for comparison. To address these issues, we use announced deals to build our counterfactual set of potential deals.

Our method aims to build a counterfactual pool of potential targets that reflects the business motivation underlying an actual acquisition. This methodology is best illustrated using an example of a single “focal” acquisition announcement and its “peer” announcements. To capture the strategic business rationale, we first identify peer announcements for which the acquirer and target are in the same 2-digit SIC code industries as their focal counterparts. As industries constantly evolve, we consider only those peer announcements that occurred within five years of the focal announcement to maximize the likelihood that we benchmark against deals that occurred under similar industry dynamics as the focal announcement. Next, we keep only those deals where that would be reasonable for the focal acquirer to execute. Thus, peer firms must be of a similar size, with total assets between half and twice that of the focal acquirer. Deal value must also be between half and twice that in the focal acquisition to ensure that the peer targets would have been feasible for the focal acquirer. Each announcement’s unique counterfactual pool consists of all the targets from the remaining deals.

3.2. CBSA cohorts

While deal-level analysis permits univariate comparisons of deals with counterfactuals, it is poorly suited to understanding how activity levels vary with regional proximity. We aggregate deal activity at the CBSA level to establish that proximity is related to deal flow and that a change in proximity causes corresponding changes in M&A activity. The data is organized by acquirer CBSA-target CBSA pairs, where each consists of the CBSAs that was home to the acquirer and that which which was home to the target. We restrict the sample to CBSAs within the continental U.S. If proximity is related to deal activity, we should observe differences in activity between those CBSA pairs that were connected by a new direct flight at some point within our sample and counterfactual CBSAs that did not have a direct flight.

Formation of appropriate CBSA pair cohorts is a critical element of our identification strategy. Consider an acquirer CBSA and target CBSA that are connected by a new direct flight. Denote the calendar year in which this direct flight is available as event time $t = 0$. We will use the term "focal" to refer to the acquirer and target CBSA that become connected, and "peer" will refer to potential counterfactual CBSAs. We form a pool all possible combinations of three types of "potential" CBSA pairs: focal acquirer to peer target, peer acquirer to focal target, and peer acquirer to peer target. We will refer to an individual CBSAs in this pool as either a "potential" acquirer CBSA or a "potential" target CBSA. A "potential" acquirer (target) may be either the focal acquirer (target) CBSA or the peer acquirer (target) CBSA. However, a "potential" CBSA pair will never be the focal acquirer CBSA and focal target CBSA.

We select counterfactual acquirer-target CBSA pairs from the potential pool to isolate the economic effect of the flight introduction on the focal CBSA pair's acquisition activity. Clearly, cohort CBSA pairs should not be connected by a direct flight at the same time, *t=0*, as our focal CBSA pair. CBSAs pairs should also not have been connected by a direct flight prior to *t=0* as this may induce acquisition activity than systematically differs our focal CBSA pair. The effects of a new direct flight may also take several years to materialize because acquisitions are time consuming transactions. Hence, we require that potential CBSAs also continue to not have direct flight between them for some time after the focal connection at *t=0*. We choose to eliminate CBSAs pairs from the potential pool that have a direct connection within ten years of the establishment of the focal connection. This is a twenty-one year window from *t=-10* through *t=10*.

We want the CBSA pairs in the cohort to to have a similar level of acquisition activity to the focal acquirer CBSA-target CBSA pair before the new direct flight is introduced to that pair. As argued previously, a CBSA may have characteristics that affect acquiring firms and target firms differently. Hence, we first screen potential acquirer CBSAs and target CBSAs separately on economic activity. We compute the number of acquisitions initiated by firms in a focal acquirer CBSA over the five-year period from *t=-7* through *t=-3* and eliminate any potential acquirer CBSAs whose constituent firms initiated less than half or more than twice this number of acquisitions. We exclude *t=-2* and *t=-1* from this comparison so that we may use these years for parallel trend robustness tests. As all focal CBSA acquirers initiated at least one acquisition by construction, this process removes all potential acquirer CBSAs with no acquisition activity. We repeat this process for potential target CBSAs, but use the number of acquisitions in which a firm in the CBSA was targeted as the metric for comparison.

Each CBSA pair selected from this potential pool is a "counterfactual" CBSA pair, with the focal pair and the counterfactuals together constituting the cohort. We limit the cohort counterfactual set to ten CBSA pairs for each focal pair. If more than ten potential pairs remain after elimination on individual acquirer CBSA and target CBSA acquisition activity, we take the pairs with the smallest absolute difference in total acquisitions from the focal pair. Any ties are decided based on the absolute difference in total population (acquirer CBSA population plus target CBSA population) from the focal pair.

4. Proximity and deal activity

If proximity is relevant to acquirer decision making, we should expect a firm to select, all else being equal, a nearby target over potential targets located further away. We test this implication univariately, examining deals and their counterfactuals, and in a regression setting that analyzes acquirer CBSA-target CBSA pairs.

4.1. Univariate proximity analysis

The univariate analysis compares distances and travel times from acquirer CBSA to target CBSA between observed acquisitions and generated counterfactuals. Each announcement has a unique counterfactual pool of potential targets, which consists of targets from peer announcements determined using the method described in section 3.1. Distances and travel times from acquirer CBSA are averaged over all potential target CBSAs to create a counterfactual statistic. Focal acquisition announcements for which we have no valid peer announcements are dropped from this univariate analysis.

Figure 1 contains two histograms comparing proximity of actual and counterfactual deal announcements. Panel A reveals that actual deals most frequently occur between geographically close firms, with approximately half of all actual deals between firms located less than 500 miles apart. Counterfactual deals suggest that acquirers would generally select targets further away, typically between 500 and 1,500 miles, if proximity was not a factor.

Travel time from acquirer to target is plotted in panel B's histogram. Actual announcement data appears multi-modal. There is an initial peak frequency of deal announcements where travel time between firms is very short, less than one hour. Deals are less frequently observed until the three hour travel time threshold, when deal frequency increases materially. On the other hand, counterfactual data suggests firms would generally pick targets between four and seven hours away if proximity did not play a role in M&A.

Statistics comparing distance and travel proximity measures between actual and counterfactual announcements are provided in table 2. Announced M&A transactions are 297.6 miles closer than counterfactuals suggest would otherwise occur, which is statistically significant at the 1% level. Counterfactual deals are, on average, between firms located in CBSAs 5.2 hours apart. The CBSA-based travel time for firms in actual deals is 4.0 hours. This difference, representing a 24% reduction in travel time, is also statistically significant at the 1% level.

4.2. Regression proximity analysis

The univariate analysis suggests that both geographic and travel time proximity play a role in M&A activity. We perform regression analysis to evaluate the relative importance of these two factors. We analyze the total number of announced deals for every unique acquirer CBSA-target CBSA in the cohort sample on a calendar year basis over our sample period from 1980 through 2018. Observations do need a merger announcement to be included in the sample; a plurality of acquirer CBSA-target CBSA years have no M&A activity.

Our empirical approach leverages high dimensional fixed effect panel data regression models. Regional characteristics can have different relevance for acquirers than they do for targets. For example, acquirers during banking merger wave of the 1990s were concentrated in states with historically liberal regulations around bank concentration, while target banks were located in areas that had stricter bank concentration regulations (Calomiris and Karceski 2000). Merger waves are a well-known phenomenon (e.g., Harford 2005), suggesting that regional factors can change over time. As a result, the fixed effect specification should include time-varying controls for when the CBSA is home to the acquiring firm separately from when it is home to the target firm.

We estimate the following two linear regression models to examine the relationships between proximity and deal activity:

$$(1) \qquad Activity_{ijt} = \beta_1 \times \log\left(Distance_{ij}\right) + \beta_2 \times \log\left(Travel\ Time_{ijt}\right) + \alpha_{it} + \alpha_{jt} + \epsilon_{ijt} \quad \text{and}$$

$$(2) \qquad Activity_{ijt} = \beta_1 \times \log\left(Travel\ Time_{ijt}\right) + \alpha_{it} + \alpha_{jt} + \alpha_{ij} + \epsilon_{ijt}.$$

The left-hand-side variable, $Activity_{ijt}$, is either the total number of acquisitions from acquirer CBSA i to target CBSA j in calendar year t or the log of one plus this variable. Time-varying acquirer CBSA and target CBSA fixed effects are denoted by α_{it} and α_{jt}, respectively. The model in eq. (1) does not include a time-invariant acquirer CBSA-target CBSA effect, α_{ij}, which can account for general M&A compatibility between regions due to cultural, regulatory, or industrial similarities, for example. We include this effect in eq. (2) and drop the spanned, time constant acquirer CBSA-target CBSA geographic distance variable. Table 3 presents the results from estimating these models. All standard errors are clustered in two dimensions by acquirer CBSA and target CBSA.

Our results indicate that travel time is a more relevant measure of proximity than geographic distance. The results in columns (1) and (2) indicate that both geographic and travel time proximity individually exhibit a statistically strong relationship with the number of acquisitions that occur between an acquirer CBSA and target CBSA. Similar results are visible in columns (6) and (7), which use the logarithm of one plus the number of acquisitions as the dependent variable. However, geographic distance is not statistically meaningful in the specifications that include both proximity measures (column (3) and (8)), while travel time remains a statistically significant covariate. We note that this result does not arise because our time-varying acquirer and target CBSA fixed effect specification disadvantages the time-constant geographic distance variable. In specifications that use time-constant acquirer CBSA and target CBSA effects, we find that geographic proximity is not statistical significant while travel time is.

Research suggests that two CBSAs may have time-constant characteristics that make them better suited for M&A deals than two CBSA selected at random. The specifications estimated in columns (1) through (3) and (6) through (8) could not include acquirer CBSA-target CBSA effects because doing so would subsume the geographic proximity variable. In columns (4) and (9), we present estimation results using the test for the presence of fixed effects suggested by Wooldridge (2010) and include the time-constant average travel time from acquirer CBSA to target CBSA as an additional explanatory variable in the eq. (1) specification. This test is cluster-robust per our two-way acquirer CBSA and target CBSA dimensions. The *t*-statistics on average travel time are -3.41 and -3.25 for the number of acquisitions and the logarithmic dependent variables, respectively, indicating that we can reject the null that acquirer CBSA-target CBSA effects are uncorrelated with our explanatory variables at the 0.1% level.

The estimation results of specifications including time-constant acquirer CBSA-target CBSA effects are displayed in columns (5) and (10). We find that travel time continues to exhibit a meaningful relationship with deal activity for both activity measures, with point estimates that are statistically significant at the 5% level. Economically, the coefficient suggests approximately a 18% increase in deal activity for a one hour decrease in travel time from the sample average.

5. Flight introductions and deal activity

The results we have presented indicate that firm proximity is highly related to M&A announcement activity. In particular, firms that are able to quickly reach one another are more likely to engage in a transaction than firms where travel is time consuming. However, this relation may arise naturally if areas that are easy to travel between share common unobservable characteristics.

The introduction of a direct flight route from an acquirer to a target CBSA can serve as a quasi-natural shock to travel times. The United States's road and rail infrastructure was largely in place at the start of our sample period, with limited development through the sample that would materially affect travel times between CBSAs. New direct flight routes, by contrast, make travel both faster and easier. During our sample period, 1,593 origin CBSAs that hosted an acquiring firm were connected to destinations, providing our tests with sufficient observations to examine how changes in travel affect deal activity.

5.1. Econometric specification

We use a difference in differences regression specification to test whether firm proximity, as captured by new flight introductions, generates acquisitions. The majority of potential acquirer CBSA-target CBSA pairs do not have an acquisition during our sample. Given this, we do not perform a generic panel test. Instead, we focus on only "affected" CBSA pairs that were connected with a direct flight during the sample period and compare each against several counterfactual acquirer CBSA-target CBSA pairs. Each cohort consists of a single affected CBSA pair and all its counterfactuals. We analyze acquisition activity during calendar year t for acquirers in CBSA i and targets in CBSA j within cohort c using the specification

$$Activity_{ijct} = \beta \times (Treatment_{ij} \times Post_{ijt}) + \alpha_{ict} + \alpha_{jct} + \alpha_{ijc} + \epsilon_{ijct}. \tag{3}$$

$Treatment_{ij}$ is time-constant indicator variable that takes the value of 1 if the acquirer CBSA is connected to the target CBSA during the sample period, and 0 otherwise. $Post_{ijt}$ is an indicator variable that takes the value 1 for the year of and years after the *affected* CBSAs are connected by a direct flight, and 0 otherwise.

The model's semi-saturated fixed effects specification includes acquirer CBSA-cohort-year (α_{ict}), target CBSA-cohort-year (α_{jct}), and acquirer CBSA-target CBSA-cohort (α_{ijc}) effects. These are all possible triple interactions excluding acquirer CBSA-target CBSA-year, which cannot be included without subsuming the $Treatment_{it} \times Post_{ijt}$ explanatory variable of interest. Our semi-saturated fixed effects specifications spans all one- and two-dimensional effects that could be formed of the acquirer CBSA, target CBSA, cohort, and year indices.[3]

5.2. *Identification*

Econometric identification synergizes our cohort formation strategy with the semi-saturated fixed effects specification. The argument is illustrated best with an example. Note that the three types of fixed effects (acquirer CBSA-cohort-year, target CBSA-cohort-year, and acquirer CBSA-target CBSA-cohort), all include a cohort dimension. Thus, we examine identification of a single focal CBSA pair and it's peers, with all arguments then scaling up to the full sample.

Assume that our focal pair is for acquiring firms based in the Seattle-Tacoma-Bellevue (Seattle)

[3] The fixed effect specification eliminates the need to include $Treatment_{ij}$ individually. $Treatment \times Post$ can be also expressed as a single indicator that varies by *i*, *j*, and *t*. We express it as a product for expositional reasons.

CBSA and target firms located in the Boston-Cambridge-Newton (Boston) CBSA, two important economic regions that were first connected by a regular direct flight in 1993. A localized economic boom in Seattle could increase acquisitions originating in the area regardless of the flight introduction. Hence, a naive panel regression, which would benchmark Seattle-Boston against the general population, could yield misleading results. On the other hand, our focal acquirer-peer target cohorts allow us to compare acquisition intensity keeping Seattle constant. We compare Seattle acquirer-San Diego target activity with counterfactuals within the cohort where Seattle based firms acquirer targets in CBSAs similar to Boston. This comparison is aided by target CBSA-year effects, which are possible because peer target CBSAs may also be paired with peer acquirer CBSAs. These time varying effects control for differences between the focal target CBSAs and its peers that may exist even after matching. A regionalized economic development that might make Boston firms more attractive targets is addressed similarly. The cohort includes counterfactuals where firms located in a CBSA peer for Seattle acquire Boston-based targets, and the specification includes time varying effects at acquirer CBSA-year level.

This empirical comparison between CBSA pair observations is aided by the acquirer CBSA-target CBSA fixed effects. This accounts for time-constant characteristics that affect the suitability of acquisitions between CBSAs, which is particularly relevant for the counterfactual peer acquirer CBSA-peer target CBSA pairs (as opposed to a counterfactual that includes a focal CBSA). We note that these effects are applied per cohort, and are not applied at the sample-level. These are possible because the acquirer CBSA target-year and target CBSA-year effects are also at the cohort level, which affects the acquirer CBSA-target CBSA effects. Acquirer CBSA-target CBSA effects per cohort helps improve the quality of the comparison versus the focal CBSA pair.

Causal identification requires that the treatment event is exogenous to the observed level of acquisitions prior to the introduction of a new direct flight. The key remaining empirical concern is that the introduction of a new flight is endogenous to unobserved characteristics in the focal CBSA pair. Our matching process builds counterfactual CBSA pairs based on acquisition activity five-year period from *t=-7* through *t=-3*. Thus, we are particularly concerned with airlines endogenously choosing to initiate a direct flight between the CBSAs based on events that from $t = -2$ forward.

There are two reasons why we believe an endogenous decision to introduce airline flights is endogenous in our setting. First, economic activity may lead to more acquisition activity for he two-year period from *t=-2* through *t=-1*. If that were to occur, then the flight introduction could be in response to economic activity and our results would be invalid. By omitting these two years from our matching process, we are able to perform a parallel trend test. The results suggest in the next section suggest that these two years do not have different acquisition activity from the other pre-flight introduction years used in our analysis. Second, it is possible that airlines introduce a flight at *t=0* in anticipation of economic ties between the acquirer and target CBSAs starting at *t=1* or later. The airline industry is characterized by high competition, significant variable and fixed costs, and low operating margins Thus, we believe it is very unlikely that airlines choose to establish a route that may not be profitable for several years in the future.

5.3. Results

We use new flight introductions to evaluate a causal relation: whether ease of travel induces aquisitions activity. We present the estimation results for eq. (3) in table 4. The dependent variables in columns (1) and (2) is the number of annual acquisitions. The dependent variables in columns (3) and (4) is the natural log of one plus the number of annual acquisitions.

We find a that new flight introductions are associated with an increase in acquisition announcements. This relationship is statistically significant beyond the 1% level for both dependent variables. The economic effect is material. The table provides the average number of deals over the ten-year period prior to the flight introduction, from *t=-10* to *t=-1*. Dividing the coefficient on $Treatment \times Post$ by this average indicates suggests that a new flight increases M&A activity by 32% between the connected CBSAs.

This interpretation of the results relies on new flights representing a meaningful and plausibly exogeneous shock to travel times. While one may naturally assume that such changes are meaningful (a direct flight should be faster than one with connections), the magnitude of the travel time reduction is of empriical interest. In untabulated results, we find that new direct flights reduce travel times between the affected CBSAs by 12% on average within thhe regression framework of eq. (3), with a *t*-statistic of 19.1. Affected CBSAs are most often geographically distant, with car travel impractical and prior air travel requiring multiple segments. Thus, the new direct flight eliminates one or more layovers and shortens the flight path.

We also perform a parallel trend test to mitigate concerns the flight introduction between the affected CBSAs is in response to economic activity that begins in *t=-2*, after the period used for cohort formation. We define the indicator $[-2,-1]_{ijt}$, which takes the value of 1 for *t=-2* and *t=-1*, and 0 otherwise. A positive and economically significant coefficient of the interaction of this variable with $Treatment_{ij}$ when added to the regression would suggest that the flight introduction is endogenous. Results in columns (2) and (4) suggest this is not the case, with *t*-statistics of 0.66 and 0.52, respectively.

6. Types of deals affected by flight introductions

We hypothesize that flight introduction that alter travel time proximity can improve the quality of information available to and exchanged between firms involved in a merger or acquisition. Information may affect M&A through the deal sourcing and due diligence processes, helping firms find appropriate partners and complete deals. After the deal is consummated, information can help the two firms integrate.

We explore the implication of these hypotheses by comparing the effects of direct flight introductions across acquisition characteristics. For example, an improvement in information during the M&A process should increase the likelihood of a deal being completed. We test this by estimating the effect of direct flights on the number of annual completed deals by acquirer CBSA-target

CBSA pair. An increase in completed deals does not necessarily prove the hypothesis. Such an increase may be a natural result consequence of overall deal activity increasing and not a direct consequence of improved information flow. Thus, we also estimate the effect of flight introductions on the non-completed deal activity. By comparing a sub-sample (completed deals) to its complement (non-completed deals), we are able to identify whether completed deals are more likely than non-completed deals.

A simultaneous equations framework is used throughout this section. We form cohorts for each CBSA pair that has a new flight introduction as described in section 5. In this setting, $Activity_{ijct}$ measures the total number of annual acquisitions in year t with a specific characteristic between acquirer CBSA i and target CBSA j. A similar activity measure denoted by an apostrophe to represent the complement, $Activity'_{ijct}$, captures the number of acquisitions that do not have the required characteristic. The specification contains four equations estimated simultaneously:

(4)
$$Activity_{ijct} = \beta \times (Treatment_{ij} \times Post_{ijt}) + \alpha^a_{ict} + \alpha^a_{jct} + \alpha^a_{ijc} + \epsilon^a_{ijct},$$

$$Activity'_{ijct} = \beta' \times (Treatment_{ij} \times Post_{ijt}) + \alpha'_{ict} + \alpha'_{jct} + \alpha'_{ijc} + \epsilon^c_{ijct},$$

$$Activity_{ijct} = \mu \times (Treatment_{ij} \times (1 - Post_{ijt})) + \eta_{ijct},$$

$$Activity'_{ijct} = \mu' \times (Treatment_{ij} \times (1 - Post_{ijt})) + \eta'_{ijct}.$$

The specification contains two types of equations. The first type is identical to eq. (3) used in section 5. This models modeling the effect of new flights on activity levels on deals with specified characteristic and deals without the characteristic through the β and β' coefficients, respectively. The second type computes the average number of acquisitions per year between acquirer CBSA and target CBSA before the introduction of the new flight. In the last two equations, the averages for deals with characteristics and without are represented by the μ and μ' coefficients, respectively. As $Post_{ijt}$ is 1 for the year of and after the flight introduction, $(1 - Post_{ijt}$ is an indicator that takes the value of 1 for the years before the flight introduction, and 0 otherwise. Thus, the $(Treatment_{ij} \times (1 - Post_{ijt})$ explanatory variable ensures that the average is only computed for the affected CBSA before the flight introduction.

Dividing the impact of a flight introduction on the annual number of deals by the average number of annual deals yields a normalized, relative economic effect. We compare the relative economic effect for deals with a specific characteristic against that for deals without the characteristic using a Wald test under the null hypothesis

$$H_0 : \beta/\mu = \beta'/\mu'. \tag{5}$$

6.1. Information flow

Informational improvements that arise due to direct flight connections can help firms source deals, improve target evaluation, and streamline post-merger integration. All these factors should make it more likely that announced deals are completed. We split the sample into a subset of announcements that are ultimately completed (completed deals) and its complement, announced deals that are not completed (non-completed deals). For each, we calculate the number of annual deals for each acquirer CBSA-target CBSA in the cohort sample.

The estimation results of eq. (4) using deal completion as a criterion are in table 5. Consistent with our hypothesis that proximity improves information, we find an economically and statistically significant increase in the number of deals that are completed in column (1). Normalizing the effect by the number of average number of deals, indicates that a new direct flight increases the number of completed deals by 29% relative to previous levels. Column (2) indicates that there is no statistically significant change in the number of deals that are not completed, although the negative point estimate suggests a decrease in non-completed deals. The difference in the normalized effect for completed and non-completed deals is 41% with a Wald statistic of 12.51, providing better than 99% confidence that we can reject the null hypothesis (eq. (5)) of equal normalized effects.

Our sample period spans an era of substantial developments in communication technology. Tools for voice communication, such as conference calling, cellular telephones, and video conferencing, achieved wide-spread popularity. Fax and email allowed people and firms to share hard documents and other types of information cheaply and quickly. Such developments should lower the effect of a new direct flight between CBSAs on merger activity. M&A due diligence and integration activities that required travel or physically transporting documents at the beginning of the sample could be replaced with technological solutions. However, if critical elements of business communication are nonverbal (e.g., Graham, Unruh, and Jennings 1991), we expect that the effect of technological developments to mute, but not eliminate, the importance of the face-to-face meetings facilitated by new direct flights.

We test this implication of our informational hypothesis, splitting the sample period from 1980 through 2018 roughly in half chronologically. The argument above implies a stronger economic effect of new flights on M&A introduction during the early period from 1980 through 1999 than on the later period from 2000 through 2018. Table 6 displays estimation results for these two sample periods. The results support the idea that the informational improvements arising from new flight introductions were stronger in the early part of the sample. We find that a new flight increases merger activity by 43% (column (1)) during the period from 1980 through 1999. Merger activity increases by 15% in the later sample period from 2000 through 2018 (column (2)). Both increases in merger activity are statistically meaningful, with the early period exceeding 1% significance and the later period exceeding 5% significance.

6.2. Due diligence and corporate integration

Acquisitions may be considered to consist of two separate phases, divided around the point in time where both the acquirer's and the target's corporate boards sign off on the deal. In the first phase, the acquirer source potential deals, identifying targets that meet strategic and tactical needs. The second phase, occurring after the deal is completed, requires the acquirer and target firms to work together and integrate their businesses. We use split sample tests to evaluate whether differences in either or both of these phases supports our evidence that information flow in M&A is an outcome of proximity.

6.2.1. Due diligence

Prior to completion, opacity between acquirers and targets can impede M&A. Acquirers may not be able to evaluate targets because they do not have access to information. Such barriers to communications should lessen significantly entirely once the deal is complete and the acquirer and target combine their businesses. Thus, if proximity helps information flow in the early stages of deal evaluation, we should see an increase in activity in situations where opacity between acquirers and targets is greatest.

Private firms are more opaque than public ones. Consequently, proximity should increase merger activity for private acquirers, private targets, and deals where both acquirer and target are private. We evaluate whether these assertions hold with split samples, and the results are shown in table 7. We find an increase in M&A activity around new flight introductions for private acquirers, private targets, and deals where both are private in columns 1, 3, and 5, respectively. Our hypothesis does not rule out an increase in deal activity for public firms. However, we find point estimates for public acquirers, public targets, and deals where one firm is public that are less economically statistically significant in columns 2, 4, and 6, respectively, than the alternate subsample.

In support of the idea that proximity affects information flow before deal completion, we find that the difference in normalized activity for private acquirers (column (1)) versus public acquirers (column (2)) is economically and statistically significant. This is also the case when comparing deals where both acquirer and target and private in column (5) against deals in which one firm is public in column (6). While we find a positive difference in normalized activity in support of the hypothesis between private and public targets in columns (3) and (4), this difference is not statistically meaningful.

Friendly deals are also more likely to experience an increase in activity with proximity. Consider an acquirer evaluating a pool of possible targets, some of they expect to facilitate a friendly deal and others they expect would need to be acquirer hostily. When proximity is changed, only the friendly deals would be affected; the acquirer and target would be able to communicate more easily, facilitating information flow and deal success. On the other hand, information flow should not change materially in a deal where the target is hostile to the acquirer. Moreover, proximity may affect deal attitude. We would expect acquirers to engage directly with targets in situations where a friendly deal is possible. Thus, increased proximity may result in some deals that would otherwise be hostile becoming friendly.

Both arguments suggest that new flight introductions increase the number of friendly deals relative to those that are not friendly. We present the estimation results for this idea in table 8. We find an economically and statistically increase in deal activity for friendly deals after the introduction of a new flight in column (1). While friendly deals increase by around 25%, non-friendly deals decrease by 24%, although this is not statistically significant. The difference in normalized effects between friendly and non-friendly deals is statistically significant at the 5% level.

6.2.2. Corporate integration

After a deal is signed, information flow is most critical for acquirers and targets that need to alter their businesses to interoperate. This would be true for non-diversifying acquisitions, where the businesses have to consolidate operations more so than would be expected in diversifying acquisitions. If corporations recognize that proximity-related information flow affects post-completion information flow, we should expect to see an increase in activity for non-diversifying acquisitions relative to diversifying ones.

Table 9 contains the results of estimating the effect of a flight introduction on the number of diversifying and non-diversifying acquisitions. While we find that diversifying acquisitions increase by about 28% and non-diversifying acquisitions increase by about 19%, the difference is not statistically significant. Thus, the result does not support the idea that proximity statistically affects the quality of information flow after deal completion.

7. Conclusion

Proxy is known to relate to M&A activity and other business decisions. This is sensible if it serves as a proxy variable for important business characteristics in empirical settings. Proximity can covary with the ease of communication between firms. Transportation costs of raw materials for industrial firms should relate to proximity.

However, one could argue that it is not clear why proximity itself should be immaterial to firms' relationship and operations. A fully specified hedonic empirical specification might not require a proximity variable. That is, if proximity is capturing cultural elements common to businesses, a variable that specifically measures cultural similarity should make proximity redundant empirically.

A problem then arises as to researching what variables are captured by proximity. Our research provides important guidance. Proximity between corporations exists on multiple dimensions. Geographic distance can engender good relations between firms due to commonalities in the region due to anthropological and regulatory similarities. Firms can also be proximate because they are easy to travel between even if they are not physical near to one another. Our evidence suggests that while both types of proximity are related to M&A activity, travel proximity is a more important factor. Communication, and other factors related to travel proximity warrant further investigation, and studies on such factors may yield new insights on M&A and businesses in general.

References

Bena, J. and K. Li. "Corporate Innovations and Mergers and Acquisitions: Corporate Innovations and Mergers and Acquisitions." *The Journal of Finance*, 69 (2014), 1923–1960.

Bereskin, F., S. K. Byun, M. S. Officer, and J.-M. Oh. "The Effect of Cultural Similarity on Mergers and Acquisitions: Evidence from Corporate Social Responsibility." *Journal of Financial and Quantitative Analysis*, 53 (2018), 1995–2039.

Calomiris, C. and J. Karceski (2000). "Is the Bank Merger Wave of the 1990s Efficient? Lessons from Nine Case Studies". In: *Mergers and Productivity*. Ed. by Steven N. Kaplan. University of Chicago Press.

Chakrabarti, A. and W. Mitchell. "The Persistent Effect of Geographic Distance in Acquisition Target Selection." *Organization Science*, 24 (2013), 1805–1826.

Chakrabarti, A. and W. Mitchell. "The role of geographic distance in completing related acquisitions: Evidence from U.S. chemical manufacturers." *Strategic Management Journal*, 37 (2016), 637–694.

Chatterjee, S., M. H. Lubatkin, D. M. Schweiger, and Y. Weber. "Cultural differences and shareholder value in related mergers: Linking equity and human capital." *Strategic Management Journal*, 13 (1992), 319–334.

Erel, I., R. C. Liao, and M. S. Weisbach. "Determinants of Cross-Border Mergers and Acquisitions." *The Journal of Finance*, 67 (2012), 1045–1082.

Graham, G. H., J. Unruh, and P. Jennings. "The Impact of Nonverbal Communication in Organizations: A Survey of Perceptions." *Journal of Business Communication*, 28 (1991), 45–62.

Harford, J. "What drives merger waves?" *Journal of Financial Economics*, 77 (2005), 529–560.

Hoberg, G. and G. Phillips. "Product Market Synergies and Competition in Mergers and Acquisitions: A Text-Based Analysis." *The Review of Financial Studies*, 23 (2010), 3773–3811.

Lee, K. H., D. C. Mauer, and E. Q. Xu. "Human capital relatedness and mergers and acquisitions." *Journal of Financial Economics*, 129 (2018), 111–135.

Uysal, V. B., S. Kedia, and V. Panchapagesan. "Geography and Acquirer Returns." *Journal of Financial Intermediation*, 17 (2008), 256–275.

Wooldridge, J. M. *Econometric Analysis of Cross Section and Panel Data*: MIT Press (2010).

Figure 1
Proximity and deal activity

This figure presents histograms comparing acquirer-target proximity statistics between acquisition announcements and counterfactuals. The sample consists of all announced deals in the SDC Platinum Mergers & Acquisitions database from 1980 through 2018. Deals must between firms located within a core based statistical area (CBSA) as defined by the U.S. Office of Management and Budget that are located within the continental U.S. Counterfactual targets are determined for each deal using observed M&A data. The counterfactual target must be in the same industry as the actual target firm. Counterfactual targets must have also been targeted by a firm similar to the acquirer, defined as a firm in the same industry and with total assets between half and twice that of the acquirer. Industries are defined using 2-digit SIC industry codes. Counterfactual targets must have also been targeted within five years of the acquisition. Statistics are computed between the actual acquirer and the counterfactuals counterfactual targets and then averaged such that there is an equal number of actual and counterfactual observations. Panel A shows the distribution of distance in miles from the centroid of the CBSA containing to the acquiring firm to the centroid of the CBSA of the target firm. Panel B displays a histogram of optimal travel times between acquirer CBSA and target CBSA. Optimal travel times are found using a Dijkstra algorithm combining segments of driving and flying. Drive times are based on an average of 60 miles per hour. Flight times assume the median ramp-to-ramp time for the year in which the acquisition occurred plus two hours for round trip travel to the airport and two hours for each layover. The vertical axis on both panels indicates the fraction of the sample observed in the histogram bin. Bars outlined in a solid line with gray shading are for actual M&A announcements. Unshaded bars outlined in dashed lines are for counterfactual deals.

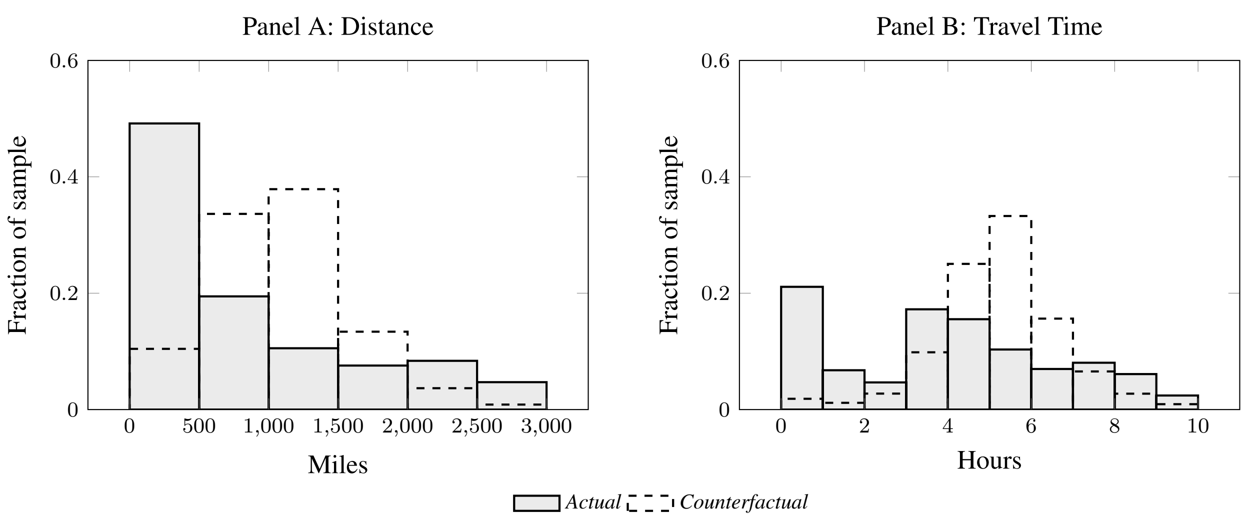

Table 1
Summary statistics

This table presents summary statistics on announced M&A deal characteristics, characteristics of acquirers and targets, and market reactions to announcements. The sample consists of all announced deals in the SDC Platinum Mergers & Acquisitions database from 1980 through 2018. Deals must between firms located within a core based statistical area (CBSA) as defined by the U.S. Office of Management and Budget that are located within the continental U.S. *Deal value* is the nominal value of the acquisition in millions of U.S. dollars; *Diversified* is an indicator that takes the value of 1 if the acquirer and target are not in the same 2-digit SIC industry, and 0 otherwise; *Friendly* is an indicator that takes the value of 1 if the deal is consider friendly per SDC classifications; *Premium % (1 week)* is the percent increase the acquirer is paying in deal value relative to the firm market capitalization as of 1 week prior; *Premium % (4 weeks)* is the percent increase the acquirer is paying in deal value relative to the firm market capitalization as of 4 weeks prior; *Distance* is the greater circle distance from the CBSA centroid in which the acquirer resides to the CBSA centroid in which the target resides; and *Travel time* is the optimal travel time from the acquirer's CBSA to the target's. Optimal travel times are found using a Dijkstra algorithm combining segments of driving and flying. Drive times are based on an average of 60 miles per hour. Flight times assume the median ramp-to-ramp time for the year in which the acquisition occurred plus two hours for round trip travel to the airport and two hours for each layover. *Public firm* is an indicator that takes the value of 1 if the firm is publicly traded, and 0 otherwise; *Market capitalization* is the market value of common equity, measured in millions of dollars; *Total assets* is the book value total assets of the firm in millions of dollars; and *Tobin's Q* is the market-to-book ratio of assets. *Acquirer CAR* and *Target CAR* and the 5-day cumulative abnormal returns (as a fraction) of the acquirer's and target's common stock Abnormal returns are single factor market model using the CRSP equally-weighted return as the market index and coefficients estimated from the period beginning 210 days prior to through 11 days prior to the announcement. The 5-day CAR window begins 2 days before the event and ends 2 days after.

			Distribution			
	Mean	SD	p25	Median	p75	N
	(1)	(2)	(3)	(4)	(5)	(6)
Deal characteristics:						
Deal Value ($ mil)	408.44	3 148.67	7.00	30.00	142.27	70978
Diversified	0.40	0.49	0.00	0.00	1.00	150838
Friendly	0.78	0.41	1.00	1.00	1.00	150838
Premium % (1 week)	44.78	1 958.79	−1.43	4.03	26.31	22485
Premium % (4 weeks)	46.53	1 974.38	−4.59	5.53	29.42	22444
Distance (mi)	1 045.53	1 276.92	0.00	486.66	1 668.11	150838
Travel Time (hr)	3.25	2.97	0.00	3.35	5.43	150223
Acquirer characteristics:						
Public firm	0.56	0.50	0.00	1.00	1.00	150838
Market capitalization ($ mil)	8 461.45	34 598.39	125.53	625.32	2 955.65	55048
Total assets ($ mil)	14 268.20	342 279.79	130.70	792.00	4 047.10	50551
Tobin's *Q*	4.42	302.06	1.10	1.49	2.22	54300
Target characteristics:						
Public firm	0.30	0.46	0.00	0.00	1.00	150838
Market capitalization ($ mil)	3 659.16	18 360.74	59.76	251.98	1 344.94	31649
Total assets ($ mil)	6 389.85	56 117.75	60.70	310.10	1 596.05	47904
Tobin's *Q*	2.62	67.31	1.03	1.29	1.94	30912

Table 2
Univariate comparison

This table displays acquirer-target proximity statistics between acquisition announcements and counterfactuals. The announced deal sample and the procedure for determining counterfactual deals are described in figure 1. The proximity measures for the counterfactual deals, which run from actual acquirer to counterfactual targets, are averaged before computing summary statistics, ensuring an equal number of actual and counterfactual observations. *Distance* is measured in miles from centroid of the CBSA containing the acquiring firm to the centroid of the CBSA of the target firm. *Travel time* is the optimal travel time from the acquirer CBSA to the target CBSA. Optimal travel times are found using a Dijkstra algorithm combining segments of driving and flying as detailed in figure 1. *Mean* (columns (1) and (3)) and *SD* (columns (2) and (4)) are the mean and standard deviation of statistics for announced and counterfactual deals, respectively. The difference in mean (announced minus counterfactual) is in column (5) with the *t*-statistic of this difference in column (6). *N* (column (7)) is the number of observations. The total number of announced deals and counterfactual observations is twice this value. *t*-statistics are reported in parentheses. Coefficients marked with ***, **, and * are significant at the 1%, 5% and 10% level, respectively.

	Announced deals		Counterfactual deals		Difference		
	Mean	SD	Mean	SD	Mean	*t*	N
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Distance (mi)	795.57	824.53	1 093.14	504.34	− 297.58***	43.47	19935
Travel time (hr)	3.98	2.79	5.24	1.53	−1.26***	55.81	19858

Table 3
Proximity and deal activity

This table shows the estimation results for specifications examining the relationships among distance, travel time, and the number of deals. The sample consists of all announced deals in the SDC Platinum Mergers & Acquisitions database from 1980 through 2018. Deals must between firms located within a core based statistical area (CBSA) as defined by the U.S. Office of Management and Budget that are located within the continental U.S. Observations are based on calendar years for each acquirer CBSA-target CBSA pair. The dependent variable in all specifications, number of deals, is scaled up by a factor of hundred due to the large fraction of CBSA pairs with no deals. *Log(1 + Distance$_{ij}$)* is the logarithm of one plus the distance in **kilometers** between centroid i of acquiring firms and centroid j of the target firms; *Log(1 + Travel Time$_{ijt}$)* is the logarithm of one plus the travel time in hours between centroid i of the acquiring firm and centroid j target firm during calendar year t; and *Avg. Log(1 + Travel Time$_{ij}$)* is the time-averaged logarithm of one plus the travel time in hours between centroid i of the acquiring firm and centroid j target firm. Estimates presented in columns (1) and (2) are based on specifications that include acquirer CBSA, target CBSA, and year fixed effects. The specification underlying column (3) includes acquirer CBSA-year, target CBSA-year, and acquirer CBSA-target CBSA fixed effects. *Log(1 + Distance)* is not included as a dependent variable in this specification as it is constant for each CBSA pair and spanned by the acquirer CBSA-target CBSA fixed effect. Standard errors are two-way cluster-robust by acquirer CBSA and by target CBSA. t-statistics are reported in parentheses. Coefficients marked with ***, **, and * are significant at the 1%, 5% and 10% level, respectively.

	Number of deals (x100)					Log (1 + Deals (×100))				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log (1+Distance$_{ij}$)	−2.72***	-	0.74*	-	-	−1.69***	-	0.35	-	-
	(−10.56)		(1.75)			(−11.64)		(1.38)		
Log (1+Travel Time$_{ijt}$)	-	−5.86***	−7.19***	−3.45***	−2.41**	-	−3.61***	−4.26***	−2.14***	−1.50**
		(−11.24)	(−6.91)	(−2.96)	(−2.46)		(−12.43)	(−6.97)	(−3.09)	(−2.53)
Avg. Log (1+Travel Time$_{ij}$)	-	-	-	−2.50*	-	-	-	-	−1.53*	-
				(−1.81)					(−1.90)	
Fixed effects:										
Acquirer CBSA × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target CBSA × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acquirer CBSA × Target CBSA	-	-	-	-	Yes	-	-	-	-	Yes
N	366 181	366 181	366 181	366 181	366 181	366 181	366 181	366 181	366 181	366 181
R^2	0.12	0.12	0.12	0.12	0.21	0.13	0.13	0.13	0.13	0.20

Table 4
Airline connections and deal activity

This table shows the estimation results for linear semi-saturated fixed effect regression models examining the relationship among merger and acquisition activity and flight connections. The sample consists of all announced deals in the SDC Platinum Mergers & Acquisitions database from 1980 through 2018. Deals must between firms located within a core based statistical area (CBSA) as defined by the U.S. Office of Management and Budget that are located within the continental U.S. Observations are organized by calendar year and acquirer CBSA-target CBSA pairs. The sample consists of CBSA pairs that had a new direct flight connection from the acquirer CBSA to the target CBSA during the sample period, where a direct flight must have had at least 8 directed segments flown in each month of the year. For each sample acquirer (target) CBSA, we find up to ten similar CBSA that have between 0.5 and 2 times the number of deals as the sample CBSA. If there are more than ten similar CBSAs, we choose similar ones based on population differences. We then form cohorts for analysis, where a cohort CBSA pair can run from sample acquirer CBSA to target similar CBSA, acquirer similar CBSA to target CBSA, or from acquirer similar CBSA to target similar CBSAs. All such pairs must be more than 100 miles apart and not directly connected by air travel at any point prior to ten years after the sample connection. The dependent variable in the column (1) specification is *Deals*, defined as the total number of deals announced in a calendar year. The dependent variable in the column (2) specification is *Log(1 + Deals)*. *Treatment* is a time-constant indicator variable that takes the value of 1 for the acquirer CBSA-target CBSA that experiences a new flight connection, and 0 otherwise. *Post* is an indicator variable that equals 1 for all CBSA pairs in the cohort in the year of, and the years following, the flight introduction, and 0 otherwise. *Pre* is an indicator variable that equals 1 two years before and one year before the flight introduction, and 0 otherwise. The fixed effects specification is semi-saturated for our acquirer CBSA, target CBSA, year, and cohort indexed data by forming all interacted triple interactions excluding that which spans the *Treatment* × *Post* variable of interest. Standard errors are two-way cluster-robust by acquirer CBSA and by target CBSA. *t*-statistics are reported in parentheses. Coefficients marked with ***, **, and * are significant at the 1%, 5% and 10% level, respectively.

	Deals (×100)		Log (1 + Deals (×100))	
	(1)	(2)	(3)	(4)
Treatment × Post	2.48***	2.57***	1.53***	1.58***
	(4.52)	(4.84)	(4.44)	(4.65)
Treatment × [-2, -1]	-	0.44	-	0.21
		(0.66)		(0.52)
Average deals in treatment sample:				
[-10, -1]	7.76	-	5.09	-
Normalized effect:				
Treatment × Post / Average [-10, -1]	0.32	-	0.30	-
Fixed effects:				
Acquirer CBSA × Cohort × Year	Yes	Yes	Yes	Yes
Target CBSA × Cohort × Year	Yes	Yes	Yes	Yes
Acquirer CBSA × Target CBSA × Year	Yes	Yes	Yes	Yes
N	1 074 101	1 074 101	1 074 101	1 074 101
R^2	0.43	0.43	0.43	0.43

Table 5
Airline connections and deal activity for completed and non-completed announcements

This table shows the estimation results for specifications examining the relationship among merger and acquisition activity and flight connections for completed and non-completed announcements. The sample and cohort construction procedure, the dependent variable (*Deals*), and the *Treatment* and *Post* indicator variables are as described in table 4. The fixed effects specification is semi-saturated for our acquirer CBSA, target CBSA, year, and cohort indexed data by forming all triple interactions, excluding that which spans the *Treatment* × *Post* variable of interest. Each pair of *Completed* and *Non-Completed* columns forms a systems estimator whereby the $Treatment \times Post$ coefficients and the average deals are estimated simultaneously. The average number of deals for the treatment sample of acquirer CBSAs that are connected to target CBSAs is presented for the ten-year period prior to the connection ([-10, -1]) and the twenty one-year period covering ten-years prior to through ten years after the connection ([-10, +10]). Normalized effects are defined as the increase in the deal activity divided by the pre-connection average ($Treatment \times Post/Average[-10, -1]$). Standard errors are two-way cluster-robust by acquirer CBSA and by target CBSA. t-statistics are reported in parentheses. Chi-squared statistics are reported in square brackets. All such statistics have 1 degree of freedom and account for simultaneity in parameter estimation. Coefficients marked with ***, **, and * are significant at the 1%, 5% and 10% level, respectively.

	Deals (×100)	
	Completed	Non-Completed
	(1)	(2)
Treatment × Post	2.64***	–0.16
	(5.32)	(1.10)
Average deals in treatment sample:		
[-10, -1]	6.38	1.37
Normalized effect:		
Treatment × Post / Average [-10, -1]	0.29***	–0.12
Difference (Friendly − Non-friendly)	0.41***	-
	[12.51]	
Fixed effects:		
Acquirer CBSA × Cohort × Year	Yes	Yes
Target CBSA × Cohort × Year	Yes	Yes
Acquirer CBSA × Target CBSA × Year	Yes	Yes
N	1 074 101	1 074 101
R^2	-	-

Table 6
Airline connections and deal activity by sample period

This table shows the estimation results for specifications examining the relationship among merger and acquisition activity and flight connections for 1980-1999 and 2000-2018 announcements. The sample and cohort construction procedure, the dependent variable (*Deals*), and the *Treatment* and *Post* indicator variables are as described in table 4. The fixed effects specification is semi-saturated for our acquirer CBSA, target CBSA, year, and cohort indexed data by forming all triple interactions, excluding that which spans the *Treatment* × *Post* variable of interest. Each pair of *1980-1999* and *2000-2018* columns forms a systems estimator whereby the $Treatment \times Post$ coefficients and the average deals are estimated simultaneously. The average number of deals for the treatment sample of acquirer CBSAs that are connected to target CBSAs is presented for the ten-year period prior to the connection ([-10, -1]) and the twenty one-year period covering ten-years prior to through ten years after the connection ([-10, +10]). Normalized effects are defined as the increase in the deal activity divided by the pre-connection average ($Treatment \times Post/Average[-10, -1]$). Standard errors are two-way cluster-robust by acquirer CBSA and by target CBSA. *t*-statistics are reported in parentheses. Chi-squared statistics are reported in square brackets. All such statistics have 1 degree of freedom and account for simultaneity in parameter estimation. Coefficients marked with ***, **, and * are significant at the 1%, 5% and 10% level, respectively.

	Deals (×100)	
	1980-1999	2000-2018
	(1)	(2)
Treatment × Post	3.80***	1.64**
	(4.94)	(2.12)
Average deals in treatment sample:		
[-10, -1]	5.39	9.80
Normalized effect:		
Treatment × Post / Average [-10, -1]	0.43***	0.15**
Fixed effects:		
Acquirer CBSA × Cohort × Year	Yes	Yes
Target CBSA × Cohort × Year	Yes	Yes
Acquirer CBSA × Target CBSA × Year	Yes	Yes
N	-	-
R^2	-	-

Table 7
Airline connections and deal activity for private and public firms

This table shows the estimation results for specifications examining the relationship among merger and acquisition activity and flight connections for private and public firms. The sample and cohort construction procedure, the dependent variable (*Deals*), and the *Treatment* and *Post* indicator variables are as described in table 4. The fixed effects specification is semi-saturated for our acquirer CBSA, target CBSA, year, and cohort indexed data by forming all triple interactions, excluding that which spans the *Treatment* × *Post* variable of interest. Each pair of *Private* and *Public* columns forms a systems estimator whereby the $Treatment \times Post$ coefficients and the average deals are estimated simultaneously. The average number of deals for the treatment sample of acquirer CBSAs that are connected to target CBSAs is presented for the ten-year period prior to the connection ([-10, -1]) and the twenty one-year period covering ten-years prior to through ten years after the connection ([-10, +10]). Normalized effects are defined as the increase in the deal activity divided by the pre-connection average ($Treatment \times Post/Average[-10, -1]$). Standard errors are two-way cluster-robust by acquirer CBSA and by target CBSA. *t*-statistics are reported in parentheses. Chi-squared statistics are reported in square brackets. All such statistics have 1 degree of freedom and account for simultaneity in parameter estimation. Coefficients marked with ***, **, and * are significant at the 1%, 5% and 10% level, respectively.

	Deals (×100)					
	Acquirer		Target		Acquirer & Target	
	Private	Public	Private	Public	Private	Other
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment × Post	1.65***	0.83**	2.21***	0.26	1.58***	0.89**
	(5.06)	(1.98)	(4.82)	(1.39)	(5.12)	(2.09)
Average deals in treatment sample:						
[-10, -1]	3.06	4.70	6.53	1.22	2.67	5.08
Normalized effect:						
Treatment × Post / Average [-10, -1]	0.36	0.14	0.25***	0.18	0.39***	0.14**
Difference (Private − Public)	0.22**	-	0.07	-	0.25**	-
	[5.22]		[0.29]		[6.55]	
Fixed effects:						
Acquirer CBSA × Cohort × Year	Yes	Yes	Yes	Yes	Yes	Yes
Acquirer CBSA × Cohort × Year	Yes	Yes	Yes	Yes	Yes	Yes
Acquirer CBSA × Cohort × Year	Yes	Yes	Yes	Yes	Yes	Yes
N	1 074 101	1 074 101	1 074 101	1 074 101	1 074 101	1 074 101
R^2	-	-	-	-	-	-

Table 8
Airline connections and deal activity for friendly and non-friendly announcements

This table shows the estimation results for specifications examining the relationship among merger and acquisition activity and flight connections for friendly and non-friendly announcements. The sample and cohort construction procedure, the dependent variable (*Deals*), and the *Treatment* and *Post* indicator variables are as described in table 4. The fixed effects specification is semi-saturated for our acquirer CBSA, target CBSA, year, and cohort indexed data by forming all triple interactions, excluding that which spans the *Treatment* × *Post* variable of interest. Each pair of *Friendly* and *Non-friendly* columns forms a systems estimator whereby the $Treatment \times Post$ coefficients and the average deals are estimated simultaneously. The average number of deals for the treatment sample of acquirer CBSAs that are connected to target CBSAs is presented for the ten-year period prior to the connection ([-10, -1]) and the twenty one-year period covering ten-years prior to through ten years after the connection ([-10, +10]). Normalized effects are defined as the increase in the deal activity divided by the pre-connection average ($Treatment \times Post/Average[-10, -1]$). Standard errors are two-way cluster-robust by acquirer CBSA and by target CBSA. *t*-statistics are reported in parentheses. Chi-squared statistics are reported in square brackets. All such statistics have 1 degree of freedom and account for simultaneity in parameter estimation. Coefficients marked with ***, **, and * are significant at the 1%, 5% and 10% level, respectively.

	Deals (×100)	
	Friendly	Non-friendly
	(1)	(2)
Treatment × Post	2.56***	–0.08
	(4.97)	(1.12)
Average deals in treatment sample:		
[-10, -1]	7.45	0.31
Normalized effect:		
Treatment × Post / Average [-10, -1]	0.25***	–0.24
Difference (Friendly − Non-friendly)	0.50**	-
	[4.88]	
Fixed effects:		
Acquirer CBSA × Cohort × Year	Yes	Yes
Target CBSA × Cohort × Year	Yes	Yes
Acquirer CBSA × Target CBSA × Year	Yes	Yes
N	1 074 101	1 074 101
R^2	-	-

Table 9
Airline connections and deal activity for diversifying and non-diversifying announcements

This table shows the estimation results for specifications examining the relationship among merger and acquisition activity and flight connections for diversifying and non-diversifying announcements. The sample and cohort construction procedure, the dependent variable (*Deals*), and the *Treatment* and *Post* indicator variables are as described in table 4. The fixed effects specification is semi-saturated for our acquirer CBSA, target CBSA, year, and cohort indexed data by forming all triple interactions, excluding that which spans the *Treatment* × *Post* variable of interest. Each pair of *Diversifying* and *Non-diversifying* columns forms a systems estimator whereby the $Treatment \times Post$ coefficients and the average deals are estimated simultaneously. The average number of deals for the treatment sample of acquirer CBSAs that are connected to target CBSAs is presented for the ten-year period prior to the connection ([-10, -1]) and the twenty one-year period covering ten-years prior to through ten years after the connection ([-10, +10]). Normalized effects are defined as the increase in the deal activity divided by the pre-connection average ($Treatment \times Post/Average[-10, -1]$). Standard errors are two-way cluster-robust by acquirer CBSA and by target CBSA. *t*-statistics are reported in parentheses. Chi-squared statistics are reported in square brackets. All such statistics have 1 degree of freedom and account for simultaneity in parameter estimation. Coefficients marked with ***, **, and * are significant at the 1%, 5% and 10% level, respectively.

	Deals (×100)	
	Diversifying	Non-diversifying
	(1)	(2)
Treatment × Post	1.46***	1.01***
	(4.10)	(3.81)
Average deals in treatment sample:		
[-10, -1]	3.73	4.02
Normalized effect:		
Treatment × Post / Average [-10, -1]	0.28***	0.19***
Difference (Diversifying − Non-diversifying)	0.09	-
	[1.93]	
Fixed effects:		
Acquirer CBSA × Cohort × Year	Yes	Yes
Target CBSA × Cohort × Year	Yes	Yes
Acquirer CBSA × Target CBSA × Year	Yes	Yes
N Observations	1 074 101	1 074 101
N Cohorts	1 074 101	1 074 101
R^2	-	-