International Trade and the Propagation of Merger Waves[*]

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Cross-border merger activity is growing in importance. We map the global trade network each year from 1989 to 2014 and compare it to cross-border and domestic merger activity. Trade-weighted merger activity in trading partner countries has statistically and economically significant explanatory power for the likelihood a given country will be in a merger wave state, both at the cross-border and the domestic levels, even controlling for its own lagged merger activity. The strength of trade as a channel for transmitting merger waves varies over time and is affected by import tariffs cuts, Euro, EU, EEA, and WTO entry. Overall, the full trade network helps our understanding of merger waves and how merger waves propagate across borders.

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1. Introduction

Recent contributions in the mergers and acquisition literature have begun to explore the rich panel of international data. Earlier papers studying cross-border acquisitions like Rossi and Volpin (2004) have been joined by Erel, Liao and Weisbach (2012) and Makaew (2012), who attempt to better understand the dynamics of cross-border acquisitions. Erel, et al. (2012) and Makaew (2012) both find broad support for neo-classical explanations that highly productive firms will buy less productive firms and that the data reveal the potential for financial conditions such as local stock market conditions or exchange rate differences to increase merger activity. They also find support for gravity-model explanations for activity based on geographic proximity, total trade and culture. Ahern, Daminelli and Fracassi (2015) demonstrate the role of culture in explaining who merges with whom. At the same time, other studies such as Ahern and Harford (2014) have examined how the network of specific industry-level trade relationships helps explain domestic U.S. acquisition activity. In this paper, we apply the network techniques of that study to international data in order to answer the question of how merger activity transmits across countries through trade links.

Specifically, we use country and industry-level import and export data from 1989 to 2014 to build a network representation of global trade flows. We then compare and combine this network with all domestic and cross-border mergers over the same period from the Thomson Financial SDC dataset. As expected, there is substantial correlation between the trade network and cross-border activity, confirming prior results based on bilateral flows and gravity models. Correlated cross-border activity also strongly predicts domestic merger activity, emphasizing the economic importance of the phenomenon. We further show that the most central countries in the trade network significantly overlap with the most central countries in the merger network. The few countries that are relatively central in the trade network, but not in the merger network, tend to have significant barriers to foreign direct investment and/or poor legal development. A comparison of the structure of the trade and merger networks between the years 1989, 2000 and 2014 also reveals fundamental changes, in particular a strong densification trend of both networks through time.

After establishing the overall concordance between the two networks, we turn to understanding the dynamics of how merger activity spreads around the world. To do so, we build year-by-year measures of the intensity of merger and acquisition (M&A) activity in a given country or country-industry, both at the cross-border and the domestic levels. We then test whether we can explain when a subject country or country-industry engages in high merger activity[1] using the trade network-weighted intensity of Ŏ ƻ ɣ ɣ Ŝ Ŏ ű Ŝ Ř merger activity Ŏ ƻ dz ɣ ű NJ ƛ Ŝ ă Ω. We show that, controlling for other factors, the intensity of M&A activity in countries that have significant trade with the subject country strongly explains merger activity in the subject country. Further, this holds when we repeat this at the country-industry level rather than the country-level. For example, consolidation in an industry in the U.S. w generate follow-on activity involving a trade partner industry in Germany. This adds to the forces explaining merger activity as well as providing an explanation for why merger waves are correlated across countries, creating global merger waves. Merger activity along trade relationships transmits to both further cross-border mergers as well as purely domestic mergers, emphasizing the economic importance of these interactions.

In the next part of our study, in an effort to identify causal relations, we ask how shocks to trade relationships affect real cross-border and domestic investment in the form of mergers and acquisitions. Our sample period spans many major tariff cuts, a substantial source of increase in global trade, and the admission to membership in the Eurozone, European Union (EU), European Economic Area (EEA) and World Trade Organization (WTO) for many countries. We find that general (not country-pair specific)

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country over the sample period.

import tariff cuts strongly amplify effects of trade-weighted M&A intensity in connected countries on cross-border and domestic mergers activity in the subject country under consideration. Euro adoption leads to same conclusions. EU and EEA accession generate significant results but only for cross-border M&A activity, as it is the case also for countries joining the WTO (in this latter case, some results are also significant for domestic mergers activity).

For example, after entering the Euro zone, the marginal impact of an increase in connected countries' trade-weighted M&A intensity on a subject country's probability to shift into a high cross-border M&A state is increased by 68% (when using the number of M&A transactions as measure of M&A intensity). Similarly, when a subject country enters into the WTO, its cross-border merger activity becomes much more sensitive to activity in countries it trades with (the marginal impact of a change in the connected countries trade-weighted M&A intensity is multiplied by seven).

The time variation in the trade and merger network structures suggests that our results may themselves change in intensity through time. We explore this issue first by identifying periods containing a global merger wave (1989, 1995-2001, 2004-2008 and 2014) and replicating our multivariate analyses in and out of periods with a wave. The spillover of merger activity through trade relations is due to periods with waves. We then study four subperiods based purely on time (1989-1994, 1995-2001, 2002-2008, 2009-2014). Consistent with reduced importance of the trade network in the earlier periods, the spillover effects appear to be mainly present during the 1995-2001 and 2002-2008 periods. Absence of significance in the earliest period may be explained by the limited density of the merger and trade networks at that time. The latest period follows the 2008 financial crisis and absence of significance likely related to the lack of a global merger wave during this period along with reduced trade activity.

We present a set of additional analyses. We start by exploring whether trade relations and location in the trade network help to predict future cross-border M&A activity. We develop this analysis at the country-pair level Our results highlight that the lagged ă dz ō Ƨ Ŝ Ŏ ű Ω ă ƛ ƳLJ ƻ NJ ű ă Ŧ NJ ƻ country are a strong predictor of cross-border M&A volume of the subject country with the connected country, both inbound (the acquirer is from the connected country) and outbound (the acquirer is from the subject country) merger activity Moreover, location in the network (the ă dz ō Ƨ Ŝ Ŏ ű Ω ă centrality) strengthens this predictive power. These findings hold true even after controlling for country-pair fixed effects and a set of time-varying country characteristics. We then complement this investigation by a Granger causality test to determine whether it is really trade flows that drive merger activity and not the reverse. The Granger causality test provides clear support to this interpretation. We finally explore whether our country industry-level analyses survive to keeping only manufacturing industries, as raw material, food, and other comparable industries are potentially less prone to be related to merger activity and find that the results hold in the manufacturing subsample.

Our study makes several contributions. First, we contribute to the broad literature on the causes and consequences of mergers and acquisitions. Much of this research has focused on explaining the motivations behind individual mergers (see Betton et al., 2008, for an extensive review) and their value implications. More closely related to our work, some authors have studied the timing of merger activity, whether at the industry or aggregate level, and its tendency to cluster in ‑sŎ ŀ ƒ ƒ Ŝ Ř Beginning Ŝ ă Φ έ with Mitchell and Mulherin (1996), and continuing with the work of Shleifer and Vishny (2003), Rhodes Kropf, Robinson and Viswanathan (2005), Harford (2005), and Ahern and Harford (2014), a stream of papers have added to our understanding of the forces that cause a merger wave to continue and then to propagate through the economy along industry connections. We extend this literature by establishing how merger waves propagate across borders and by estimating how much of a given country and ƛ ƴ Ř dz ă ű NJ è Ω ă Ƴ Ŝ NJ Ǝ Ŝ NJ ŀ M&A intensity in trade partners Ŝ Ŝ ÈLJ ƒ ŀ ƛ ƴ Ŝ Ř ō è

Second, there is a deep literature studying foreign direct investment. Many of these papers make use of gravity models which relate the amount of investment between two countries to the economic size of the two countries and measures of distance, which can be geographical, cultural or otherwise (e.g. Portes and Rey (2004), Chan, Covrig and Ng (2005), di Giovanni (2005), Siegel, Licht and Schwartz (2011)). We add to this literature by incorporating network-level information into our models to explain mergers and acquisitions as one important form of FDI. Specifically, we use a country or country-ƛ ƴ Řdz ă ű NJ è Ω ă Ŏ Ŝ ƴ ű Further, by using all of the connections in a trade-weighted approach, we are effectively accounting for all of the potential sources of gravity, rather than evaluating effects in a pair-by-pair setting.

Overall, our work furthers our understanding of how merger activity spreads globally along trade lines. In particular, assuming a continued trend toward increased connectivity through trade, the trade network will become increasingly dense. Our results suggest that this will lead to a larger portion of a given country-ƛ ƴ Řdz ă ű NJ è Ω ă Ƴ Ŝ NJ ∃ Ŝ NJ ŀ Ŏ ű ƛ Ǿ ƛ ű è ō Ŝ ƛ ƴ ∃ ƛ ƴ Ŧ ƭ dz Ŝ ƴ Ŏ Ŝ Ř

2. Data

We employ two primary datasets: one covering trade data and another covering mergers. The trade data come from the UN ComTrade database, which provides data on imports and exports for different commodity classifications BEC (Broad Economic Categories), HS (Harmonized System) and SITC (Standard Industrial Trade Classification). The data starts from as far back as 1962 depending on the commodity classification. Since our analysis is based on country level and industry level, for consistency purposes, we choose SITC Rev.3 (revision 3) commodity classification for both country and industry levels. This allows us to convert SITC Rev.3 into ISIC Rev.3 (revision 3 of international standard industrial classification)[2]. The data on SITC Rev.3 starts in 1988. One limitation of the ComTrade database is that imports/exports data do not start for all countries from 1988 and countries join the list along the years. The most notable examples are United States and Germany for which the data is available from 1989 and 1991 respectively. We decide therefore to choose 1989 as the starting year of our analysis period. We have imports and exports between 100 countries from 1989 to 2014 and we are able to exclude re-imports and re-exports. We have the data at both the country level and the industry level. Panel A of Table 1 describes the trade data.

The international trade network contains very few missing edges: within the top 100 countries, there are very few pairs of countries with literally no trade between them. The mean percentage of imports or exports for a country-pair is about 1.2%, and among country-pairs accounting for at least 1% ƨ ƴ Ŝ ƨ Ŧ ű Ķ Ŝ LJ ŀ NJ ű ƴ Ŝ about 0.5% ű NJ ŀ Ř Ŝ Σ ű Ķ Ŝ ŀ Ƴ ƨ dz ƴ ű ƛ ă

h dzNJ Ƴ Ŝ NJ Ǝ Ŝ NJ Ř ŀ ű ŀ Ŏ ƨ Ƴ Ŝ Ŧ NJ ƨ Ƴ ¢ Ķ ƨ Ƴ ă ƨ ƴ all cross-border Ŏ ƛ ŀ f Ω ă mergers between the 100 UN ComTrade countries from 1989 to 2014. A country must have at least 1 cross-border merger per year or 26 mergers over span of 26 years. We include deals classified as Ψ / ƨ ƳLJ f Ŝ ŴŜ ƛ Ř ĸ Ř where the acquirer and target status is either public, private or subsidiary. We exclude transactions where the transaction value is missing. We also exclude acquisitions of partial interest, buybacks, recapitalizations, and exchange offers. These filters yield a sample of 45,089 transactions worth $14.616 trillion across 70 countries. Panel B of Table 1 presents summary statistics for the merger dataset and Figure 1 graphs it.

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[2] Data on mergers and acquisitions reported in SDC are identified as US standard industrial classification (SIC) 1987 and no direct correspondence is available between SITC and SIC codes. However, we can convert SITC Rev.3 and US SIC 1987 to common ISIC Rev.3. European Commission provides the correspondence table between SITC Rev.3 and ISIC Rev.3, and US SIC 1987 and ISIC Rev.3. The correspondence tables are extracted directly from the European Commission website.

The graph shows the familiar merger waves of the 1990s and 2000s and establishes that the well-studies U.S. merger waves coincide with those of the rest-of-the-world. Panel B of Table 1 summarizes the pairwise connections in the panel. The cross-border merger network is considerably sparser than the trade network. In fact, 60% of country-pairs have no recorded mergers between them. The average pairwise merger activity is 9 transactions worth $4.2 billion. As is to be expected in the context of mergers and a sparse network, the data are skewed, with the 95th percentile of pairs having 29 mergers and the maximum being 6,625 (Canadian acquisitions in the United States[1]), followed by 2,548 (United Kingdom acquisitions in United States, unreported). Panel B of Table 1 also reports corresponding figures for cross-border and domestic mergers. As expected, domestic mergers represent the largest portion of the merger market activity with 157,895 transactions in our sample but the share of cross-border mergers is sizeable (45,089 transactions).

We collect additional information needed for control variables in the DataStream database (for currency exchange rates), in the ICRG Political Risk Guide for investment profile and quality of institutions, from the World Bank for indicators such gross domestic product (GDP) and import tariffs, the European Commission internet site for EU and EURO zone entries and from the World Trade Organization (WTO) internet site for WTO accession years.

3. The Trade and Merger Networks

Part of our contribution is descriptive: documenting the global trade and merger networks over time. To do so, we use network visualization software (Gephi) to create figures representing snapshots of the networks at various points during our sample period.

3.1 The Trade Network over Time

We begin with a discussion of the trade network. Figure 2, subfigures A through C show the export network based on dollar value of exports in 1989, 2002 and 2014, respectively. Comparing across the subfigures, it is clear that the trade network has become denser over time with greater value of goods flowing through it. While many of the same countries remain the largest nodes in the network, the relative size of the next two tiers increases as more countries develop and increase their trade with the rest of the world. While we do not show it here, similar inferences can be drawn from the import network.

3.2 The Merger Network over Time

Figure 3, subfigures A through C present the visualizations of the merger network. Again, one can see the increasing density of the cross-border merger network through time. While the U.S. and Great Britain remain the largest nodes, the relative size of other countries increases over time, just as in the trade network. In comparison with the trade network visualization provided in Figure 3, the sparsity of the merger network is also clearly apparent.

In the remaining sections, we compare the sample-long networks of merger and trade activity. We also use the year-by-year trade network centrality measures to explain the dynamics of merger activity around the world.

3.3 Comparing the Networks

Figures 2 and 3 allow one to visually compare the networks and draw conclusions about their similarities. In Panel A of Table 2, we list the 15 most central countries in the import, export and merger networks. It is immediately clear that many countries appear on all three lists. We note that the countries appearing on the import or export lists but not appearing (or appearing in the last positions) on the mergers list tend to have barriers to FDI or poor legal development (e.g. Russia and China)[3]. In Appendix 1 we provide the corresponding lists for years 1989, 2002 and 2014 because figures 2 and 3 highlight how the trade and merger networks change through time. Noteworthy in the export lists is the rise of China, which ranks number one in 2014, ahead of the United States. China's rise goes hand-in-hand with the global rise of Asiatic countries. In the 2014 top-15 countries' list, Japan, South Korea, Hong Kong and Singapore appear in addition to China, six countries altogether or forty percent of the list. The import lists also show the rise of China (from absence in 1989 to second in 2014). Another noteworthy fact is the appearance of India in the 2014 list (ranked thirteenth), another sign of the changing structure of Asiatic country economies. The merger lists confirm the steady if unsurprising central role of the United States and the United Kingdom in cross-border activities. Maybe more unexpected is the rise of Hong-Kong, from absence in 1989 to the third one in 2014, probably by acting as an entry to Asiatic countries (the main destination country of cross-border acquisitions from Hong Kong is China, by far).

We formally compare the three networks by computing the correlation of the centralities of countries in each network and present the results in Panel B of Table 2. For this exercise, we consider both degree and eigenvector centrality. The centralities of countries in the import and export network are extremely highly correlated (> 0.94). When comparing the import or export networks with the merger networks, we see that while far from the near perfect correlation between the trade networks, the correlations are still quite high, ranging from 0.43 to 0.59. These formal correlations serve to confirm what can be seen informally in the figures and in Panel A of Table 2.

4. The Propagation of Merger Activity through the Trade Network

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[3] The Heritage Foundation ranks Russia and China 144 and 153 respectively among 186 countries around the world on their economic freedom index in 2016. The economic freedom index comprises of four sub-components (1) Rule of Law (property rights, freedom from corruption); (2) Limited Government (fiscal freedom, government spending); (3) Regulatory Efficiency (business freedom, labor freedom, monetary freedom); and (4) Open Markets (trade freedom, investment freedom, financial freedom). For more details on the subcomponents, see http://www.heritage.org/index/about

4.1 Country-level merger activity

Our primary empirical tests are designed to establish the degree to which merger activity in separate countries propagates along trade links. Our independent variable of interest, $ConnectedM\&A$, is the trade-weighted merger activity in connected countries. We use information from the entire network of trade data, weighting merger activity in each country (the nodes) by the amount of trade they do with the subject country (their edges connecting them to the subject country). $ConnectedM\&A$ is therefore computed as:

$$ConnectedM\&A_{it} = \sum_{j \neq i} w_{ijt} \times M\&A_{jt} \qquad (1)$$

where i and j are subject and connected country respectively, t is the year, w_{ijt} is a weighting term based on trade flows between i and j at year t and $M\&A_{jt}$ is the measure of M&A intensity in country j and year t (either count based or value based, depending on the weighting scheme adopted to compute the dependent variable). For each country i and at each time period t, four $ConnectedM\&A_{it}$ variables can be computed, depending on the trade flows used to compute w_{ijt}:

- Subject Imports from Connected: w_{ijt} is the percentage of country *i*'s imports that come from country j;
- Connected Imports from Subject: w_{ijt} is the percentage of country j's imports that come from country i;
- Subject Exports to Connected: w_{ijt} is the percentage country i's exports that go to country j;
- Connected Exports to Subject: w_{ijt} is the percentage of country j's exports that go to country i.

Because the $ConnectedM\&A$ variables display strong right skewness, a consequence of the relative sparsity of the merger network (see Panel B of Table 1), we winsorize them at 2.5% in the right tail.

Using ὅἑὲὲὨὢὸὨὨ ὒῼὂ, we study the probability that a given country ὶ will be in ὋὛὨὨ ὒῼὂ ὙὸὥὸὨ in year ὸ, defined as ῥ Ḱ Ŝ Ŏ ≥ dz ỿ ῥ Ǌ ὲ Ω ă (the number or the dollar value of merger transactions) being in the highest quartile of all values for that country over the sample period in the year under consideration. The ὋὛὨὨ ὒῼὂ ὙὸὥὸὨ is computed for cross-border mergers and for domestic mergers separately. Our main specification also includes the eigenvector or degree centrality of the subject country in year ὸ (ὅὨὲὸὶὥὰὨὸὡ), interactions between centrality and aggregate worldwide merger activity (ὒῼὂ ὂὢὸὨὺὨὸὡ), the lagged value of the dependent variable (ὋὛὨὨ ὒῼὂ ὙὸὥὸὨ) to account explicitly for country-level merger waves, and a set of country-level time-varying control variables (ⱶ▫▪◂▸▫▮▾)[4]. This leads to the following regression equation:

ὋὛὨὨ ὒῼὂ ὙὸὥὸὨ = ὅ + ὋὛὨὨ ὒῼὂ ὙὸὥὸὨ + ὅἑὲὲὨὢὸὨὨ ὒῼὂ + ὅὨὲὸὶὥὰὨὸὡ

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Bold type face is used to indicate vectors. Because our data form a panel and all of our specifications include country fixed effects (and standard errors are clustered at the country level), we use the least square dummy variable estimator. All specifications also include year fixed effects. Our primary empirical tests are designed to establish the degree to which cross-border and domestic merger activity in connected countries propagates along trade links.

The first set of results is presented in Table 3 where we report estimates of Equation (2) over the sample period for cross-border mergers using the number of M&A transactions as measure of M&A intensity in Panel A and the aggregate value of M&A transactions in Panel B. Panels C and D report

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[4] Time-varying country level control variables include GDP, GDP Growth, GDP Per Capita, Investment Profile, Quality of Institutions and exchange rate based variables. Exchange rates based variables are computed similarly to ὅἑὲὲὨὢὸὨὨ ὒῼὂ, using exchange rates expressed as one subject currency unit in connected currency units and the same weighting scheme as ὅἑὲὲὨὢὸὨὨ ὒῼὂ. The ὅἑὲὲὨὢὸὨὨ ὈὼὢὨὥὲὨὨ ὙὥὸὨ ὈὶἑὺὸὨ variable is the weighted average of the end-of-year to end-of-year relative change in the exchange rate and the ὅἑὲὲὨὢὸὨὨ ὈὼὢὨὥὲὨὨ ὙὥὸὨ ὡἑὥὸὰὶὰὸὡ is the corresponding standard deviation of the monthly exchange rates over a period of 36 months.

corresponding estimations for domestic mergers. For cross-border mergers, using the number of M&A transactions (Panel A), the results support our hypothesis: all measures of trade-weighted M&A activity load positively for explaining a High M&A State whether using degree centrality or eigenvector centrality to characterize of the subject position in the trade network. The effects are strongest (both in terms of coefficient values and statistical significance) for Subject Imports from Connected and Subject Exports to Connected. These variables are defined such that they are large when the subject country imports or exports a substantial portion of its total imports or exports to countries that are undergoing merger waves. Thus, they capture times when countries that are important to the subject country are undergoing substantial merger activity. The other two trade-weighted variables capture when the connected countries import or export a large portion of their total imports or exports from the subject country. Thus, they capture times when the subject country is important to the connected countries undergoing variation in merger activity, but not necessarily vice-versa.

Our specification controls for the lagged value of the cross-border M&A State variable, which also loads positively, a result confirming the presence of merger waves in international data (Makaew, 2012). The coefficients on the interactions between centrality measures and aggregate M&A activity are positive and significant in 5 out of the 6 specifications. This is consistent with countries that are more central in the overall global trade network to be more likely to be undergoing cross-border merger waves when there is a global merger wave. This result is consistent with the findings in Ahern and Harford (2014), who show that aggregate merger waves in the U.S. coincide with high merger activity in the most central industries in the economy. They explain how once a shock causes merger activity in a central industry, it can quickly cause merger activity in many connected industries, creating an aggregate merger wave. The same mechanism appears to be at work at the international level.

Finally, the importance of trade connections for propagating merger waves is robust to changes in exchange rate growth, their volatility, to both time-varying and time-invariant country characteristics, such as the quality of financial institutions and GDP growth, the latter having a positive effect on cross-border merger activity on its own. Our country fixed-effects absorb time-invariant country characteristics and our year fixed-effects absorb shocks affecting the cross-section of countries in a given year

In Panel B, we use the aggregate value of M&A transactions as measure of M&A activity intensity. Results are qualitatively comparable to results reported in Panel A. In Panels C and D, we replicate the analysis using domestic mergers to compute the ῎Ὸ῝Ώ῞Ώ ΰϘӧ ῝Ὺὸὤὸ῾Ώ dependent variable. Results are similar to the results obtained using cross-border mergers, and in many places are statistically stronger. Taking into account the importance of domestic mergers in overall merger activity, this emphasizes the economic importance of the results uncovered for cross-border mergers.

We replicate Table 3 results for total merger activity (the sum of cross-border and domestic activity). Results (unreported) are similar to results reported in Table 3.

4.2 Industry-level activity

In this section, we refine the unit of observation to the country-industry-year level. In doing so, we investigate whether the trade-based channel holds because our trade measures are aggregated at the country level or are driven by the industry level of analysis. Turning to Table 4, Panels A and B replicate Panels A and B of Table 3 (cross-border mergers analysis) at the country-industry-year level and Panels C and D replicate Panels C and D of Table 3 (domestic mergers analysis). The importance of connected countries' industry-specific M&A activity in predicting a High M&A State is confirmed for both cross-border and domestic mergers (ὅέὲὲ῾Ώὦ̃ὸ῾Ώ῾Ώ ΰϘӧ variables load positively and statistically significantly in almost all specifications.) These results are strongly consistent with results obtained at the country level (Table 3) and support the economic linkage interpretation of the results, while providing evidence that our country-level results are driven by the aggregation of industry-level effects.

We also observe in Table 4 (Panels A to D) that interactions between centrality measures (whether degree of centrality or eigenvector centrality) and aggregate M&A activity are no longer statistically significant. We infer that the amplification effect of country centrality in the diffusion of aggregate M&A activity is too disaggregated at the country-industry level to remain significant.

4.3 Trade Shocks

Having established the baseline impact of trade on propagating merger activity across countries, we now turn to the effect of shocks to trade relationships by examining the effect of import tariff cuts, Euro adoption, entry in the EU and in the EEA, and the decision to join the WTO. Our goal is to confirm the causal nature of the relation between cross-border merger activity and trade flows. While these various trade-related shocks are at least partially Ŝ ƴ Ř ƻ ∃ Ŝ ƴ ƻ dz ă ƛ ƴ ű K Ŝ ă Ŝ ƴ ă Ŝ ű K ŀ ű chooses to make these changes, they are still informative for our purposes. First, the process leading up to each change is lengthy and so the government is not timing the effective date of the change to coincide with some underlying merger process. Further, the motivations for making these changes is broad-based, reflecting a deepening economic relationship between the subject country and the countries already in the trading bloc. As our purpose is to establish that these economic connections, which we use trade flows to identify, allow and explain how merger activity in one nation propagates to others, studying the change in the strength of the effect after each of these imposed shocks is very informative. C ƛ ƴ ŀ f f ȅ Σ LJNJ ƻ Ƴ ƻ ű ƛ ƴ ∃ Ƴ Ŝ NJ ∃ Ŝ NJ ă ƛ ă LJNJ ƻ ō ŀ ō f ȅ ƴ ƻ ű ű decisions such as adopting the Euro or accessing to EU and EEA. In this sense, these shocks are largely exogenous with respect to M&A activity.

For each shock to trade relationships, we modify our main specification to include the shock and an interaction between the shock and our trade-weighted M&A variable. We present the results in Table 5, based only on weighting the trade connections using Subject Import from Connected, for parsimony. Recall, this weighting scheme gives larger weights to countries that are important to the subject country because it imports a substantial fraction of its total imports from them. Panels A to E are dedicated to import tariff cuts, Euro adoption, EU and EEA entries and WTO accession respectively. In each Panel, we report results for cross-border mergers (Columns 1 to 4) and domestic mergers (Columns 5 to 8). Columns 1, 2, 5 and 6 use the number of transactions as the measure of M&A intensity and Columns 3, 4, 7 and 8, the aggregate deal value

We collect import tariff cuts from the World Bank Indicators and identify large tariff cuts as tariff cuts that are five times as high as the average tariff cuts for the country under consideration during our analysis period. Results reported in Panel A of Table 5 indicates that, in themselves, tariff cuts reduce the likelihood of a High Merger State for the subject country, but increase the effect of the connected Ŏ ƨ dz ƴ ű NJ ƛ-weighted merger activity on its own merger activity. Results are statistically highly significant for both cross-border mergers and domestic mergers (with the exception of the negative effect of tariff shocks in the case of domestic mergers and the use of aggregate transaction value as measure of M&A intensity).

Panels B to E focus on entry in the Eurozone, EU, EEA and WTO respectively. In each case, we take accession into account up to end of 2011 so as to let time for real economic effects of such shock on trade-flows to materialize (e.g., Russia is excluded from our sample of WTO accession because it joined the WTO in August 2012). Like for import tariff cuts, adopting the Euro reduces the likelihood of a High Merger State for the subject country, but ƴ ŎNJ Ŝ Ɨ ă Ŝ ă ű K Ŝ Ŝ Ŧ Ŧ Ŝ Ŏ ű ƨ Ŧ ű K Ŝ Ŏ weighted merger activity on its own merger activity. Results are statistically highly significant. Entries in the EU and EEA generate comparable negative effects on the likelihood of a High Merger State for the ădzōƧŜŎű Ŏƻdzƴ űNJè ōdzű űKŜ LJƻăƛűƛǾ-weighted merger activity űKŜ shows up only in the case of cross-border mergers. A more general reduction in trade barriers occurs when a country joins the WTO, which is what we study in Panel E. The results are qualitatively similar to what we find in previous experiments for the case of cross-border mergers.

We conclude from the import tariff cuts, Euro, EU, EEA and WTO experiments that merger lŎűƛǾƛűè ƛƴ l-partners propagates along those trade links and the effect becomes stronger after it joins a free-trade zone with its major trading partners, especially when cross-border merger activity is used a measure of M&A intensity.

4.4 The Interaction of Trade and Global Merger Waves

It is clear from the foregoing analysis that trade connections are an important conduit that transmits merger activity from country to country. This transmission helps us understand how merger activity clusters and aggregates to produce the global merger waves observed in Figure 1. A natural question, which we address in this section, is whether trade connections are as important outside a wave as inside a wave. It is an empirical question as to which direction the comparison goes. While trade connections clearly have a role in starting waves, once the wave starts, activity could progress along traditional lines. Further, it could be the case that links are most important outside of merger waves because non-wave cross-border mergers will only happen along established trade links. Alternatively, it can be the case that the importance of trade connections in starting the wave continues through the wave, so that trade connections are critical to understanding which mergers happen during aggregate waves, but not as important in the one-off mergers that happen outside of the waves.

To answer the question, we divide our full sample period into two subsamples based on whether the year was part of a wave or not. The wave sample contains the years 1989, 1995-2001, 2004-2008, and 2014. The non-wave sample contains all the other years. We present the analysis in Table 6.

Panel A of Table 6 presents the results based only on the periods containing aggregate waves for the case of cross-border mergers and the use of number of transactions as measure of M&A activity intensity. It is clear that trade connections are highly significant, both statistically and economically. Interactions between centrality and aggregate M&A activity play a role only when adopting the subject point of view (Columns 1, 3, 5 and, 7). An increase in the *Connected M&A: Subject Imports from Connected* variable from its first to its fourth quartile value typically increase the probability of being in a high M&A state by more than 19%. b ƨ ǘ Ŝ ǘ Ķ ŀ ǘ ǿ Ŝ Ŏ ƨ ɯ ǘ ƛ ɯdz Ŝ ǘ ƨ Ŏ ƨ ɯ ǘ NJ ƨ ŧ wave state, so the influence of trade connections is incremental to the existence of a merger wave.

Panel B of Table 6 presents corresponding results (cross-border mergers using number of transactions as the measure of M&A activity) for the subperiods that do not contain an aggregate merger wave. The results stand in stark contrast to those for the aggregate wave periods none of the trade connection variables load significantly. Only the results highlighting the importance of centrality for the effect of aggregate M&A activity are maintained. Comparing Panels A and B, we conclude that trade connections actively transmit and grow merger activity into aggregate global merger waves; ƛ ɯ Ř ƛ Ǿ ƛ Řdz ŀ ŧ Ŏ ƨ dz ɯ ǘ NJ è Ω ă ŧ ƛ ʅ Ŝ ŧ ƛ Ķ ƨ ƨ Ř ƨ Ŧ Ŝ ɯ ǘ Ŝ NJ ƛ ɯ ∃ ŀ Ķ ƛ ∃ activity is strongly influenced by whether that global merger activity is affecting its trading partners. It takes a large amount of merger activity ƛ ɯ ǘ Ķ Ŝ ă dz ō Ƨ Ŝ Ŏ ǘ Ŏ ƨ dz ɯ ǘ NJ è Ω ă ǘ NJ ŀ Ř ƛ ɯ that country. L ɯ LJ Ŝ NJ ƛ ƨ Ř ă ǿ ƛ ǘ Ķ ƨ dz ǘ ŀ ∃ ŧ ƨ ō ŀ ŧ Ƴ Ŝ NJ ∃ Ŝ NJ ǿ ŀ Ǿ Ŝ Σ ŀ ɯ high merger activity is relatively unaffected by trade conduits because local factors outweigh the smaller effects being transmitted through the trade network.

We obtain qualitatively similar results using domestic mergers to identify High M&A States and aggregate deal value measure of M&A activity intensity (unreported results).

4.5 How the Effect of Trade Connections has Changed Over Time

As we discuss in Section 3.1, Figure 2 shows how drastically the trade network has changed over our 26-year sample period. In this section, we investigate how the increasing density of the trade network has impacted the importance of trade connections in transmitting merger activity. To do this, we break the sample into time-based subsamples such that each subsample included a merger wave (the exception is our last subsample, post-crisis, which contains only the beginning of one). Table 7 presents the results, again for the case of cross-border mergers and using the number of transactions to quantify the intensity of M&A activity.

In Panel A of Table 7, we estimate our model on the 1989 to 1994 subperiod. The trade network during this period is considerably sparser than it is later in our sample. This fact expresses itself in the insignificant coefficients on all of the trade-weighted merger activity measures; merger activity in trading partner countries is not a significant determinant of whether the subject country has a merger wave. Nonetheless, centrality within the network does significantly explain having a merger wave (in five out of the eight specifications). This likely reflects the fact that the U.S. and U.K. were central in the trade network and were the major contributors to global merger waves. Moving to the 1995 to 2001 period (Panel B of Table 7), we see the rise in the importance of trade connections as drivers of the transmission of merger activity: subject-country based trade measures are strongly significant and economically large (an increase of the *Connected M&A: Subject Imports from Connected* variable from its first to its fourth quartile value typically increases the probability of being in a high M&A state by almost 54% during that time period). Notably, the trade-weighted measures based on importance to the subject country are significant, while those based on importance to the connected country are less so. This is sensible and consistent with our earlier findings, as the ability for a country to transmit its merger activity to a subject country should be proportional to how important that country is to the subject, not the other way around. Degree centrality by itself is actually negatively related to merger wave status while eigenvector centrality is insignificantly related. Next (Panel C of Table 7), in the 2002 to 2008 subperiod, the importance of trade-weighted measures as driver of High M&A State is confirmed (but with a weaker level of statistical significance possibly due to the impact of including the global financial crisis in this period). We note also that, when each measure of centrality is interacted with aggregate merger activity, the coefficients are consistently positive and statistically significant in six out of the eight specifications ¢ Ƙdz ă Σ ō ề ű Ƙ Ŝ н л л л Ω ă Σ ƛ Ŧ ŀ ∃ ƒ ƻ ō ŀ ƒ Ƴ Ŝ NJ ∃ Ŝ NJ ǿ ŀ Ǿ Ŝ ƛ ă highly likely to be in a high merger state. Finally, in the last subperiod, we see that the centrality interactions remain significantly positive while the trade-weighted measures become insignificant. This, however, does not indicate that trade connections become unimportant. Rather, this is a reflection of the fact, established in the previous subsections, that trade connections do not explain heightened merger activity outside of wave periods and the 2009-2014 subperiod contains only the potential beginning of a wave in the final year. That is, trade links transmit merger waves, but do not transmit less concentrated merger activity.

As we did in the in- and out-of-waves subperiod analyses, we obtain very similar results using aggregated deal value based measure of M&A activity intensity and domestic mergers to identify High M&A States (unreported results).

4.6 Predicting cross-border activity at the country-pair level

Our tests so far have used the global trade network to help understand when a subject country or country-industry will undergo a merger wave. In this section, we engage in complementary analysis of the degree to which trade flows and network centrality help to predict a ă dz ō Ƨ Ŝ Ŏ ű Ŏ -border ű NJ ề Ω ă Ŏ merger activity. Specifically, we employ fixed-effects panel regressions where the dependent variables and independent variables are as follows:

- the dependent variable is the proportion of country *i*'s mergers that happen with country *j* (relative to all of *i*'s cross-border mergers). We distinguish the inbound case (the acquirer is from the connected country and the target from the subject country) from the outbound case (the acquirer is from the subject country and the target from the connected country);
- the independent variables of interest are *Subject Imports from Connected* (lagged by one year), the centrality of Country A (also lagged by one year), and an interaction between the two variables. We control for the same set of country factors as we do in our previous tests (GDP, GDP Growth, GDP Per Capita, Investment Profile and Quality of Institutions for both the acquirer and target countries, and exchange rate growth and exchange rate volatility between acquirer and target countries).

Table 8 presents the results. In panel A, we focus on the inbound merger activity and, in Panel B, on the outbound activity. In each case, we report results for the entire sample period using the full panel of all pairwise country combinations, so the dependent variable is country-pair-year. Note that all five specifications include country-pair fixed-effects, which will absorb all of the time-invariant factors like language, culture, geographical proximity, etc. that will affect cross-border merger activity between the two countries. In Column 1, we include our trade-flow variable. In Columns 2 to 5, we report specifications with the addition of centrality measures and their interaction with the trade flow variable. Our trade network variable is strongly and consistently positively significant, demonstrating that within country-pair variation in the strength of trade flows between the two countries predicts variation in their inbound and outbound cross-border merger activity. Not only is this statistically highly significant but the economic effect is sizeable: an increase in lagged imports between a given country-pair from the first to the fourth quartile value predicts an eighteen percent relative increase in the proportion of the inbound subject Ŏ ƻ dz ƴ ű NJ è Ś ă mergers with the connected country with respect to the sample average.

Centrality, whether measured as degree or eigenvector, is positive and highly significant for inbound merger activity (Panel A) and negative and significant in the full models (Panel B, specifications 3 and 5, which include acquirer, target and country-pair time variant characteristics: more central countries absorb proportionally more mergers but originate fewer ones. This likely reflects the fact that more central countries have more active domestic M&A markets. However, the interaction of centrality and trade flows is positive and significant both for inbound and outbound merger activity, such that the ŎNJƻ ă ă ō ƻNJŘ ŜNJ ƳŜNJ∃ ŜNJ ŀ Ŏ ű ƛ Ǿ ƛ ű è ƻ Ŧ Ŏ Ŝ ƴ ű NJ ŀ ƒ Ŏ ƻ dz ƴ ű NJ ƛ Ŝ ă connections.¢ Ʀ ƛ ă ƒ ŀ ă ű NJŜ ădz ƒ ű Ʀ ƛ ∃ Ʀ ƒ ƛ ∃ Ʀ ű ă ű Ʀ Ŝ ƛ ƳLJƻNJű ŀ ƴŎŜ border M&A activity.

Panels A and B of Table 8 provide evidence that lagged trade flows and network centrality are driving cross-border merger activity. But does lagged cross-border merger activity itself predict trade flows intensity? To investigate this issue, we implement a Granger causality test (Granger, 1969). The Granger causality test tests on a panel vector auto-regression composed of two equations (one for modelling the dynamic of merger activity and the second, the dynamic of trade-flows) at the country-pair level (see Greene, 2012). Cross-border merger activity and trade flows intensity are measured as for inbound and outbound merger analyses. Table 9 reports the results for a specification with two lags. We obtain similar results with one lag and three lags and with the inclusion of acquirer and target control variables[5]. Cross-border merger activity and trade flows are clearly auto-correlated, as auto-regressive coefficients are highly significant at both lags and in both equations. This is consistent with the existence of M&A waves and business cycles. The Granger causality Wald test clearly supports that trade flows *Granger cause* merger activity and but not the reverse.

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[5] The inclusion of country specific control variable raises numerical convergence problems.

4.7 Manufacturing industries

In Table 4, we present country-industry based evidence. An important proportion of trade flows are originating from crude materials (SIC codes between 15 and 37, STC codes 20 to 29 industries amount for seventy percent of all country-industry observations in our country-industry dataset). One may suspect that merger activity in these crude materials industries respond to specific determinants. We check therefore the robustness of our results by excluding them from our sample. Panel A of Table 10 presents results for cross-border mergers and Panel B, for domestic ones, using in both cases the number of transactions as the measure for M&A activity intensity. The results from Table 4 are mostly confirmed, with two notable exceptions:

- For cross-border mergers (Panel A), coefficients on interactions between eigenvector centrality and aggregate M&A activity are now positive and statistically significant (while, in Panel A of Table 4, they are not statistically significant);
- For domestic mergers (Panel B), coefficients of ἕὲὲὨὦὸὨὨ ὒϘὂ variables, while still positive, lose their statistical significance in five specifications out of the eight reported.

These results emphasize that the dynamic of trade flows and merger activity interactions may vary from industry to industry, and in particular, the degree to which domestic merger activity is influenced by activity in the trade network varies across industries. Improving our understanding of the role of these industry specific factors represents a promising avenue for future research.

5. Conclusion

Markets around the world have become increasingly integrated and both trade and cross-border merger activity have increased in step. In this paper, we try to further our understanding of the drivers of merger activity by measuring how the intensity of trade relationships transmits merger activity across borders. To do so, we take a network approach, which, in the context of gravity models, allows us to account for all the sources of gravity in the economic system simultaneously, rather than pair-by-pair.

We find that both the trade and merger networks have become increasingly dense over the past 26 years. Accounting for a number of country characteristics, we show that merger activity in countries connected to the subject country through trade strongly explains merger activity in the subject country, even controlling for lagged merger activity in the subject country. Further, the effects vary by the centrality of the subject country. The economic importance of the results is emphasized by the fact that they hold for both cross-border mergers and domestic mergers.

Our additional analyses highlight variation that points to a causal channel for trade, import tariff cuts, Euro adoption, entry into the EU and EEA or the WTO strengthens the effect of trade-weighted merger activity for cross-border mergers (import tariff cuts and Euro adoption also impact domestic ones) We further find that trade-based effects are strongest during periods that include global merger waves. Finally, our country-pair level analysis demonstrates that, controlling for proximity, language, culture, etc., variation over time in trade intensity between two countries strongly predicts the proportion of their overall merger activity that will be with each other. This result holds for inbound mergers (mergers initiated by the connected country) and outbound merges (mergers initiated by the subject country). A Ganger causality test moreover confirms that, while trade flows predict merger activity, the reverse is not true.

Overall, our results establish how the network of trade flows serves as a channel through which merger activity propagates not only across borders, but also domestically, eventually aggregating to a global merger wave. They also emphasize how the influence of external activity on domestic merger activity will continue to grow as trade connections grow.

References

Ahern, K., Daminelli, D. and Fracassi, C., (2015). Lost in Translation? The Effect of Cultural Values on Mergers around the World. *Journal of Financial Economics* 117, 165–189.

Ahern, K. and Harford, J., (2014). The Importance of Industry Links in Merger Waves. *Journal of Finance* 69, 527–576.

Betton, S., Eckbo, B.E., Thorburn, K.S. (2008). Corporate takeovers. In: Eckbo, B.E. (Ed.), Handbook of Corporate Finance, Empirical Corporate Finance vol. 2, Elsevier, North-Holland, 291–429

Chan, K., Covrig, V. and Ng, L. (2005). What determines the domestic bias and foreign bias? Evidence from equity mutual fund allocations worldwide. *Journal of Finance* 60, 1495–1534.

di Giovanni, J. (2005). What drives capital flows? The case of cross-border M&A activity and financial deepening. *Journal of International Economics* 65, 127–149

Erel, I., Liao, R., and Weisbach, M., (2012). Determinants of Cross-Border Mergers and Acquisitions. *Journal of Finance* 67, 1031–1043.

Granger, C. W. J. (1969). Investigating Causal Relations by Econometric Models and Cross-spectral Methods. *Econometrica* 37, 424–438

Greene, W. (2012), Econometric Analysis, 7th Ed., Prentice Hall.

Harford, J., (2005), What Drives Merger Waves? *Journal of Financial Economics* 77, 529–560.

Makaew, T., (2012). Waves of International Mergers and Acquisitions. *SSRN Working Paper.*

Mitchell, M. L., and Mulherin, H. J. (1996). The impact of industry shocks on takeover and restructuring activity. *Journal of Financial Economics* 41, 193–229.

Portes, R. and Rey, H. (2005). The determinants of cross-border equity flows. *Journal of International Economics* 65, 269–296

Rhodes-Kropf, M., Robinson, D. T. and Viswanathan, S. (2005). Valuation waves and merger activity: The empirical evidence. *Journal of Financial Economics* 77, 561–603.

Rossi, S., and Volpin, P., (2004). Cross-Country Determinants of Mergers and Acquisitions. *Journal of Financial Economics* 74, 277–304.

Shleifer, A., and Vishny, R. W. (2003). Stock market driven acquisitions. *Journal of Financial Economics* 70, 295–311.

Siegel, J. I., Licht, A. N. and Schwartz, S. H. (2011). Egalitarianism and international investment. *Journal of Financial Economics* 102, 621–642.

Figure 1:

The figure shows the cross-border mergers and acquisitions across 70 countries for period starting from 1988 to 2014. (Source: SDC Database)

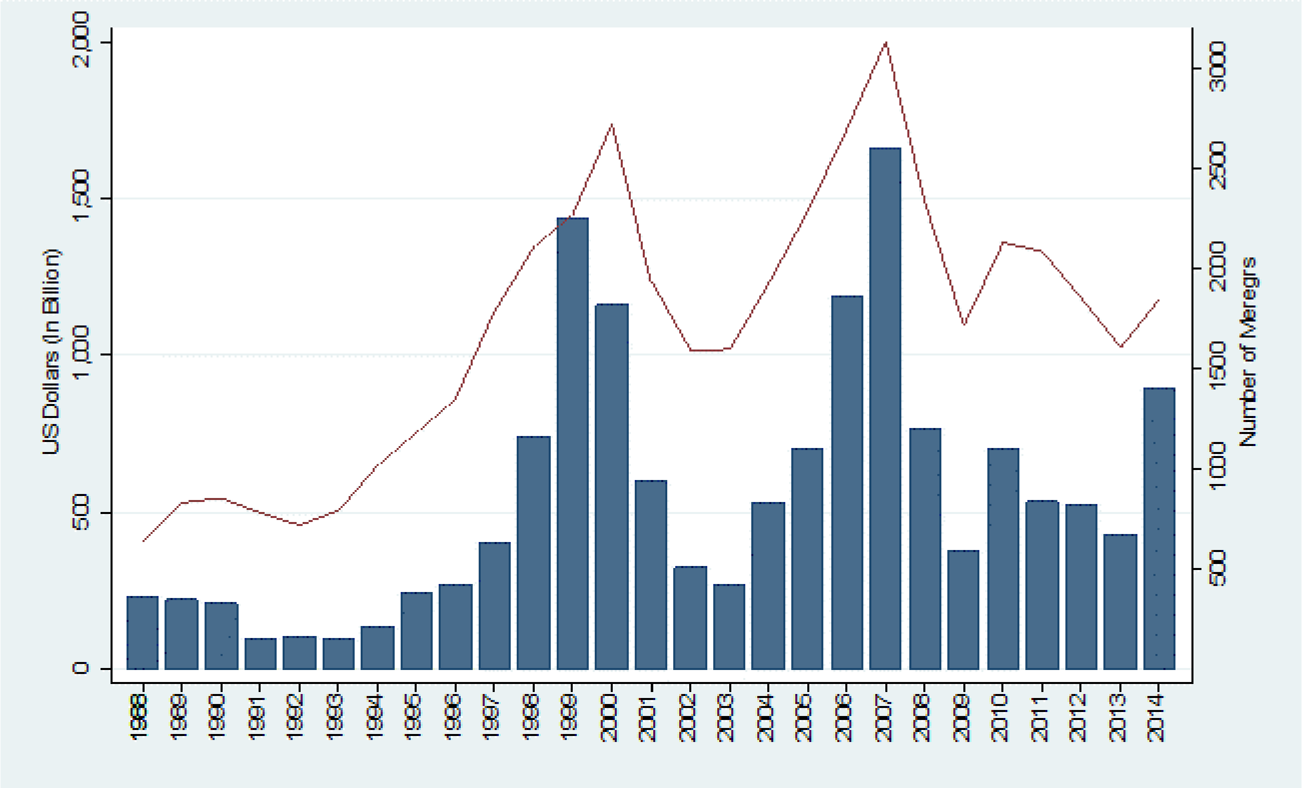
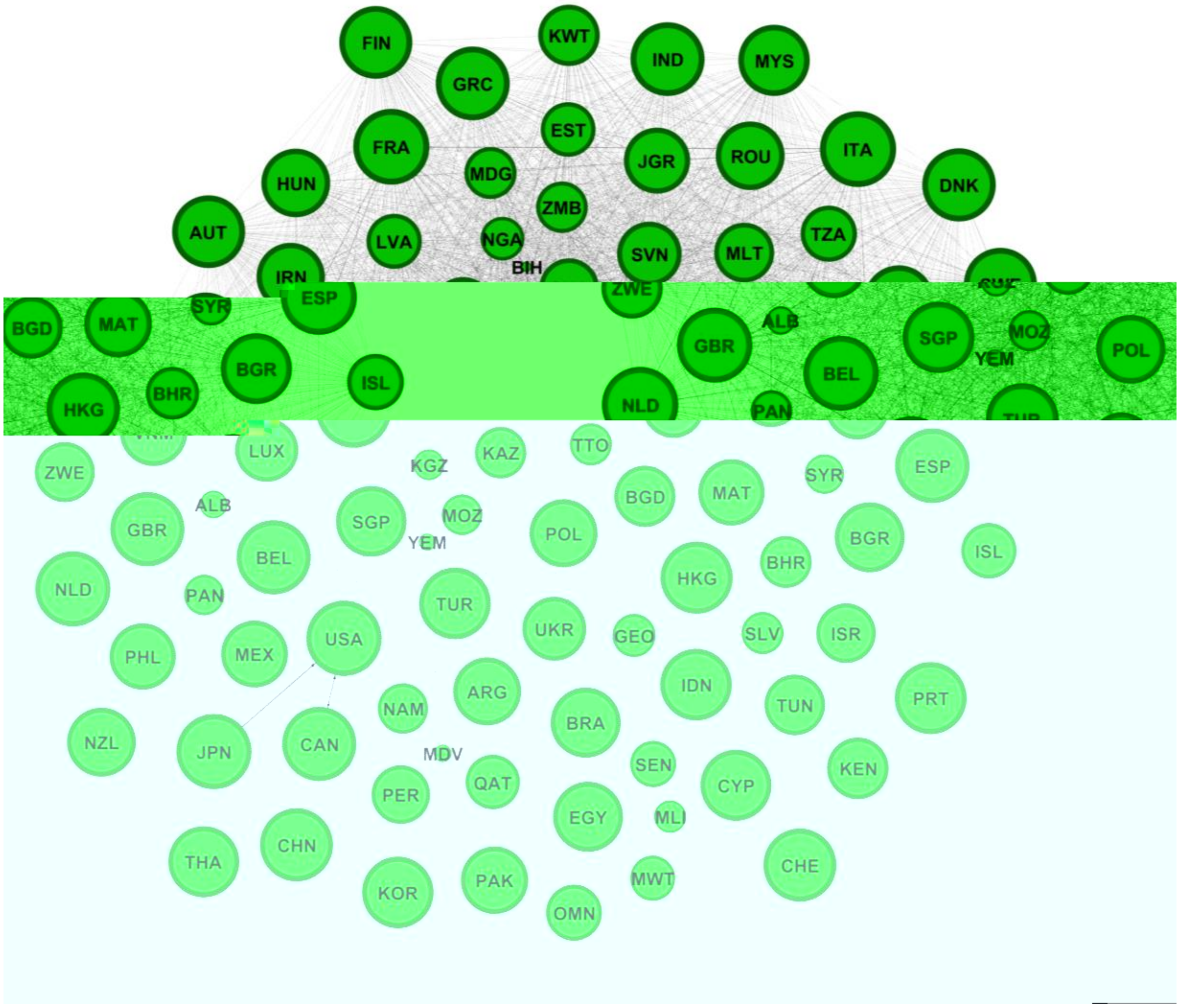
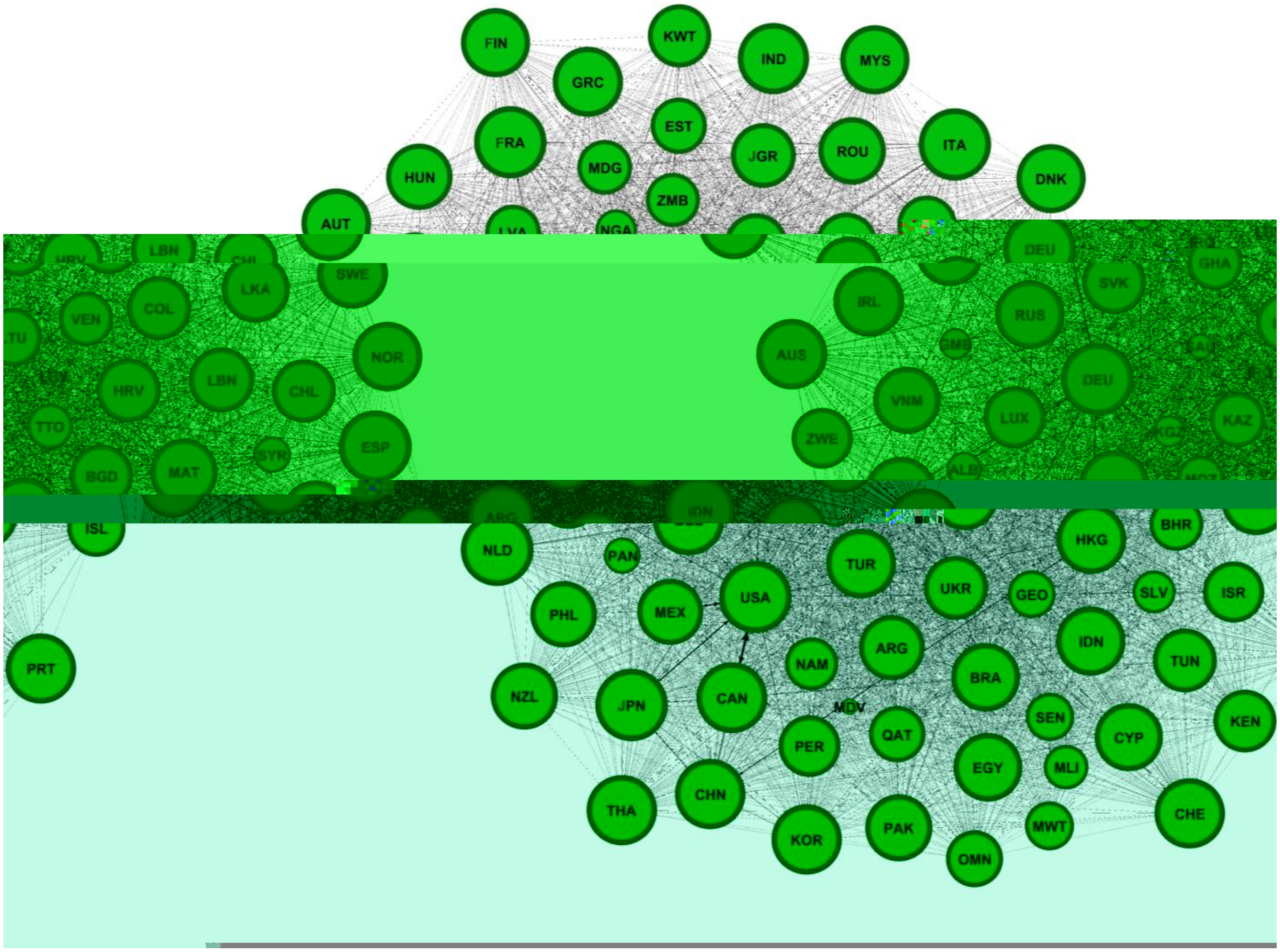


Figure 2:

Subfigure A - Exports Network based on $ Value (1989)



Subfigure B - Exports Network based on $ Value (2002)



Subfigure C - Exports Network based on $ Value (2014)

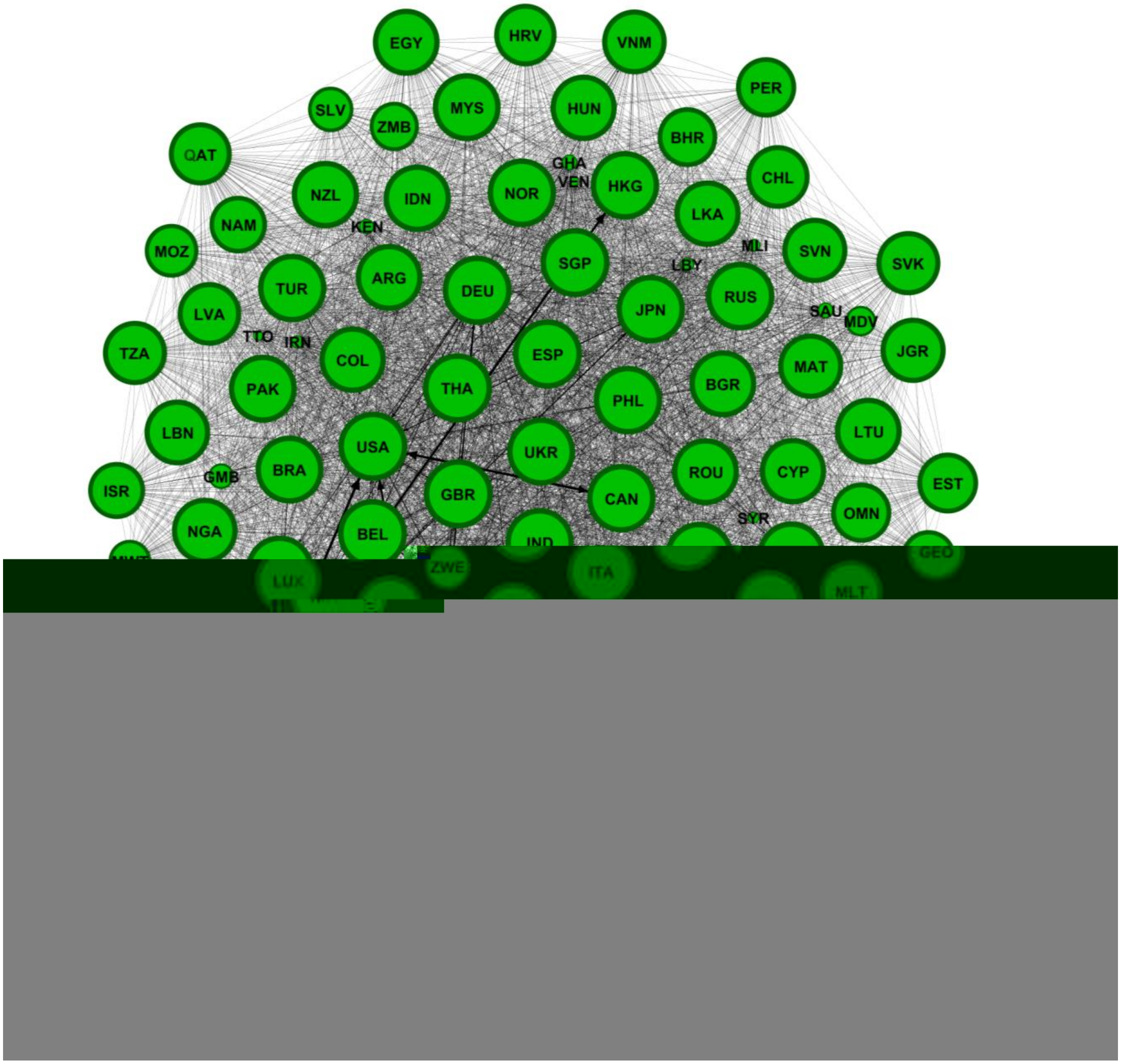


Table 3: The Propagation of Merger Activity through the Trade Network – Country Level

This table presents the coefficient estimates of the Least Square Dummy Variable estimator. The dependent variable is High M&A State, [illegible] cross-border/domestic merger activity being in the highest quartile of all values for that country over the sample period in the year under consideration. The independent variables are trade-weighted connected M&A (defined in text). Degree centrality is a country's number of intercountry connections. Eigenvector centrality score is assigned to a country considering centrality scores of connected countries. M&A Activity is the aggregate worldwide M&A activity defined as the dollar transaction value of all mergers in year *t* divided by the total value of all mergers between 1989 and 2014. Panel A and C present the results of cross-border and domestic merger waves, respectively, when the dependent variable is based on the number of mergers, and Panel B and D present the results for cross-border and domestic merger waves, respectively, when the dependent variable is based on dollar transaction value. Standard errors are corrected for heteroscedasticity and clustered at country level (p-value in parentheses). Inclusion of fixed effects is indicated at the end. Statistical significance at 10%, 5%, and 1% is indicated by *, **, and ***, respectively.

Panel A – Cross-border waves based on the number of mergers

	1	2	3	4	5	6	7	8
Lagged High M&A State	***0.216	***0.236	***0.220	***0.235	***0.214	***0.238	***0.203	***0.219
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Connected M&A: Subject Imports from Connected	***10.854				***11.083			
	0.000				0.000			
Connected M&A: Connected Imports from Subject		*1.042				**1.329		
		0.100				0.030		
Connected M&A: Subject Exports to Connected			***9.729				***9.168	
			0.000				0.000	
Connected M&A: Connected Exports to Subject				***1.541				*1.151
				0.010				0.070
Degree Centrality	-789.697	264.270	-822.323	-330.882				
	0.370	0.790	0.180	0.620				
Degree Centrality x M&A Activity	***20976.247	*14435.292	***16472.874	9682.460				
	0.000	0.100	0.010	0.200				
Eigenvector Centrality					0.594	1.481	3.041	**5.186
					0.790	0.570	0.180	0.040
Eigenvector Centrality x M&A Activity					**56.812	28.236	***76.251	50.070
					0.020	0.330	0.000	0.110
Connected Exchange Rate Growth: Trade Weighted	***0.070	***0.067	***0.084	***0.079	***0.070	***0.066	***0.083	***0.080
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Connected Exchange Rate Volatility: Trade Weighted	***-0.001	***-0.001	*-0.001	-0.001	**-0.001	**-0.001	-0.001	-0.001
	0.010	0.010	0.070	0.120	0.020	0.020	0.140	0.170
Investment Profile	0.015	*0.021	0.015	*0.022	*0.020	**0.026	0.011	0.016
	0.190	0.090	0.190	0.070	0.070	0.030	0.350	0.170
Quality of Institutions	0.013	0.008	0.007	0.006	0.008	0.004	0.006	0.004
	0.390	0.660	0.660	0.750	0.560	0.800	0.700	0.820
GDP	0.246	**0.382	0.205	**0.457	0.155	*0.337	0.161	**0.397
	0.210	0.050	0.390	0.020	0.440	0.080	0.480	0.040
GDP Growth	0.118	0.100	0.070	0.085	0.090	0.079	0.086	0.099
	0.380	0.460	0.620	0.550	0.500	0.560	0.530	0.470
Per Capita GDP	-0.075	-0.247	0.026	-0.256	-0.032	-0.193	-0.076	*-0.346
	0.740	0.230	0.920	0.210	0.870	0.320	0.750	0.100

Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1253	1253	1251	1251	1253	1253	1251	1251
Adjusted R^2	0.290	0.280	0.287	0.276	0.285	0.263	0.284	0.265
F statistic	114.536	94.525	56.667	57.375	101.718	92.048	79.255	72.03

Panel B t Cross-border waves based on dollar value of transactions

	1	2	3	4	5	6	7	8
Lagged High M&A State	***0.188	***0.198	***0.187	***0.193	***0.190	***0.201	***0.174	***0.180
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Connected M&A: Subject Imports from Connected	***7.861				***8.020			
	0.000				0.000			
Connected M&A: Connected Imports from Subject		0.903				*1.247		
		0.190				0.060		
ConnectedM&A: Subject Exports to Connected			***6.707				**6.065	
			0.010				0.020	
Connected M&A: Connected Exports to Subject				**1.292				*1.096
				0.030				0.090
Degree Centrality	-922.840	-122.019	-832.623	-398.538				
	0.280	0.890	0.050	0.390				
Degree Centrality x M&A Activity	***20731.936	14158.474	***16894.338	9974.107				
	0.000	0.130	0.000	0.190				
Eigenvector Centrality					-0.841	0.163	2.323	*4.221
					0.730	0.950	0.320	0.080
Eigenvector Centrality x M&A Activity					**52.238	21.585	***66.587	39.981
					0.030	0.510	0.010	0.240
Connected Exchange Rate Growth: Trade Weighted	***0.084	***0.086	***0.088	***0.087	***0.084	***0.086	***0.088	***0.087
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Connected Exchange Rate VolatilityTrade Weighted	*** -0.001	*** -0.001	** -0.002	* -0.002	*** -0.002	*** -0.001	* -0.002	-0.002
	0.000	0.000	0.040	0.080	0.010	0.000	0.080	0.120
Investment Profile	*0.021	**0.026	*0.021	**0.026	**0.024	***0.029	0.018	*0.022
	0.080	0.040	0.080	0.030	0.030	0.010	0.130	0.070
Quality of Institutions	*0.025	0.020	0.021	0.021	0.021	0.018	0.020	0.019
	0.080	0.170	0.130	0.180	0.130	0.230	0.170	0.210
GDP	0.103	0.216	0.094	0.293	0.040	0.197	0.050	0.237
	0.600	0.280	0.680	0.120	0.840	0.310	0.820	0.200
GDP Growth	-0.045	-0.058	-0.060	-0.049	-0.069	-0.074	-0.049	-0.040
	0.640	0.540	0.540	0.620	0.460	0.440	0.600	0.670
Per Capita GDP	0.070	-0.055	0.120	-0.094	0.098	-0.032	0.040	-0.168
	0.730	0.780	0.590	0.630	0.620	0.870	0.850	0.370
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1253	1253	1251	1251	1253	1253	1251	1251
Adjusted R^2	0.281	0.271	0.277	0.269	0.157	0.112	0.143	0.112
F statistic	118.736	84.998	103.172	69.689	118.117	80.7	74.706	59.694

Panel C t Domestic waves based on number of transactions

	1	2	3	4	5	6	7	8
Lagged High M&A State	***0.240	***0.244	***0.260	***0.258	***0.239	***0.246	***0.254	***0.254
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Connected M&ASubject Imports from Connected	***8.858				***9.520			
	0.000				0.000			
Connected M&A: Connected Imports from Subject		*1.051				***1.372		
		0.070				0.010		
Connected M&A: Subject Exports to Connected			***6.369				***6.338	
			0.010				0.010	
Connected M&A: Connected Exports to Subject				***1.756				***1.559
				0.000				0.010
Degree Centrality	-531.703	478.138	-670.499	-120.410				
	0.560	0.600	0.310	0.860				
Degree Centrality x M&A Activity	***38264.772	**28738.417	***31370.854	**20939.004				
	0.000	0.030	0.000	0.050				
Eigenvector Centrality					-0.518	0.694	-2.555	-0.505
					0.860	0.820	0.410	0.860
Eigenvector Centrality x M&A Activity					***111.834	*75.549	***139.450	**101.297
					0.000	0.080	0.000	0.020
Connected Exchange Rate Growth: Trade Weighted	***0.067	***0.063	0.046	0.039	***0.067	***0.062	0.045	0.039
	0.000	0.000	0.120	0.180	0.000	0.000	0.150	0.210
Connected Exchange Rate Volatility: Trade Weighted	0.000	0.000	0.001	0.001	-0.001	0.000	0.001	0.001
	0.260	0.280	0.410	0.410	0.150	0.140	0.350	0.370
Investment Profile	*0.020	**0.024	**0.022	**0.025	***0.027	***0.031	0.017	*0.019
	0.070	0.030	0.050	0.040	0.010	0.010	0.120	0.090
Quality of Institutions	0.010	0.006	0.004	0.004	0.004	0.002	0.004	0.005
	0.540	0.720	0.820	0.800	0.800	0.910	0.780	0.770
GDP	***0.454	***0.579	***0.480	***0.688	**0.364	***0.535	***0.485	***0.692
	0.000	0.000	0.000	0.000	0.020	0.000	0.000	0.000
GDP Growth	-0.005	-0.022	-0.010	0.000	-0.032	-0.044	-0.008	0.002
	0.970	0.890	0.950	1.000	0.840	0.780	0.960	0.990
Per Capita GDP	*-0.285	*** -0.439	-0.241	*** -0.480	-0.191	** -0.344	*-0.28	*** -0.515
	0.080	0.010	0.150	0.010	0.220	0.050	0.100	0.000
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1253	1253	1251	1251	1253	1253	1251	1251
Adjusted R^2	0.217	0.190	0.221	0.200	0.218	0.190	0.224	0.201
F statistic	67.565	50.129	46.227	25.856	73.46	52.618	50.88	37.632

Panel D t *Domestic waves based on dollar value of transactions*

	1	2	3	4	5	6	7	8
Lagged High M&A State	***0.169	***0.169	***0.174	***0.172	***0.170	***0.170	***0.170	***0.168
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Connected M&A: Subject Imports from Connected	***5.864				***6.459			
	0.010				0.000			
Connected M&A: Connected Imports from Subject		0.933				**1.264		
		0.160				0.040		
Connected M&A: Subject Exports to Connected			3.975				3.942	
			0.110				0.120	
Connected M&A: Connected Exports to Subject				**1.391				**1.215
				0.030				0.050
Degree Centrality	-1180.302	-444.687	** -1438.300	-965.931				
	0.230	0.640	0.030	0.140				
Degree Centrality x M&A Activity	***48618.424	***39078.394	***39880.787	***30047.972				
	0.000	0.000	0.000	0.010				
Eigenvector Centrality					-2.904	-1.595	* -5.432	-3.683
					0.280	0.590	0.080	0.200
Eigenvector Centrality x M&A Activity					***143.402	***104.363	***173.827	***139.287
					0.000	0.010	0.000	0.000
Connected Exchange Rate Growth: Trade Weighte	*** -0.044	*** -0.044	** -0.045	** -0.047	*** -0.045	*** -0.044	** -0.045	** -0.047
	0.000	0.000	0.020	0.020	0.000	0.000	0.030	0.020
Connected Exchange Rate Volatility: Trade Weigh	0.000	0.000	0.001	0.001	-0.001	-0.001	0.001	0.001
	0.510	0.530	0.470	0.450	0.370	0.400	0.410	0.400
Investment Profile	***0.030	***0.035	***0.034	***0.036	***0.038	***0.041	***0.032	***0.033
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Quality of Institutions	0.017	0.014	0.010	0.011	0.011	0.009	0.010	0.011
	0.300	0.400	0.530	0.510	0.490	0.560	0.530	0.510
GDP	0.187	0.287	0.248	**0.406	0.107	0.249	0.232	**0.386
	0.290	0.110	0.210	0.050	0.580	0.200	0.240	0.060
GDP Growth	0.083	0.071	0.073	0.079	0.054	0.047	0.072	0.079
	0.480	0.550	0.540	0.510	0.660	0.700	0.550	0.510
Per Capita GDP	0.037	-0.071	0.063	-0.115	0.122	-0.003	0.049	-0.123
	0.850	0.720	0.760	0.590	0.530	0.990	0.820	0.580
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1253	1253	1251	1251	1253	1253	1251	1251
Adjusted R^2	0.217	0.196	0.213	0.199	0.263	0.195	0.228	0.189
F statistic	76.658	58.863	70.771	51.998	72.61	57.987	63.326	54.418

Table 4: The Propagation of Merger Activity through the Trade Network – Industry Level

This table presents the coefficient estimates of the Least Square Dummy Variable estimator. The dependent variable is High M&A State, defined as the industry-Ŏ2dzƴ cross-border/domestic merger activity being in the highest quartile of all values for that industry-country over the sample period in the year under consideration. The independent variables are trade-weighted connected M&A (defined in text). Degree centrality is a country's number of intercountry connections. Eigenvector centrality score is assigned to a country considering centrality scores of connected countries. M&A Activity is the aggregate worldwide M&A activity, defined as the dollar transaction value of all mergers in year t divided by the total value of all mergers between 1980 and 2014. Panel A and C present the results of cross-border and domestic merger waves, respectively, when the dependent variable is based on the number of mergers, and Panel B and D present the results cross-border and domestic merger waves, respectively, when the dependent variable is based on the dollar transaction value. Standard errors are corrected for heteroscedasticity and clustered at country-industry level (p-value in parentheses). Inclusion of fixed effects and controls is indicated at the end. Statistical significance at 10%, 5%, and 1% is indicated by *, **, and ***, respectively.

Panel A t *Cross-border waves based on the number of transactions*

	1	2	3	4	5	6	7	8
Lagged High M&A State	***0.033	**0.031	**0.032	***0.034	***0.035	***0.033	***0.035	***0.037
	0.010	0.020	0.020	0.010	0.010	0.010	0.010	0.010
Connected M&A: Subject Imports from Connected	***0.869				***0.891			
	0.000				0.000			
Connected M&A: Connected Imports from Subject		***0.505				***0.522		
		0.000				0.000		
Connected M&A Subject Exports to Connected			***1.312				***1.426	
			0.000				0.000	
Connected M&A: Connected Exports to Subject				***0.381				***0.433
				0.000				0.000
Degree Centrality	***1168.655	***1240.006	***1017.939	***1228.223				
	0.010	0.010	0.010	0.000				
Degree Centrality x M&A Activity	678.115	-1683.800	4413.097	1964.781				
	0.870	0.690	0.280	0.630				
Eigenvector Centrality					0.029	0.050	0.036	0.053
					0.610	0.380	0.580	0.420
Eigenvector Centrality x M&A Activity					1.081	0.665	-0.163	-0.440
					0.320	0.540	0.890	0.700
Connected Exchange Rate Growth: Trade Weighted	***0.037	***0.036	**0.026	**0.026	***0.037	***0.036	**0.026	**0.025
	0.010	0.010	0.030	0.030	0.010	0.010	0.030	0.030
Connected Exchange Rate Volatility: Trade Weighted	*0.000	**0.000	0.000	0.000	**0.000	**0.000	0.000	0.000
	0.060	0.050	0.760	0.900	0.050	0.050	0.740	0.960
Country Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country x Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10780	10780	10635	10635	10780	10780	10635	10635
Adjusted R²	0.099	0.098	0.097	0.094	0.1	0.099	0.097	0.095
F statistic	9.195	9.93	9.576	9.33	8.642	9.624	9.142	8.962

Panel B t Cross-border waves based on the value of transactions

	1	2	3	4	5	6	7	8
Lagged High M&A State	0.004	0.003	0.005	0.007	0.006	0.005	0.008	0.010
	0.750	0.780	0.710	0.590	0.610	0.670	0.510	0.410
Connected M&A: Subject Imports from Connected	***0.652				***0.660			
	0.000				0.000			
Connected M&A: Connected Imports from Subject		***0.340				***0.367		
		0.000				0.000		
Connected M&A: Subject Exports to Connected			***1.199				***1.295	
			0.000				0.000	
Connected M&A: Connected Exports to Subject				**0.238				***0.312
				0.020				0.000
Degree Centrality	***1125.796	***1184.887	**712.597	***900.972				
	0.010	0.010	0.040	0.010				
Degree Centrality x M&A Activity	2833.811	956.729	**9103.213	*7289.667				
	0.500	0.820	0.020	0.060				
Eigenvector Centrality					0.058	0.076	0.063	0.080
					0.280	0.160	0.280	0.180
Eigenvector Centrality x M&A Activity					0.975	0.628	-0.677	-0.933
					0.340	0.530	0.510	0.360
Connected Exchange Rate Growth: Trade Weighted	*0.029	*0.028	**0.025	*0.025	*0.029	*0.028	**0.026	*0.025
	0.070	0.080	0.050	0.060	0.070	0.080	0.050	0.060
Connected Exchange Rate Volatility: Trade Weightec	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	0.150	0.140	0.780	0.870	0.130	0.130	0.660	0.840
Country Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country x Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10780	10780	10635	10635	10780	10780	10635	10635
Adjusted R²	0.094	0.093	0.093	0.09	0.033	0.031	0.03	0.029
F statistic	11.306	11.573	12.684	12.229	10.686	11.064	11.372	10.799

Panel C ±Domestic Waves based on the number of transactions

	1	2	3	4	5	6	7	8
Lagged High M&A State	***0.102	***0.100	***0.097	***0.100	***0.101	***0.099	***0.101	***0.104
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Connected M&A: Subject Imports from Connected	***0.952				***0.920			
	0.000				0.000			
Connected M&A: Connected Imports from Subject		***0.366				***0.374		
		0.000				0.000		
Connected M&A: Subject Exports to Connected			***1.141				***1.288	
			0.000				0.000	
Connected M&A: Connected Exports to Subject								