# Strategic Alliances, Macroeconomic Conditions and Firm Performance

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Preliminary Version

Please do not quote

December 2018

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Abstract

We study corporate strategic alliances using a novel cross-country data set from 1999 until 2014. We document significant variation in alliance activity over time. Our results suggest that shocks to competition rather than capital market conditions are likely to explain this variation. We then show that firms with low cash flow, high cash holdings and a high level of investments are likely to form strategic alliances in industries subject to completion shocks. Further, we find evidence that cash flow growth and investments improve following a strategic alliance. The improvement in performance, however, is concentrated in private firms. Our results suggest that strategic alliances are an important means of restructuring following shock to product market competition especially for private firms.

## 1. Introduction

Strategic alliances are common vehicles for organizing between-firm collaborations. In relatively recent years, there has been increasing interest in the financial literature in studying these collaborations and acknowledging their financial and strategic importance (e.g. Lerner et al. (2003); Robinson (2008); Bodnaruk et al. (2013)). This paper extends this literature across a few dimensions: 1) by studying country-level variation in the alliance activity and 2) by analyzing its firm-level impact.

It is well documented in the literature that major economic activities such as M&As and LBOs vary widely over time and a number of competing explanations have been proposed and tested for these fluctuations (e.g., Harford (2005); Axelson et al. (2013); Haddad et al. (2017)). Little is known, however, about time-variation in alliance activity. In this paper, using cross-country data, we first document significant variation in alliance activity over time. In our sample of European countries, peak years experience close to 900 corporate alliance while low years experience less than 200. Then we take an initial step towards understanding these fluctuations. We consider capital market conditions and shocks to competition. Our sample period includes financial crisis and China import penetration to provide rich data to study the impact of these factors on alliance formation.

The existing literature suggests that capital market conditions are an important driver of organizational structure. Lerner et al. (2003) directly relates equity market conditions and alliance activity in the bio-technology industry. The authors argue that during hot IPOs, markets alliance are less prevalent as biotech firms may be able to finance projects through public equity issues but during periods when equity issues are more difficult, such firms may have few alternatives to undertaking alliances. Thus, we investigate the relation between alliance activity and equity

market conditions such as intensity of IPO markets. Notably, consistent with Lerner et al. (2003) we find that private firms are important alliance participants, about 75% of corporate alliances in our sample involve private firms.

Credit market conditions may also impact a firm's organizational structure including the decision to form a strategic alliance. Petersen and Rajan (1997) and Fishman and Love (2003) suggest that when bank credit is not readily available, constraint firms may rely on collaboration with other non-financial firms to get access to resources for project development; for example, such firms may implicitly borrow from their suppliers. Strategic alliances might be another possibility for a collaboration.

The above discussion implies substitutability between strategic alliances and poor capital market conditions. By contrast, the redistribution view suggests that strategic alliances are less likely during poor market conditions (Love et al., 2007). This is because sources of funds dry up for all counterparties and there may be nothing left to redistribute to financial constraint firms through strategic alliances.

Shocks to competition is an alternative suggested trigger for alliance formation (e.g. Williamson (1969), Arping and Troege (2002)). Either cost efficiency or product market coordination may help alliance partners to withstand competitive pressure. Our results show that shock to competition rather than capital market conditions are likely to explain alliance activity. We use China import penetration as an exogenous shock to competition and find a positive relation between change in China imports and alliance intensity in a country. We do not find evidence that alliances are used as a substitute form of financing when capital market conditions are poor. And find only limited support for the redistribution view: during hot IPO markets, firms are somewhat more likely to form strategic alliances but this result does not hold in all specifications.

We then investigate what types of firms form alliances in response to competition shocks. Rather than test hypotheses from particular theories, our primary goal here is to deepen our understanding of strategic alliances by developing a rich set of facts describing the firm performance. We find that larger firms with low cash flow and high cash holdings are more likely to form alliances. These findings suggest that alliance firms might be the most affected by the shocks and high cash holdings allow such firms to restructure via alliance consistent with the precautionary motive for holding cash. Private alliance firms also exhibit a high level of investment. High investment levels of these firms might also be indicative of their attempts to restructure. Indeed, Bloom, Draca and Reenen (2016) provide evidence consistent with firm restructuring following China import penetration and strategic alliances may facilitate such restructuring.

Our next set of findings shows how performance of alliance firms changes following the alliance formation. Using fixed effects models with a set of control firms, we find evidence that cash flow growth and investments improve following a strategic alliance. The improvement in performance, however, is only concentrated in private firms and it is evident for both cross-border and domestic deals and it is not limited to hi-tech alliances. For private firms, strategic alliances might be more important as a means of restructuring than for public firms given private firms' limited access to external funds.

This paper extends the literature that studies strategic alliances more broadly. Robinson (2008) and Palia et al. (2008) investigate why firms sometimes prefer alliances over internally organized projects; while Robinson and Stuart (2006) and Lerner and Merges (1998) study allocation of control rights in strategic alliances. Chan et al. (1997); Johnson and Houston (2000); and McConnell and Nantell (1985) study stock price reactions to strategic alliances and document

a positive and significant announcement return. Our findings suggest that the positive reaction, at least partially, might be explained by the ability of alliance partners to withstand competitive pressure.

This paper also contributes to the literature that studies variations in firm organizational structure over time. Harford (2005) shows that capital market conditions are important in explaining merger waves. Axelson et al. (2013) emphasize economy-wide credit conditions in explaining buyout activity, while Haddad et al. (2017) document, instead, that buyout activity responds to changes in the equity risk premium. We show that shocks to competition rather than capital market conditions are likely to explain alliance activity.

The rest of the paper is organized as follows. The next section performance country-level analysis of alliance activity as well as discusses it potential determinants and describes country-level data. Section 3 focuses on firm-level analysis and describes firm-level data. Section 4 concludes.

## 2. Country-level analysis of alliance activity

In this section, we first discuss how capital market conditions, such as IPO activity and lending growth, and shock to product market completion may influence alliance activity. We then present our cross-country data and main country-level variables. Next we describe the behavior of alliance activity and examine its relation with capital market conditions and shocks to competition.

### A. Potential determinants of alliance activity

#### A1. Equity market conditions

The link between clustering of equity market offerings in "hot issue" markets and alliance activity was first highlighted in the economic literature by Lerner et al. (2003). Theoreticians have long suggested that external financing is an important driver of organizational structure and managerial behavior. Lerner et al. (2003) apply this view to a specific setting and study the impact of shifts in equity market financing activity on strategic alliances between small biotechnology firms and larger corporations.

The authors propose that during periods when public financial markets are readily accessible, small firms (or firms with high information asymmetry or private firms) may be able to finance projects through either public equity issues or alliances. But during periods when equity issues are more difficult, such firms may have few alternatives to undertaking alliances. The partnering firms may have information that is not available to outside public investors and thus they participate in the strategic alliances for project development even at the times when equity issues are difficult. Thus, alliances within this framework could be viewed as a substitute for equity financing. Lerner et al. (2003) provide evidence that in periods characterized by little public market activity, biotechnology firms appear to be, at least modestly, more likely to fund projects through alliances rather than internal funds.

In this paper, we study the relation between intensity of IPO market and alliance activity in a broad setting using cross-industry and cross-country data.

A2. Credit market conditions

Credit market conditions may also affect alliance activity. The existing literature proposes two views on how credit market conditions may affect collaborations between two non-financial corporations: the substitution view and the redistribution view (see for example, Love et al. (2007)). Both views were applied to trade credit but can be extended to alliances as well.

The substitution view suggests that when bank credit shrinks, then firms take steps to mitigate the effects of this deficiency on project development and financing (Fishman and Love (2003)). One possibility is to collaborate with other firms via a strategic alliance on project development. Thus alliance activity should increase when credit market conditions are poor.

By contrast, the redistribution view suggests that alliance activity should decrease when credit market conditions are poor. The redistribution view implies that firms with better access to capital will redistribute the credit they receive to more constrained firms via an alliance. However, for redistribution to take place some firms first need to be able to raise external financing to pass on to other firms (Love et al. (2007)). In states of the economy when external sources of finance dry up, there may be nothing left to redistribute through an alliance. Further, this view suggests that alliance activity may decrease not only when credit market conditions are poor but also when equity market conditions are poor.

Love et al. (2007) find support for the redistribution view of firm collaboration while Petersen and Rajan (1997), Nilsen (2002) and Fishman and Love (2003) find support for the substitution view (using trade credit data).

In this paper, we investigate a link between alliance activity and credit market conditions using data on lending growth in European countries.

A3. Shock to Competition

Starting with Williamson (1968), the economic literature points to a potential link between alliance activity and competition (see, Arping and Troege (2002) for a summary). This literature suggests that firms may form alliances in response to competitive pressure for at least two reasons. First, alliance partners through resource sharing may achieve cost efficiency. This cost reduction

could make alliance partners more effective competitors in response to the pressure. Second, alliances may allow for coordination of product market actions resulting in anti-competitive effects such as price collusion or entry deterrence. This literature, however, also recognizes potential conflicts of interest and agency problems in alliances, which may hinder their success.

In this paper, we use China import penetration as an exogenous shock to competition to investigate a potential link between alliance activity and competition.

## B. Data, sample selection and variables

In this sub-section, we describe our data, discuss the sample selection procedure for the alliance firms, and present descriptive statistics for our base sample and variables.

### B.1. Sample construction

We start with the Thompson SDC Platinum database to obtain information on corporate alliances. This database covers alliances across the world and includes, among other variables, names of alliance partners, announcement date, country, industry as well as listing status of the alliance partners. We require non-missing information across these variables. The dataset covers both corporate alliances that are formed without establishing a new entity, i.e., contract-based strategic alliances, and corporate alliances involving establishing a new entity, i.e., joint ventures. We focus on alliances that involve two partners and exclude multiple-partner alliance deals, which are uncommon.

We use the Bureau Van Dijk (BvD) database that provides annual financial statements of public and private firms in European countries to obtain alliance partners' accounting data. The version of the BvD database we use allows us to collect data from 1999 until 2014. One of the

primary advantages of using European data is that we can exploit the detailed firm-level information on private firms. Unlike the U.S., in most European countries, every company with limited liability, independent of its listing status, is required to file accounting and financial statements to an official public body. Corporate alliances often involve private firms and using European data allows us to explore transactions with not only public companies but also private companies. We are able to obtain accounting data for privately held firms before and after alliance formation. In our sample construction, we require non-missing data on total assets.

We merge SDS data and BvD data using firm names and country. We use both manual and electronic matching to obtain a broad set of accurate matches. The final sample comprises of 8,405 alliances.

B.2. Descriptive statistics and country-level variables

Table 1 presents the distribution of alliances by deal type, year and country. Panel A shows 29% of alliances involve only private companies, while 46% involve both private and public companies. Thus about 75% of alliances involve at least one private company, which highlights the importance of using data on private firms while studying alliance activity. A significant percentage of alliances is cross-border, 79.25%; about 50% of corporate alliances are joint venture, and 34% are hi-tech alliances.

Panel B shows the deal distribution by country. Alliance firms are from 39 European countries with the largest number of deals coming from the U.K., about 30%.

Panel C shows significant time variation in alliance activity in Europe. The number of alliances picked up in 2007 with 875 deals, then decreased significantly in 2009 with only 342 deals and then picked again in 2013. While time-variation in M&A activity has been studied

extensively in the literature, time-variation in alliance activity has received less attention despite its economic significance.

To better understand time-variation in alliance activity, we consider a set of country-level variables focusing on access to finance and competition. We use two variables to capture the state of finance in an economy. The first variable, aggregate lending growth, is designed to measure the availability of private credit such as bank loans to companies in a country in each year. We use the Bankscope data provided by Bureau van Dijk to obtain data on gross loans for each bank in a country in a year. We then calculate weighted average growth of gross loans, where growth of gross loans is gross loans at time t minus gross loans at time t-1 divided by gross loans at time t-1 and the weights are total assets. This measure is similar to the one used by Becker and Ivashina (2016) to measure aggregate loan supply conditions.

The second variable is IPO activity related to the state of public equity financing in a country in a year. IPO activity is the number of IPOs in a country and we use the SDS database to obtain the number of IPOs for our sample countries.

To capture exogenous impact on the level of competition in a country, we use China import penetration. This variable is a one-year change in Chinese imports in a country, which is in turn calculated using a mean percentage of Chinese imports across four-digit NACE codes in a country. The data are from the Comext dataset provide by Eurostat.[1]

Panel D of Table 1 presents correlations for our main country-level variables and GDP growth. IPO activity is positively correlated with China imports, the coefficient is 0.2116; and it

[1] We would like to thank Sandra Mortal for sharing these data with us.

has a low correlation with Lending Growth, the coefficient is only -0.0641. Lending Growth, however, seems to have a relatively high correlation with GDP Growth, the coefficient is 0.2328.

C. Country-level empirical analysis

We start our analysis with examining country-level factors that may potentially explain variation in alliance activity. Results of this analysis are presented in Table 2.

Panel A reports results using China import penetration. Specification 1 reports results of a parsimonious regression relating China import to the number of alliances in a country. The coefficient on China import is positive and statistically significant at the 10% level suggesting that the shock to the competition is associated with more alliances. Specification 2 reports results including country dummies, thus controlling for other time-invariant country-level variables that may explain alliance formation. The coefficient on China import remains positive and statistically significant. Finally, Specification 3 also includes time dummies controlling for unobservable time-variant effects on alliance formation. The coefficient on China import is 25.8977, and it is statistically significant at the 1% level. In terms of economic significance, this finding suggests that a country with an increase in China import by one standard deviation is predicted to have 2.82 more alliances.

Panel B reports the results using IPO activity. Across all three specifications, the coefficient on IPO activity is positive and statistically significant, although the significance level drops from 1% to 10% in the last specification. Findings in Specification 3 suggest that an increase in IPO activity by one standard deviation is associated with 11.58 more alliances. Generally, the findings in this panel, seems to indicate that public equity financing cycles matter for alliance activity.

Periods characterized by high IPO activity are associated with more strategic alliances. This is different from the findings in Lerner et al. (2003) who document a negative relation between equity financing cycles and alliance activity. Specifically, they find that in periods characterized by little public market activity, biotechnology firms appear to be at least modestly more likely to fund R&D through alliances rather than internal funds. The finding, however, is consistent with the redistribution view of alliance formation that suggests that firms are less likely to fund projects through alliances when access to external capital is more difficult.

Panel C reports results using Lending growth. Specification 1 shows that the coefficient on Lending growth is negative and statistically significant at the 10% level. However, in specifications 2 and 3 the coefficients on Lending growth are statistically insignificant; indicating that the availability of credit has no impact on alliance activity. This contrasts with the view that strategic alliances are a substitute form of financing when bank credit is not readily available.

Finally, Panel D reports results using all three country-level variables. Coefficients on Lending Growth are statistically insignificant in all three specifications. In specification 2, the coefficients of both China import and IPO activity are statistically significant, suggesting that both equity market conditions and shock to competition may explain alliance activity. In specification 3, only the coefficient on China import is statistically significant, highlighting importance of shock to competition in explaining alliance activity. Firms may form alliances in an attempt to mitigate negative impact from an increase in product market competition.

## 3. Firm-level analysis

In this section, we take a close look at shocks to competition and alliance activity by analyzing firms that form alliances in industries subject to such shocks. To that end, we exclude all industries from our sample which experience no China import penetration.

A. Control group

Our analysis of firms that form alliances in industries subject to competition shocks requires a benchmark sample of firms that do not form alliances. One of the important advantages of using European sample is that we can identify a large sub-set of such firms, both public and private. We use the following procedure to construct the control sample of firms. This procedure ensures that the sample of firms that form alliances is not too small relative to controls to make the empirical analysis meaningful. For each alliance firm, we find control firms from the same country, with the same listing status and from the same industry with the difference in total assets less than 30% as of one year prior to the transactions. Among all the matched firms, we choose up to five control firms that have the smallest difference in total assets. For most of the deals, we use the 3-digit U.S. SIC code as an industry specification, but for the alliance firms for which we are not able to find any matched firms, we use the 2-digit industry specification instead. This procedure selects a large sub-set of firms that are comparable to alliance firms in size and industry but allows comparison on other firm characteristics. Our sample includes 4,256 alliance firms and 23,980 controls.

Finally, we collect firm-year panel data for the target and control firms in our sample. We use 10-year observations around the alliance formation if available. We require each firm-year observation to have non-missing total assets. The final panel dataset has 343,063 firm-year observations.

B. Main variables

We use cash flow, normalized by total assets, to measure firm profitability. We use sales growth to proxy for growth opportunities and leverage to analyze capital structure decisions. We use cash, normalized by total assets, to investigate cash polices. As the Amadeus database does not have a capital expenditure variable, we calculate capital investment as a change in fixed assets plus depreciation, normalized by previous year total assets. All variables are winsorized at the 1% tail, but because of extreme outliers, sales growth and investment variables are winsorized at 5% for the upper tail. The Appendix A1 describes how each variable is defined.

C. Empirical analysis and results

In this section, we conduct an empirical analysis of performance of alliance firms prior to and after the alliance to provide further insight into these important transactions.

C.1. Pre-alliance analysis: What type of firms form alliances in industries subject to competition shock?

We start our empirical analysis of alliance formation by examining characteristics of alliance firms prior to the transactions. To that end, we compare alliance firms to a set of control firms.

In Table 2, we use univariate analysis to compare the characteristics of alliance firms and control firms as of the most recent year prior to the transaction. Panel A reports results for the full sample, while Panel B reports results for private firms and Panel C reports results for public firms.

Alliance firms are notably larger with mean total assets of 7,174.41 million dollars versus 424.67 million dollars for control firms. This difference exists for both private and public firms. Private alliance firms seem to have lower cash flow than the control firms but higher sales growth

and capital investments. This is not the case for public firms. Public alliance firms seem to have higher cash flow than the control firms but lower sales growth and lower capital investments. These preliminary results seem to suggest that the response to the competition shock may differ across public and private firms.

C.1.1. Regression analysis

We employ a probit regression as a baseline model, where the dependent variable is an indicator variable for alliance firms. In particular, we use the following specification:

$$Probability(Alliance) = f\ (log\ assets,\ profitability\ ,cash,\ leverage,\ sales\ growth,\ investments,\ country\ \&\ year\ fixed\ effects) \quad (1)$$

The sample includes the most recent available accounting data prior to the acquisition. In addition to the main explanatory variables, we include country and year dummies to control for unobservable country effects and time trends that may affect the transactions. Standard errors are clustered at the firm level. The number of observations varies across specifications depending on the availability of independent variables included in the regression. We report marginal effects from the probit regressions. While we report results of the probit regressions, the findings do not change if we use logit regressions instead.

Table 3 presents results of the probit regressions. We continue to find that larger firms tend to form alliances. Alliance firms also have lower cash flow but higher cash holdings and this is the case for both public and private firms. These findings may suggest that alliance firms are affected the most by the competitive shock. Higher cash holdings, however, may help these firms to restructure via alliance, consistent with the precautionary motive for cash holdings. The notable differences remain between public and private firms. Private alliance firms have higher sales

growth and investments than controls while public alliance firms do not differ from controls on these dimensions. High investment levels of these firms might be indicative of their attempts to restructure due to competition shocks. Indeed, Bloom, Draca and Van Reenen (2016) provide evidence consistent with firm restructuring following China import penetration and strategic alliances may facilitate such restructuring. For private firms, strategic alliances might be more important as a means of restructuring than for public firms given private firms' limited access to external funds.

C.2. Post-alliance analysis

Empirical evidence documented in the previous section seems to suggest that strategic alliances might be used as a means of restructuring following shocks to competition and they might be more important for private firms than public firms to deal with the competitive pressure. In this section, we take a look at firm performance following alliance formation to provide insights on the impact of strategic alliance and their potential benefits. To that end, we compare performance of alliance firms and the control group following alliance formation. As discussed above, the Amadeus data allows us to analyze post-alliance performance of both public and private firms to investigate whether there is real evidence on performance improvement.

Table 4 reports the summary statistics of alliance firm characteristics and control firm characteristics one year before and one year after the alliance. Notably both alliance and control firms experience a decline in cash holdings, sales growth and capital investments around alliance formation, which is expected given the significant pressure from China import penetration.

C.2.1. Panel regressions

Further, we analyze the effect of alliance firms' performance in a panel regression framework. Observations of the year of alliance formation are omitted. We run a series of OLS regressions, where the dependent variables are cash flow, change in cash flow, cash holdings, leverage, sales growth, and investment, with the following specification:

*Firm Performance = f (AFTER, AFTERxAlliance, log assets, log GDP, log GDP Growth, firm & year fixed effects)* (3)

To control for any firm-specific unobservable factors that would affect performance and investment, all regressions include firm and year fixed effects. Additionally, we control for the overall state of the economy including GDP and GDP growth. The coefficient on the AFTER variable, an indicator of observations after the alliance, represents whether firm performance significantly changes around alliance formation after controlling for unobservable time-invariant characteristics of the firms. The coefficient of AFTER*x*Alliance captures the difference in performance between alliance and non-alliance firms following alliance formation.

Results of this analysis are reported in Table 5. Panel A reports results for the full sample, while Panel B and Panel C report results for the sub-samples of private and public firms, respectively. Our main variable of interest is AFTER*x*Alliance. The coefficients on the AFTERxAlliance variable are positive and statistically significant for leverage and capital investment in Panel A. The improvement in capital investment is economically significant. The results suggest that the investments of alliance firms are higher by about 0.03 following alliance formation than the investment of the control firm. Given that the average capital investments of control firms following alliances is 0.33, this effect on investment is equivalent to about a 9% increase.

Alliance firms also increase leverage. This result is consistent with Chen, King, and Wen (2015) who find that debtholders view alliances positively and thus alliance formation may allow firms to get access to additional debt financing.

Next, we turn to private firm alliances in Panel B. The notable difference with the full sample results is thesignificant increase in cash flow growth for the alliance firms, by about 19%. Thus, alliances seem to allow private firms to improve performance in industries subject to competition shocks. This is not the case for public firms, where there is not much improvement in firm performance following alliance formation, consistent with the literature that argues that potential conflicts of interest and agency problems may hinder alliance success. In fact, the increase in capital investment documented in Panel A is driven by private firm alliances.

In Table 6 we perform additional cross-sectional tests. Notably, the improvement in performance that we document is not driven by cross-border or hi-tech alliances. Although, joint ventures exhibit some important differences as is evident by the increase in sales growth.

## 4. Summary and Conclusions

In this paper, we analyze strategic alliance using cross-country European data from 1999 until 2014. Our sample period includes the financial crisis and China import penetration thus providing rich data to study the impact of market conditions and shocks to competition on alliance formation. Further, our dataset includes firm financial information not only for public firms but also for private firms. Private firms are important participants in these transactions; thus including private firms allows us to perform a comprehensive study of the performance of strategic alliances.

We document a set of results that are new to the literature. First, we document significant variation in alliance activity over time and show that shocks to completion rather than capital market conditions are likely to explain this variation. This finding stands in contrast to the literature that studies fluctuations in firm organizational structure such as M&As and LBOs over time. This literature documents that capital market conditions are important determinants of M&As and LBOs. Our findings underscore the importance of product market completion in explaining firms' organizational structure. Although, we do find some evidence that during hot IPO markets, firms are somewhat more likely to form strategic alliances consistent with the redistribution view.

We next show that firms that form alliances in industries subject to China import penetration display low cash flow but high cash holdings. These findings suggest that alliance firms are affected the most by the competitive shocks. High cash holdings, however, may help these firms to restructure via alliance, consistent with the precautionary motive for cash holdings. Private alliance firms also have high sales growth and investments.

Further, we find that private firms experience an increase in cash flow growth and capital investments following alliance formation. This is not the case for public firms, where there is not much improvement in firm performance following alliance formation, consistent with the literature that argues that potential conflicts of interest and agency problems may hinder alliance success. Interestingly, alliance firms also increase leverage. This result is consistent with Chen, King, and Wen (2015) who find that debtholders view alliance positively and thus alliance formation may allow firms to get access to additional debt financing. Overall, our results seem to suggest that firms form alliances in an attempt to mitigate the negative impact from an increase in product market competition.

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**Table 1. Sample distribution**

This table shows the distribution of the alliances in our sample by deal type in Panel A, by the announcement year in Panel B, by participants' country in Panel C. The sample consists of corporate alliance deals in European countries in the 1999-2014 period that are matched to the BvD financial database. Variable descriptions are provided in Appendix A1.

**Panel A. By deal type**

| Deal type | Mean | N |
|---|---|---|
| Private/Private Alliance | 0.2907 | 8,405 |
| Public/Private Alliance | 0.4645 | 8,405 |
| Public/Public Alliance | 0.2449 | 8,405 |
| Hi-Tech Alliance | 0.3406 | 8,405 |
| Join Venture | 0.5020 | 8,405 |
| Cross-Border Alliance | 0.7925 | 8,405 |

**Panel B. By participants country**

| Country | No. of Deals | Percentage |
|---|---|---|
| AUSTRIA | 93 | 1.11 |
| BELGIUM | 212 | 2.52 |
| BOSNIA-HERZEGOVINA | 1 | 0.01 |
| BULGARIA | 26 | 0.31 |
| CROATIA | 17 | 0.2 |
| CYPRUS | 3 | 0.04 |
| CZECH REPUBLIC | 40 | 0.48 |
| DENMARK | 205 | 2.44 |
| EIRE (IRELAND) | 31 | 0.37 |
| ESTONIA | 13 | 0.15 |
| FINLAND | 265 | 3.15 |
| FRANCE | 999 | 11.89 |
| GERMANY | 1,014 | 12.06 |
| GREECE | 85 | 1.01 |
| HUNGARY | 41 | 0.49 |
| ICELAND | 10 | 0.12 |
| IRELAND | 130 | 1.55 |
| ITALY | 555 | 6.6 |
| LATVIA | 10 | 0.12 |
| LIECHTENSTEIN | 1 | 0.01 |
| LITHUANIA | 11 | 0.13 |
| LUXEMBOURG | 36 | 0.43 |
| MACEDONIA (FYROM) | 4 | 0.05 |
| MALTA | 1 | 0.01 |
| NETHERLANDS | 367 | 4.37 |
| NORWAY | 240 | 2.86 |
| POLAND | 50 | 0.59 |

| | | | |
|---|---|---|---|
| PORTUGAL | 26 | 0.31 | |
| ROMANIA | 15 | 0.18 | |
| RUSSIAN FEDERATION | 325 | 3.87 | |
| SERBIA | 8 | 0.1 | |
| SLOVAKIA | 2 | 0.02 | |
| SLOVENIA | 15 | 0.18 | |
| SPAIN | 273 | 3.25 | |
| SWEDEN | 409 | 4.87 | |
| SWITZERLAND | 279 | 3.32 | |
| TURKEY | 34 | 0.4 | |
| UKRAINE | 12 | 0.14 | |
| UNITED KINGDOM | 2,547 | 30.3 | |
| Total | 8,405 | 100 | |

**Panel C. By alliance year**

| Year of Alliance | No. of Deals | Percentage |
|---|---|---|
| 1999 | 6 | .07 |
| 2000 | 384 | 4.57 |
| 2001 | 372 | 4.43 |
| 2002 | 448 | 5.33 |
| 2003 | 355 | 4.22 |
| 2004 | 510 | 6.07 |
| 2005 | 572 | 6.81 |
| 2006 | 849 | 10.1 |
| 2007 | 875 | 10.41 |
| 2008 | 385 | 4.58 |
| 2009 | 342 | 4.07 |
| 2010 | 630 | 7.50 |
| 2011 | 763 | 9.08 |
| 2012 | 840 | 9.99 |
| 2013 | 899 | 10.7 |
| 2014 | 175 | 2.08 |
| Total | 8,405 | 100.00 |

**Panel D. Summary statistics for country-level variables**

| | Mean | Median | Std. Dev. | Obs |
|---|---|---|---|---|
| China Import | 0.0712 | 0.0628 | 0.1090 | 291 |
| Log IPO | 1.9229 | 1.7918 | 1.3983 | 298 |
| IPO Number | 19.8792 | 6.000 | 41.8694 | 298 |
| Lending Growth | 0.1878 | 0.1317 | 0.2539 | 456 |

**Panel E. Correlations for country-level variables**

| | China Import | Log IPO | Lending Growth | GDP Growth |
|---|---|---|---|---|
| China Import | 1.0000 | | | |
| Log IPO | 0.2116 | 1.0000 | | |
| Lending Growth | -0.0641 | 0.0094 | 1.0000 | |
| GDP Growth | 0.0341 | 0.0901 | 0.2328 | 1.0000 |

**Table 2. Shock to competition, access to finance and alliance activity: Country-level analysis**

This table reports results of the Poisson regression. The dependent variable is the number of corporate alliances in a country. The average marginal effects are reported. The sample consists of alliance deals in European countries in the 1999-2014 period that are matched to the BvD financial database. China import is a one-year change in Chinese imports in a country in the year prior to alliance announcement. IPO is the number of IPOs in a country a year prior to alliance announcement. Lending growth is the weighted average growth of gross loans within a country. Variable descriptions are provided in Appendix A1. Robust standard errors are in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

**Panel A. China imports**

| | (1) | (2) | (3) |
|---|---|---|---|
| China import | 48.8575* | 124.1996*** | 25.8977*** |
| | (29.273) | (26.435) | (9.016) |
| Country dummies | No | Yes | Yes |
| Year dummies | No | No | Yes |
| Observations | 265 | 265 | 265 |
| Log pseudolikelihood | -15,019 | -2,403 | -870.5 |
| Pseudo R-squared | 0.00461 | 0.841 | 0.942 |
| N Countries | 26 | 26 | 26 |

**Panel B. IPO activity**

| | (1) | (2) | (3) |
|---|---|---|---|
| Log IPO | 42.3848*** | 20.3479*** | 8.2863* |
| | (7.403) | (1.154) | (4.825) |
| Country dummies | No | Yes | Yes |
| Year dummies | No | No | Yes |
| Observations | 279 | 279 | 279 |
| Log pseudolikelihood | -5,746 | -1,831 | -1,219 |
| Pseudo R-squared | 0.607 | 0.875 | 0.917 |
| N Countries | 33 | 33 | 33 |

**Panel C. Lending growth**

| | (1) | (2) | (3) |
|---|---|---|---|
| Lending growth | -37.2735* | 12.0712 | -15.5809 |
| | (19.118) | (14.082) | (12.523) |
| Country dummies | No | Yes | Yes |
| Year dummies | No | No | Yes |
| Observations | 425 | 425 | 425 |
| Log pseudolikelihood | -20,074 | -3,233 | -1,585 |
| Pseudo R-squared | 0.0192 | 0.842 | 0.923 |
| N Countries | 34 | 34 | 34 |

**Panel D. Combined**

| | (1) | (2) | (3) |
|---|---|---|---|
| China Import | -43.0072 | 59.7730* | 34.8300*** |
| | (43.665) | (34.566) | (12.199) |
| Log IPO | 51.0698*** | 22.9683*** | 0.3226 |
| | (9.466) | (1.634) | (1.589) |
| Lending growth | -45.9356 | 2.5728 | -5.0912 |
| | (43.035) | (16.864) | (9.850) |
| Country dummies | No | Yes | Yes |
| Year dummies | No | No | Yes |
| Observations | 195 | 195 | 195 |
| Log pseudolikelihood | -4,540 | -1,455 | -717.3 |
| Pseudo R-squared | 0.618 | 0.878 | 0.940 |
| N Countries | 25 | 25 | 25 |

**Table 2. Pre-alliance analysis: Means comparison**

This table shows the means comparison of firm characteristics for alliance firms and their controls one year prior to alliance formation. The sample is limited to alliances formed in industries subject to China import penetration. Each alliance firm is matched to control firms from the same country in the same three-digit SIC industry code. Matched firms are required to have total assets greater than 1 million U.S. dollars and the difference in total assets is no greater than 30% one year prior to the alliance formation. The control group includes a maximum of five matched firms with the smallest difference in total assets. The differences in means are evaluated using a t-test. Variable descriptions are provided in Appendix A1. ***, **, and * represent the statistical significance at the 1%, 5%, and 10% levels, respectively.

**Panel A. All alliance partners**

| | Alliances | | Controls | | |
|---|---|---|---|---|---|
| | Obs. | Mean | Obs. | Mean | Diff |
| Total Assets | 4,256 | 7174.405 | 23,980 | 424.666 | 6749.738*** |
| Cash Flow | 3,463 | 0.040 | 17,897 | 0.043 | -0.003 |
| Cash | 4,110 | 0.127 | 22,269 | 0.134 | -0.007* |
| Leverage | 4,256 | 0.505 | 23,980 | 0.525 | -0.020*** |
| Log Sales Growth | 2,413 | -1.947 | 11,604 | -1.893 | -0.053 |
| Capital Investments | 2,717 | 0.335 | 13,331 | 0.355 | -0.019* |

**Panel B. Private firms**

| | Alliances | | Controls | | |
|---|---|---|---|---|---|
| | Obs. | Mean | Obs. | Mean | Diff |
| Total Assets | 2,029 | 1660.900 | 15,011 | 313.054 | 1347.846*** |
| Cash Flow | 1,615 | 0.036 | 10,314 | 0.072 | -0.035*** |
| Cash | 1,923 | 0.117 | 13,456 | 0.115 | 0.002 |
| Leverage | 2,029 | 0.582 | 15,011 | 0.577 | 0.005 |
| Log Sales Growth | 1,106 | -1.898 | 6,661 | -2.001 | 0.104* |
| Capital Investments | 1,261 | 0.363 | 8,373 | 0.329 | 0.034** |

**Panel C. Public firms**

| | Alliances | | Controls | | |
|---|---|---|---|---|---|
| | Obs. | Mean | Obs. | Mean | Diff |
| Total Assets | 2,227 | 12197.710 | 8,969 | 611.467 | 11586.243*** |
| Cash Flow | 1,848 | 0.043 | 7,583 | 0.005 | 0.038*** |
| Cash | 2,187 | 0.137 | 8,813 | 0.164 | -0.027*** |
| Leverage | 2,227 | 0.435 | 8,969 | 0.439 | -0.003 |
| Log Sales Growth | 1,307 | -1.988 | 4,943 | -1.748 | -0.241*** |
| Capital Investments | 1,456 | 0.312 | 4,958 | 0.399 | -0.087*** |

**Table 3. Pre-alliance analysis: Probit regressions**

This table reports marginal effects from the probit regressions. The probability of alliance is estimated. The sample is limited to alliances formed in industries subject to China import penetration. Each alliance firm is matched to control firms from the same country in the same three-digit SIC industry code. Matched firms are required to have total assets greater than 1 million U.S. dollars and the difference in total assets is no greater than 30% one year prior to the alliance formation. The control group includes a maximum of five matched firms with the smallest difference in total assets. Variable descriptions are provided in Appendix A1. ***, **, and * represent the statistical significance at the 1%, 5%, and 10% levels, respectively.

| | All firms | Private firms | Public firms |
|---|---|---|---|
| | (1) | (2) | (3) |
| Log Total Assets | 0.0617*** | 0.0385*** | 0.0899*** |
| | (0.004) | (0.004) | (0.008) |
| Cash Flow | -0.1542*** | -0.1581*** | -0.2677*** |
| | (0.040) | (0.048) | (0.066) |
| Cash | 0.1290*** | 0.0997*** | 0.1844*** |
| | (0.035) | (0.037) | (0.067) |
| Leverage | 0.0100 | -0.0063 | -0.0509 |
| | (0.020) | (0.021) | (0.049) |
| Log Sales Growth | 0.0036 | 0.0073* | 0.0003 |
| | (0.004) | (0.004) | (0.006) |
| Capital Investments | 0.0191 | 0.0367*** | 0.0110 |
| | (0.012) | (0.013) | (0.023) |
| Country dummies | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes |
| Observations | 9,447 | 5,466 | 3,951 |
| Log pseudolikelihood | -3,627 | -2,079 | -1,453 |

**Table 4. Changes in firm performance around alliance: Summary statistics**

This table shows the summary statistics and regression estimations for changes in firm performance around the acquisition. Panel A presents summary statistics for the firm-level variables of the targets in our sample as a two-year average before and after the acquisitions. The difference in mean is evaluated with a t-test. Panel B reports the marginal effects from probit models estimating changes in target firm performance relative to control firms before and after the acquisitions. The sample includes target and control firms. The dependent variable equals one for target firms and zero for control firms. The firm-level variables are measured one year prior to the acquisition in columns (1) and (3) and one year after the acquisitions in columns (2) and (4). We report p-values for the difference in coefficients of each variable from the joint estimation of two probit models. All regressions include two-digit SIC industry code, target country, and year dummy variables. Standard errors are corrected for clustering the observations at the firm level and z-statistics are in parentheses. Variable descriptions are provided in Appendix A1. ***, **, and * represent the statistical significance at the 1%, 5%, and 10% levels, respectively.

| | Alliances | | | | | Controls | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | BEFORE | | AFTER | | | BEFORE | | AFTER | | |
| | Obs. | mean | Obs. | mean | Difference | Obs. | mean | Obs. | mean | Difference |
| Cash Flow | 5,260 | 0.0499 | 5,245 | 0.0445 | -0.0054 | 23,834 | 0.4768 | 23,417 | 0.0453 | -0.0023 |
| Cash Flow Growth | 4,633 | -0.1807 | 4,984 | -0.1387 | 0.0421 | 20,458 | -0.1541 | 22,348 | -0.2098 | -0.0558* |
| Cash | 6,215 | 0.1301 | 6,152 | 0.1211 | -0.0090*** | 28,503 | 0.1366 | 28,048 | 0.1295 | -0.0070*** |
| Leverage | 6,418 | 0.4984 | 6,373 | 0.5119 | 0.0135*** | 30,514 | 0.5260 | 30,173 | 0.5155 | -0.0105*** |
| Log Sales Growth | 3,734 | -1.9393 | 3,549 | -2.1242 | -0.1850*** | 15,329 | -1.8671 | 14,449 | -2.0565 | -0.1894*** |
| Capital Investment | 4,135 | 0.3305 | 4,307 | 0.3117 | -0.0188* | 17,687 | 0.3649 | 18,908 | 0.3304 | -0.0346*** |

**Table 5. Changes in firm performance before and after alliances: Panel regression**

This table shows the panel OLS regression estimations for changes in firm performance around alliance announcement. The sample includes firm-year observations ten years around the alliance announcement. Observations at the year of announcement are dropped. *AFTER* is equal one for the years after the alliance and zero otherwise. Standard errors are corrected for clustering the observations at the firm level and robust standard errors are in parentheses. Variable descriptions are provided in Appendix A1. ***, **, and * represent the statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. All firms

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Dependent variables: | Cash Flow | Cash Flow Growth | Cash | Leverage | Log Sales Growth | Capital Investments |
| AFTER x Alliance | -0.0051 | -0.0187 | -0.0008 | 0.0478*** | 0.0349 | 0.0292** |
| | (0.006) | (0.075) | (0.010) | (0.011) | (0.090) | (0.013) |
| AFTER | 0.0007 | -0.0037 | -0.0036 | -0.0043 | -0.0950*** | -0.0270*** |
| | (0.002) | (0.040) | (0.003) | (0.004) | (0.031) | (0.005) |
| Log Total Assets | 0.0301*** | -0.0161 | -0.0167*** | -0.0180*** | 0.0685*** | 0.0582*** |
| | (0.003) | (0.041) | (0.002) | (0.004) | (0.018) | (0.006) |
| Log GDP | -0.0701*** | -0.2258 | 0.0213*** | 0.0577*** | -0.2541*** | -0.1876*** |
| | (0.011) | (0.180) | (0.006) | (0.015) | (0.069) | (0.026) |
| GDP Growth | 0.1441*** | 2.0370* | 0.0679* | 0.0492 | 0.1774 | 0.2392* |
| | (0.049) | (1.156) | (0.037) | (0.061) | (0.576) | (0.124) |
| Firm dummies | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 175,441 | 153,238 | 205,671 | 219,772 | 111,373 | 134,488 |
| Adjusted R-squared | 0.423 | 0.016 | 0.593 | 0.641 | 0.243 | 0.223 |

Panel B. Private firms

| Dependent variables: | (1) Cash Flow | (2) Cash Flow Growth | (3) Cash | (4) Leverage | (5) Log Sales Growth | (6) Capital Investments |
|---|---|---|---|---|---|---|
| AFTER x Alliance | 0.0017 | 0.1887** | -0.0061 | 0.0469*** | 0.0577 | 0.0300** |
| | (0.007) | (0.087) | (0.005) | (0.010) | (0.057) | (0.013) |
| AFTER | -0.0035 | -0.0391 | 0.0008 | -0.0040 | -0.1134*** | -0.0321*** |
| | (0.002) | (0.051) | (0.002) | (0.004) | (0.030) | (0.007) |
| Log Total Assets | 0.0218*** | -0.0094 | -0.0120*** | 0.0012 | 0.0836*** | 0.0487*** |
| | (0.003) | (0.046) | (0.002) | (0.004) | (0.019) | (0.005) |
| Log GDP | -0.0477*** | -0.4329** | 0.0009 | 0.0215 | -0.4783*** | -0.2068*** |
| | (0.009) | (0.178) | (0.005) | (0.016) | (0.074) | (0.025) |
| GDP Growth | 0.1787*** | 1.3286 | 0.0016 | 0.0380 | 0.5537 | 0.3299** |
| | (0.039) | (1.007) | (0.026) | (0.059) | (0.541) | (0.131) |
| Firm dummies | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 93,376 | 81,176 | 109,906 | 121,579 | 56,587 | 76,396 |
| Adjusted R-squared | 0.388 | 0.016 | 0.631 | 0.661 | 0.209 | 0.199 |

Panel C. Public firms

| Dependent variables: | (1) Cash Flow | (2) Cash Flow Growth | (3) Cash | (4) Leverage | (5) Log Sales Growth | (6) Capital Investments |
|---|---|---|---|---|---|---|
| AFTER x Alliance | -0.0153 | -0.1990* | 0.0121 | 0.0307* | 0.0233 | 0.0229 |
| | (0.010) | (0.116) | (0.016) | (0.017) | (0.143) | (0.020) |
| AFTER | 0.0039 | 0.0552 | -0.0120** | 0.0064 | -0.0763 | -0.0186** |
| | (0.004) | (0.061) | (0.005) | (0.006) | (0.053) | (0.009) |
| Log Total Assets | 0.0377*** | -0.0298 | -0.0199*** | -0.0401*** | 0.0531* | 0.0694*** |
| | (0.005) | (0.067) | (0.004) | (0.007) | (0.029) | (0.010) |
| Log GDP | -0.0753*** | 0.1719 | 0.0364*** | 0.0745*** | -0.1165 | -0.1412** |
| | (0.023) | (0.369) | (0.009) | (0.022) | (0.102) | (0.059) |
| GDP Growth | 0.0566 | 2.6727 | 0.1775** | 0.0052 | 0.0377 | 0.0544 |
| | (0.102) | (2.335) | (0.071) | (0.106) | (0.926) | (0.237) |
| Observations | 82,065 | 72,062 | 95,765 | 98,193 | 54,786 | 58,092 |
| Adjusted R-squared | 0.443 | 0.018 | 0.550 | 0.572 | 0.275 | 0.253 |

**Table 6. Panel regression by deal type**

This table shows the panel OLS regression estimations for changes in firm performance around alliance announcement. The sample includes firm-year observations ten years around the alliance announcement. Observations at the year of announcement are dropped. *AFTER* is equal to one for the years after the alliance and zero otherwise. All regressions include a set of control variables presented in Table 5. Standard errors are corrected for clustering the observations at the firm level and robust standard errors are in parentheses. Variable descriptions are provided in Appendix A1. ***, **, and * represent the statistical significance at the 1%, 5%, and 10% levels, respectively.

**Panel A. Cross-border alliances**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Dependent Variables: | Cash flow | Cash flow growth | Cash | Leverage | Log Sales growth | Capital Investments |
| AFTERxAlliancexCross-border | 0.0044 | 0.0833 | -0.0045 | -0.0045 | 0.0039 | 0.0187 |
| | (0.009) | (0.135) | (0.011) | (0.014) | (0.078) | (0.017) |
| AFTER | -0.0002 | 0.0313 | -0.0063* | -0.0078 | -0.1099*** | -0.0145* |
| | (0.003) | (0.056) | (0.003) | (0.005) | (0.039) | (0.009) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 175,441 | 153,238 | 205,671 | 219,772 | 111,373 | 134,488 |
| Adjusted R-squared | 0.423 | 0.016 | 0.593 | 0.641 | 0.243 | 0.223 |

**Panel B. High-tech alliances**

| Dependent Variables: | (1) Cash flow | (2) Cash flow growth | (3) Cash | (4) Leverage | (5) Log Sales growth | (6) Capital Investments |
|---|---|---|---|---|---|---|
| AFTERxAlliancex Hi-Tech | -0.0026 | -0.2144 | -0.0076 | 0.0337** | -0.1887 | 0.0102 |
| | (0.011) | (0.131) | (0.017) | (0.014) | (0.145) | (0.023) |
| AFTER | -0.0063** | -0.0487 | 0.0009 | 0.0014 | -0.0412 | -0.0270*** |
| | (0.002) | (0.045) | (0.003) | (0.004) | (0.033) | (0.006) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 175,441 | 153,238 | 205,671 | 219,772 | 111,373 | 134,488 |
| Adjusted R-squared | 0.423 | 0.017 | 0.593 | 0.641 | 0.244 | 0.223 |

**Panel C. Joint ventures**

| Dependent Variables: | (1) Cash flow | (2) Cash flow growth | (3) Cash | (4) Leverage | (5) Log Sales growth | (6) Capital Investments |
|---|---|---|---|---|---|---|
| AFTERxAlliancexJoint Venture | -0.0071 | 0.0009 | 0.0164 | -0.0329* | 0.2078* | -0.0147 |
| | (0.009) | (0.113) | (0.014) | (0.018) | (0.121) | (0.021) |
| AFTER | 0.0063** | 0.0008 | -0.0056* | -0.0136*** | -0.1225*** | -0.0289*** |
| | (0.003) | (0.046) | (0.003) | (0.004) | (0.033) | (0.006) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 175,441 | 153,238 | 205,671 | 219,772 | 111,373 | 134,488 |
| Adjusted R-squared | 0.423 | 0.016 | 0.593 | 0.641 | 0.244 | 0.223 |

**Appendix A1. Variable Definition**

| Variable | Definition |
|---|---|
| AFTER | An indicator variable equals to one for firm-years after alliance formation |
| Total Assets | Total assets in U.S. million dollars |
| Cash Flow | Cash flows/Total assets |
| Cash Flow Growth | (Cash flow - Lagged cash flow)/Lagged cash flow |
| Sales Growth | (Sales - Lagged sales)/Lagged sales |
| Leverage | (Long-term debt + Current liabilities)/Total assets |
| Capital Investment | (Fixed assets - Lagged fixed assets + Depreciation)/Total assets |
| Log GDP | Log of GDP of a country in U.S. million dollars |
| GDP Growth | (GDP - Lagged GDP)/Lagged GDP |
| Lending growth | Weighted average growth of gross loans within a country and year. Source: Bankscope data. |
| China Import | China import is a one-year change in Chinese import in a country in the year prior to alliance announcement. Chinese import in a country is calculated using a mean percentage of Chinese imports across four-digit NACE codes in a country. Source: Comext database in Eurostat. |
| IPO activity | Number of IPOs within a country and year. Source: SDC data. |