

## Rivals or Partners?

### Evidence from Europe's International Private Equity Deals

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**Abstract:** Cross-border private equity flows have increased substantially in recent years. This study looks at the issue of how European investors view their local counterparts in the portfolio companies' home countries. If they regard them as rivals, they will target countries that lack a private equity industry. If they view them as (potential) partners, however, they will prefer investing in countries with a mature private equity industry. We test these two contradictory hypotheses by using a unique cross-border country dataset on international investments of European private equity investors. We find that European investors predominantly invest in countries with more mature private equity industries. The presence of local private equity investors also determines how European investors exploit differences in growth rates between the target country and their home country: European private equity investors respond more strongly to given growth differentials if investments can be syndicated with an experienced local investor. In our reading, these findings are in line with the partnership hypothesis.

Keywords: Private Equity, Internationalization, Transnational Syndication.

JEL Classification: F21, G24.

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## *1 Introduction*

Cross-border private equity transactions have experienced rapid growth in recent years worldwide. Temple (1999) calls private equity investors the “secret multinationals of the new millennium”. From this perspective it is astonishing that academic research on internationalization in private equity industries remains very rare and that most of the existing investigations are just case studies. Our study analyzes the worldwide geographical investment patterns of European private equity investors. To the best of our knowledge, we are the first to offer an empirical analysis of cross-border private equity transactions originating in nearly all European countries. Focusing on the private equity industries in European countries is of particular interest because many of them were poorly developed a decade ago. Much has been done in the last decade at the national level to promote these industries. In addition, European cross-border private equity transactions have grown at high rates: the compounded annual growth rate of transnational private equity deal volumes between 1995 and 2005 reached 36.3 percent. Also, the ratio of cross-border to total deals increased substantially. Whereas in 1996, cross-border deals accounted for only 16.3 percent of all European private equity transactions, this share reached 38.1 percent in 2005. In absolute numbers European cross-border private equity transactions amounted to €17.93 billion in 2005 – which was invested in more than 1,600 deals (EVCA 2001, EVCA 2006).

Growth differentials between countries are one important reason for investors to operate across borders. Investors from low-growth countries aim to invest in companies in high-growth countries, whenever the expected return from exploiting the growth differential is positive and exceeds the costs of carrying out a cross-border deal. However, even if we control for other factors, such as the business environments in the two countries involved and their cultural and geographical proximity, this story might be too simplistic because it ignores the impact of the private equity industry in the country in which the investors have identified promising deals (hereafter the deal country). The starting point of our analysis is the conjecture that precisely this factor may determine private equity investors’ choices of the countries in which to place their money, since the maturity of the private equity industry in the deal country affects the costs and returns of a cross-border transaction. We have two contradicting hypotheses with respect to this impact.

A high-growth country might not attract investors from low-growth countries, if it already has plenty of local private equity investors, who have an information advantage over foreigners. The better informed local investors would select the most promising deals. Consequently, the pool of the remaining deals, in which investors from abroad could invest, would have a lower expected success rate. This reasoning implies that – for a given positive growth differential – private equity investors prefer investments in countries with immature private equity industries, because they expect to face much weaker competition from informed local investors in these countries. Therefore, foreign investors have a much better chance of finding a good investment opportunity in countries where the private equity industry is immature. We call this the *rivalry* hypothesis.

Contrary to this reasoning, a high-growth country might attract even more investors from low-growth countries, if it already has a plenty of informed local private equity investors. Only in countries with mature private equity industries do foreign investors stand a chance of finding an informed inside investor with whom they can form a transnational syndicate. By doing so, the foreign investor may delegate monitoring and reduce the direct transaction costs of being involved in a cross-border deal by lowering his personal traveling costs, and he may save on indirect transaction costs incurred by handling information asymmetries between portfolio companies and investors. This reasoning implies that – for a given positive growth differential – private equity investors prefer investments in countries where the private equity industry is more mature. We call this the *partnership* hypothesis.

These two hypotheses guide us in analyzing European private equity investors' cross-border deals. Bilateral country data on cross-border private equity deals are not available. However, on an individual level, the Bureau van Dijk's ZEPHYR database provides information on single deals conducted by private equity investors. For each deal the database offers information on the location of the portfolio companies and their investors. We create our dataset by aggregating individual cross-border private equity deals on a country-pair basis. By identifying cross-border deals we distinguish whether the private equity investor is a newcomer or whether he has already accumulated experience by financing companies in a particular deal country.

To test our hypotheses adequately requires a meaningful measure for the maturity of the different private equity industries. Because our cross-border private equity deals sample only starts in 2000, the

maturity of private equity industries in the deal countries may result from previous private equity investors' cross-border activities. We tackle this problem by using several measures for maturity: First, we start with an index, averaged over 1998-1999, indicating whether private equity is easily available in the deal country. Second, we use the same index from the beginning of the 1990s. Even such an index from the beginning of the 1990s, however, might be affected by the first cross-border wave of private equity activities that took place in the middle of the 1980s. As an additional and third measure of the maturity, we therefore use the number of domestic private equity firms founded in the deal country before the start of our sample period.

Our results indicate that European private equity investors do not regard established private equity industries in the deal countries as a source of rivalry. On the contrary, they more often target countries with more mature private equity industries. In addition, for a given growth differential between the deal country and the investors' home country, European private equity investors react more strongly if the private equity industry in the deal country is mature than if it is immature. Thus, the empirical evidence we find is in line with the partnership hypothesis, which rests on the assumption that foreign and local investors form transnational syndicates. Therefore, our analysis goes ahead by distinguishing between deals in which a local syndication partner participates (syndicated cross-border deals) and deals in which only foreign investors are involved (pure cross-border deals). The insights gained from this part of our analysis also support the partnership hypothesis: deal countries with more mature private equity industries have more syndicated deals (relative to pure cross-border deals), compared to countries with immature private equity industries.

The contribution of our research to the existing literature is threefold. First, our analysis adds to the emerging literature on internationalization in private equity industries. The majority of existing studies in this area are descriptive. A few studies constitute interesting exceptions. Lerner and Schoar (2005) find evidence that private equity investors use different kinds of securities when investing in countries with different legal systems. Kaplan *et al.* (2003) demonstrate that when investing abroad, deal contracts of private equity investors located in civil law countries differ significantly from those of private equity investors located in common law countries. Cumming and Johan (2006a, 2006b) investigate institutional investors' allocation of funds to domestic and foreign private equity investors.

Most similar to our research is the study by Guler and Guillén (2005). They offer insights into the determinants of cross-border investments by U.S. private equity investors, such as the stock market capitalization and the number of patent applications in the deal country. Our study also gives useful insights into the role of the “classical” determinants of cross-border deals. However, our analysis focuses on the role played by local private equity industries in attracting cross-border investments.

Second, our study contributes to the literature on the syndication of private equity transactions. Private equity investors typically form syndication networks (e.g., Sorensen and Stuart 2001, Lerner 1994, Hochberg *et al.* 2007) in order to achieve portfolio diversification and larger deal flows. Moreover, through the syndicate partners’ complementary skills and contact networks (Lindsey 2005, Hsu 2004), they are also able to generate additional value in their portfolio companies (Brander *et al.* 2002). Reputational mechanisms, repeated relationships and reciprocity diminish potential agency conflicts among the syndicate partners. The investment patterns of private equity syndicates involving partners from several countries are likely to differ from those of single investors and domestic syndicates, since transnational private equity syndicates may invest in the most promising countries at a relatively low cost, relying on the information provided by the network’s local partner. When investment conditions change, another country may move into the focus of the syndicate and another partner take over the role of the informed investor. Besides this, complementary skills within transnational private equity syndicates, such as a syndicate’s familiarity with capital and product markets in several countries, may be particularly valuable to portfolio companies planning an expansion into markets outside their home countries.

Third, our research adds to the broad literature on international capital flows. While little is known about cross-border private equity flows, a considerable amount of research has been carried out into international capital flows (e.g., Gelos and Wei 2004, Cao and Brennan 1997). For several types of international capital flows, such as bank lending and foreign direct investments of banks, the recent literature shows that the economic growth in the deal country is an important factor for attracting foreign capital flows (Focarelli and Pozzolo 1999, Goldberg 2002, Goldberg 2005, Goldberg *et al.* 2002). The studies on international capital flows also put particular emphasis on transaction costs

(Barron and Valev 2000, Portes *et al.* 2001, Portes and Rey 2005). Our results indicate that growth and transaction costs also play a decisive role in cross-border private equity deals.

The remainder of the paper is organized as follows. In Section 2, we derive hypotheses on the role of the maturity of the private equity industries in the deal countries. Section 3 is devoted to the description of our data set. In Section 4, we analyze whether European private equity investors invest more or less often in countries with mature private equity industries. We further investigate whether their response to growth differentials depends on the maturity of the private equity industry in the deal country. Section 5 focuses on transnational syndication, since the partnership hypothesis rests on the assumption that private equity investors from the foreign and the deal countries work together. Section 6 summarizes the results and gives directions for further research.

## **2 Hypotheses**

We have two contradictory hypotheses on the impact of the maturity of the private equity industry in the deal country (DC). Our first hypothesis we call the *rivalry* hypothesis. Suppose that private equity investors from the DC have an advantage over investors from abroad, since the former are familiar with the legal and tax systems, as well as with the entrepreneurial culture, in the DC. In countries with mature private equity industries, many sophisticated private equity investors are around, deal competition is strong, and the likelihood of an excess demand for private equity by promising companies is very low. Private equity investors from the DC may use their informational advantage to pick up the winners. When entering such a country, foreign private equity investors are confronted with a probability of financing a “lemon” (Akerlof 1970), which is higher than the average probability that a business in the DC will turn out to be a “lemon”. In contrast, in countries with immature private equity industries in which the likelihood of an excess demand is high, foreign private equity investors face only an average probability of selecting a “lemon”. Consequently, under the rivalry hypothesis we expect private equity investors to enter countries in which private equity industries are still immature. The maturity of the DC private equity industry should show up as negative in a cross-border deal regression.

In addition to this *level* effect of the private equity industry's maturity, we also expect an *amplification* effect for the differential in the growth rates of the DC and the foreign country. Investors go abroad only if the growth opportunities in the DC are much better than the growth opportunities in their home countries because cross-border private equity deals involve much higher transaction costs than domestic deals. These high costs come partly from direct transaction costs such as traveling costs. Moreover, in order to reduce the informational disadvantage *vis-a-vis* their counterparts from the DC and to reduce the "lemon" problem, foreign private equity investors have to bear indirect costs of gathering information on portfolio companies and becoming familiar with legal and cultural traditions in the DC.

Because of the indirect information-related transaction costs, the impact of the growth differential between the DC and the foreign country on cross-border deals depends on the maturity of the private equity industry in the DC. Under the rivalry hypothesis, the impact of the growth differential between the DC and the foreign country on cross-border deals should be lower when the private equity industry in the DC is mature than when it is immature. This is because the "lemon" problem faced by foreign investors is less pronounced in countries without a mature private equity industry than in countries with such an industry. In other words, because of the more intensive competition, the growth differential between the DC and the foreign country must be much larger to attract a given number of cross-border deals, if the DC has a mature private equity industry than if the DC lacks it.

Our second hypothesis we call the *partnership* hypothesis. Under this hypothesis transnational syndication creates value for the syndicate partners. Theoretical literature has put forward several motives for syndication, such as risk diversification (Chowdhry and Nanda 1996, Wilson 1968) and information sharing (Millon and Thakor 1985, Sah and Stiglitz 1986, Casamatta and Haritchabalet 2003). Recent empirical literature investigates these and other motives for national syndication. For example, Brander *et al.* (2002), and Cumming and Walz (2004) find evidence that syndicated venture capital (in the case of the former) and private equity investments (in the latter study) generate larger returns, indicating that syndicates add more value to portfolio firms than stand-alone investors.

In an international context, syndication may reduce direct and information-related transaction costs for foreign private equity investors when they delegate the monitoring of the portfolio companies to their

partners in the DC. Such “delegated monitoring” has some parallels with the delegated monitoring modeled by Diamond (1984). Without an additional mechanism, delegated monitoring costs would not be lower than direct monitoring costs because, instead of controlling the portfolio company, the foreign private equity investor would have to monitor his partner in the DC. However, reputational concerns and repeated relationships within syndicates are likely to reduce monitoring costs among the syndicate partners substantially (e.g., Pichler and Wilhelm 2001, Chowdhry and Nanda 1996, Tykvová 2007).

Besides the transaction cost reduction, transnational syndicates may combine more complementary skills and capabilities than domestic syndicates. For instance, they may play a key role in the internationalization efforts of their portfolio companies, which may profit from the private equity investors’ knowledge of their respective home country product and capital markets.

Under the partnership hypothesis we expect private equity investors to enter countries in which they find experienced partners for syndication more often. The maturity of the DC private equity industry should be positive in a cross-border deal regression. Again, we do not expect only this *level* effect on cross-border deals, but also an *amplification* effect: if investors can and do syndicate their deals with partners from the DC, then the transaction costs of these cross-border deals are lower, and the value created in portfolio firms is higher compared to deals in countries in which the investors do not find a reliable partner. Therefore, even a DC with a relatively small growth differential – compared to the investor’s home country – may be attractive when it has a mature private equity industry enabling deal syndication, transaction cost reduction and value creation.

In order to test these hypotheses, we control for a number of determinants which may be relevant for cross-border private equity deals. We discuss them in Section 3, where we describe our dataset.

### **3 The dataset**

#### *Endogenous variables*

We use data on private equity cross-border deals from Bureau van Dijk’s ZEPHYR database, which offers information on mergers and acquisitions, initial public offerings, and private equity transactions. We collected information on individual deals of European private equity investors for the period 2000-

2004, in particular on the geographical locations of the investors and their investments. We classified the deals from the ZEPHYR database using several criteria. In the first step, we searched the database for deals where the acquirer was from Europe, which were completed in 2000-2004, and which had one of the following types of financing: venture capital, private equity, angel investment, corporate venturing, or seed financing. In the second step, we used the European Venture Capital and Private Equity Association (EVCA) directory and several national venture capital associations' member directories and created a list of private equity investors. We then searched the ZEPHYR database for these, in order to ensure that no deals had been omitted in the first step. In the third step, we analyzed the business description of the investors and kept only the deals in which the business description of at least one investor included "venture capital" or "private equity".

In the framework of this study, we are only interested in cross-border private equity deals, i.e. deals in which the investors do not invest in their home country. We aggregated the number of deals for each pair of countries over the whole observation period 2000-2004 for two main reasons. Firstly, there is a low variability in the deal data on one hand and a large heterogeneity among the private equity investors on the other hand. Secondly, structuring a private equity deal takes time. Therefore, a deal finalized in the first half of 2001 was probably initiated in 2000 and might also have been affected by the country-wide data at that point in time.

Instead of using the number of deals as the endogenous variable, we could employ the volumes invested in the private equity deals between the two countries. But unfortunately, invested volumes of single deals are only reported for approximately 80% of the deals in our sample. Moreover, the invested volumes are available only for a deal as a whole. So, in syndicated deals, we do not know how much each single acquirer invested. Therefore, in our investigations we rely on the number of deals, and not on the deal volumes.

For each foreign country and each DC, Table 1 shows the number of cross-border deals (for four different definitions of cross-border deals), the number of country pairs without a cross-border deal, and the number of all possible country-pair combinations. We construct an aggregated *total count-based* deal measure in the following way: if one or more private equity investors from France provide capital to a company in Germany, this deal shows up once in the cross-border deals between France as

the foreign country and Germany as the DC. If a private equity investor from France and a private equity investor from the United Kingdom provide capital to a firm in Germany, this transaction counts once for the deals between France and Germany but also once for the deals between the United Kingdom and Germany. By using this count-based approach, one deal with multiple investors from various foreign countries is counted more than once. Therefore, we also use an alternative *weight-based* approach to capture total deals. Here, each deal is divided among the participating investors and each investor receives the same fraction of the deal. Thus, if a private equity investor from France and another investor from the United Kingdom provide capital to a firm in Germany, the deal shows up as a half deal between France and Germany and a half deal between the United Kingdom and Germany.

Testing the rivalry and the partnership hypotheses adequately requires us to take into account the possibility that private equity investors may have accumulated experience in the DC even if they are not a local investor in this DC. More specifically, the internationalization process often took the form of establishing a fund in the United Kingdom and investing it in Continental Europe, where private equity investor may or may not have established a subsidiary. One example of such a strategy is *3i Group*, which is located in the United Kingdom and invests all over Europe and Asia. *3i Group* established a management unit in Germany, for example, in as early as 1986. In the ZEPHYR database, all *3i Group* investments in Germany are specified as deals from the United Kingdom. However, we would expect that, because of its long track record, *3i Group's* behavior in Germany will be akin to that of a domestic, informed investor rather than a foreign, inexperienced investor. Also, without a management unit, there certainly is a difference in the know-how of private equity investors with experience in a given country and newcomers. Foreign private equity investors with experience in a particular DC are likely to behave similarly to domestic investors in this DC. We therefore create two further measures of cross-border deals: the number of count-based and weight-based *newcomer* deals.

To construct the variables count-based and weight-based newcomer deals, we identify the first deal of each of our private equity investors for each DC under consideration in the ZEPHYR database. Those private equity investors that had at least one deal before 2000 in a given DC were re-classified as local rather than foreign for all their transactions in this DC. To give an example, for all *3i Group* deals in

Germany, the investors' home country was changed from the United Kingdom to Germany. For private equity investors and DCs with their first deal after 2000, we kept only the first deal as a cross-border deal. For all later deals of this investor in this DC, the origin country was re-classified, and the investor was regarded as a local investor in the respective DC. Because of this procedure nearly 60 percent of our total cross-border deals fall into the category of local deals and were excluded from our analysis on newcomer cross-border deals.

Since we focus on worldwide investments by European private equity investors, the number of DCs exceeds the number of countries the investors come from. In order to capture the full universe of European private equity investors' cross-border deals, all countries around the globe were selected as potential DCs. We then dropped the DCs in which Europe's private equity investors had less than ten deals within the period under consideration. For each European country we were left with 23 country-pair combinations. In the next step, we excluded countries which launched five deals or less from the group of investor countries. As a result, 14 countries remained as foreign investors' home countries. Consequently, we ended up with  $14 \times 23 = 322$  country pairs and a total of 3,591 cross-border deals (1,443 newcomer cross-border deals). The number of DCs with non-zero total cross-border deals across these 14 investor countries varies from just two DCs for Ireland to 22 DCs for Germany, the Netherlands, and the United Kingdom.

#### *Exogenous variables of interest*

Our first measure to capture the level effect of the maturity of the private equity industry in the DC is the private equity index published in the World Competitiveness Yearbook. A higher value of this index indicates a more mature private equity industry. Since we analyze cross-border deals from 2000-2004, we use the index averaged over the years 1998 and 1999. Table 2 shows the summary statistics of the private equity index averaged over the years 1998 and 1999 for the DCs in our sample; it ranges from 3.36 in India to about 7.96 in the United States.

The value of the private equity index, averaged over the years 1998 and 1999, can be influenced by cross-border private equity flows, since private equity investors, such as *3i Group*, started to internationalize very early. Thus, this index does not measure the maturity of the private equity industry that would result purely from national sources. Instead, a country might have a high private

equity index because it attracted many private equity investors from abroad in former times. In order to tackle this endogeneity problem, we use the private equity index from 1990 as a robustness check in our regression analysis.<sup>1</sup> Overall, however, the values of the private equity index show little variation over time.

Our second measure of the maturity of private equity industries is the number of private equity investors originally founded in the country under observation before our sample period starts. To generate this variable we use the VCPro database which contains information about private equity and venture capital companies worldwide. The number of private equity investors included in this database is roughly comparable to the number of private equity investors who are members of the local private equity associations. We only focus on primary foundations. This means that in our count we do not include management units and subsidiaries of existing private equity investors, which were identified with the help of webpage information. Combining this webpage information with the foundation data provided in the VCPro database, we kept only the oldest company as the primary foundation. In addition, we dropped all companies which were founded later than 1999. In order to obtain a relative measure, we used the population of the respective country to scale the number of private equity investors.

The amplification effect of the maturity of the private equity industry in the DC is captured by dummy variables interacted with the growth differential. Our first dummy variable  $D_{PEI,DC}$  builds on the private equity index averaged over 1998-1999. It equals one if the private equity industry in the DC is mature (private equity index is above the 75-percentile) and zero otherwise. Our second dummy variable,  $D_{PEC,DC}$  is based on the number of domestic private equity investors in the DC. It equals one if the relative number of private equity investors in the DC exceeds the 75-percentile of the sample and zero otherwise. In the same way, we construct two dummy variables for the maturity of the private equity industry in foreign countries ( $D_{PEI,FC}$  and  $D_{PEC,FC}$ ).

Our next exogenous variable of interest, the growth differential, is the difference between the real annual GDP growth rates (in percent) in the DC and the foreign country, averaged over 1998-1999.

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<sup>1</sup> For most of the countries in our sample, the private equity index is available from 1990 onwards. For the remaining countries, we use the index value of the year first reported.

We use the growth rates from a period before our sample starts in order to ensure that cross-border private equity investments do not influence our growth measure. Real GDP growth rates vary substantially in our country sample, from as low as 0.03 percent in the Czech Republic to 9.90 percent in Ireland (see Table 2).

### *Control variables*

In order to test our hypotheses, we control for a number of determinants, some of which are specific to this type of financing, whereas other are relevant for foreign asset holdings in general. We summarize these determinants within two broad categories: the business environment and the cultural and geographical proximity of the DC and the foreign country. The Appendix provides the definitions and sources of the variables used. The summary statistics are presented in Table 2.

The business environment includes access to stock markets. Some countries, such as the United Kingdom and the United States, have a high stock market capitalization relative to GDP, while many Continental European countries have a comparatively low stock market capitalization. A developed stock market encourages venture capital investments (Jeng and Wells 2000, Black and Gilson 1998, Bascha and Walz 2002), because it offers a profitable exit route and supports investors' reputation building and fundraising (Gompers 1996). These arguments might also hold for the broader investment class of private equity. Carrying out an initial public offering via a foreign stock market, as Israeli and Dutch firms do on the NASDAQ (Blass and Yafeh 2001), might not create similar effects, since going public on a foreign exchange is more expensive than going public on the domestic stock market. Therefore, we conjecture that a developed stock market in the DC should attract foreign private equity investors. Since a high stock market capitalization might result from former private equity investments, we use data from the period before our sample starts (average over 1998 and 1999).

The investment decision of an investor is, however, not solely driven by the characteristics of the DC. In a similar way, the investment decision depends on the investment possibilities open to the investor in his home country. Ignoring for a moment the high correlation between stock markets and private equity industries, one should expect that investors from countries in which stock markets are underdeveloped have an incentive to enter countries in which stock markets play an important role.

This would imply that the difference between stock market development in the DC and the foreign country should have a positive effect on the cross-border private equity deals between the DC and the foreign country. However, this argumentation ignores that in countries with poor stock markets, private equity investors who invest either domestically or internationally may be hard to find. From this perspective, stock market development in the investors' home country may have a positive effect on cross-border deals originating in this country. We conclude that the impact of the differential between stock market capitalization in the DC and the foreign country remains ambiguous.

Returns from entrepreneurship are at the centre of investment decisions. On a country level, these returns depend positively on creativeness of people, which is reflected in the human capital available in this country. We measure human capital availability by the number of patent applications relative to population. Since patent applications likely result from private equity and venture capital investments (Kortum and Lerner 2000), we use data from the period before our sample starts (average over 1998 and 1999). In addition, we use an entrepreneurship index from the World Competitiveness Yearbook which indicates whether entrepreneurship practices are widespread among managers in the country. Returns from entrepreneurship depend also on corporate taxes. Private equity investors have incentives to invest in those DCs that offer favorable tax conditions relative to the tax conditions in their home countries. However, the corporate tax rate may not be an adequate reflection of the tax burden faced by cooperations because the tax deduction systems and the determination of the tax base differ substantially between countries (OECD 2002).

Cultural and geographical proximity between the DC and the foreign country determine the costs private equity investors have to carry for managing cross-border deals. Geographical proximity, i.e. the distance between the two countries, determines traveling costs for the private equity investor. Cultural proximity, reflected by same vs. different language and legal tradition, influences the costs of contracting: If the same language is spoken in the DC and the foreign country, and if both countries have the same legal tradition, contracting costs are lower.

For each country pair we calculate the difference between the growth rate in the DC and in the foreign country, and the difference between each control variable in the DC and the foreign country. Table 3 gives the correlation coefficients for these differentials, interacted growth differentials and the

measure of the private equity industries' maturity in the DC and the foreign country. Correlation coefficients do not point to excessive multicollinearity among the variables.

#### ***4 Do European private equity investors have rivals or partners in mind?***

##### *The level effect*

If private equity investors going abroad consider private equity investors in the DC as rivals and, therefore, as negative for their investment success, we should observe private equity investors selecting more often DCs in which the private equity industry is still immature. However, if private equity investors regard their counterparts in the DC as potential partners, we should observe private equity investors selecting deals from those countries in which the private equity industry is mature more often.

In order to trace out whether private equity investors see their counterparts in the DC as rivals or partners, we analyze the count-based total and, alternatively, newcomer cross-border deals between each of our 23 DCs and the 14 European countries the private equity investors come from. Our two other endogenous variables, weight-based total and weight-based newcomer cross-border deals, are used as a robustness check. We scale the number of cross-border deals by the population averaged over the DC and the foreign country since the countries in our sample vary substantially in size. We end up with endogenous variables which are zero for all country pairs without (total or newcomer) cross-border deals and positive otherwise. Therefore, we use a one-side censored Tobit model which takes into account the fact that several country pairs have zero cross-border deals. In addition to the measure of the private equity industries' maturity in the DC and the foreign country and the growth differential, we include control variables capturing the business environment and the cultural and geographical proximity as discussed in Section 3. Results of the Tobit exercises are given in Table 4.

The results of the model specification in column (1) indicate that the private equity index of the DC has a significant positive impact on the total number of cross-border deals. Thus, countries with more mature private equity industries are more successful in attracting cross-border deals than countries with less mature private equity industries. This suggests that private equity investors going abroad see their counterparts in the DC as partners rather than as rivals. However, the private equity index may

overstate the impact of the maturity of the private equity industry because this index might be affected by former investment activities from foreign private equity investors. But the positive and significant marginal effect is also observed for the number of original private equity investors in the DC (column (2)). This measure of the private equity industries' maturity in the DC hardly depends on former investment activities of foreign private equity investors. The positive impact of the maturity of the private equity industry in the DC holds not only for total, but also for newcomer deals (columns (3) and (4)).

Not only does cross-border private equity target countries with mature private equity industries, it also comes from those countries in which the private equity industries are mature, as indicated by the positive and statistically significant coefficients on  $PEI_{FC}$  and  $PEC_{FC}$ .

A high growth differential,  $\Delta g$ , i.e. a high real GDP growth rate in the DC and/or a low real GDP growth rate in the foreign country, gives foreign private equity investors incentives to invest in the DC. This result holds for the total deals as well as for the newcomer deals irrespective of whether the maturity of the private equity industry is measured by the private equity index or the number of private equity investors.

In the various model specifications reported in Table 4, most of our control variables have the expected signs. The differential in stock market capitalization between the DC and the foreign country,  $\Delta CAP$ , impacts cross-border deals negatively. In order to gain further insights into the role of the stock market development, we investigate the capitalization in the DC and the foreign country individually instead of using the differential (results are not reported). This analysis shows that the stock market capitalizations of the DC and the foreign country impact cross-border deals significantly positively, and that the marginal effect of the latter exceeds the marginal effect of the former. Thus, countries with a higher stock market capitalization are more successful in attracting foreign private equity investors than countries with a poor stock market capitalization. At the same time, private equity investors located in countries with a higher stock market capitalization invest more often abroad than private equity investors located in countries with a poor stock market capitalization.

The differential in patent applications,  $\Delta HC$ , and the differential in the entrepreneurial index,  $\Delta EN$ , both have the expected signs.  $\Delta HC$  and  $\Delta EN$  impact cross-border deals significantly positively except

when we use newcomer deals in combination with the number of private equity investors (column (4)). However, this lack of statistical significance can be attributed to the higher correlation between the number of private equity investors and  $\Delta HC$  and  $\Delta EN$  (see Table 3). With regard to the differential in corporate taxes,  $\Delta T$ , we expect a negative effect on cross-border deals. However, in the first three model specifications, we find statistically positive marginal effects of  $\Delta T$ . As discussed before, tax rate may be an inappropriate measure to capture the complex differences in the tax burden within a country sample. Therefore, the coefficients of  $\Delta T$  might be not informative at all.

Both cultural and geographical proximity are important determinants of cross-border private equity flows. The shorter the distance between the DC and the foreign country ( $Dist$ ) is, the more cross-border private equity deals we observe in all model specifications. The number of cross-border deals is always higher when the same language,  $D_L$ , is spoken in the DC and the foreign country. These results underline the relevance of transaction costs in cross-border private equity deals. The same legal tradition in the DC and the foreign country,  $D_{LT}$ , does not have a significant impact on cross-border deals.

We carry out a large number of additional regressions in order to yield insights whether the results we have discussed so far are sensitive to various sources of changes. In particular, we carry out the following robustness checks (results not reported but are available upon request): (i) We estimate the impact of each single variable discussed so far on cross-border deals individually in a univariate regression in order to check whether multicollinearity among exogenous variables really does not damage the results. (ii) We experiment with dummy variables for the legal tradition. (iii) We use the private equity index from 1990 instead of the average over 1998 and 1999 in order to tackle the potential endogeneity of the private equity index in the DC. (iv) We use the GDP growth rate averaged over 1998-2004 instead of the average over 1998 and 1999 (thus, we ignore the potential endogeneity of the GDP growth rate). (v) We exclude the United Kingdom as an investor's home country from the sample because the British economy is more market-based than the other European countries considered here (Beck and Levine 2002) and because US private equity investors such as *Advent*, *General Atlantic* and *Benchmark* used the United Kingdom to systematically enter European private equity industries in the boom phase at the end of the 1990s (Hardymon *et al.* 2003). (vi) We execute

all specifications from Table 4 and all robustness checks (i)–(v) for the weight-based (total and newcomer) deals.

Our robustness checks yield the following insights: (i) The effects of the variables estimated individually are roughly in line with the results we present in Table 4 for the full-specified level-effects model. (ii) In our sample, countries' legal traditions play a minor role in explaining cross-border private equity deals. (iii) Using the private equity index from 1990 instead of the index averaged over 1998-1999 changes neither the size nor the significance of its marginal effect for the DC substantially. The marginal effect of the foreign country increases by about one half. (iv) When we use the growth differential averaged over 1998-2004, the significance of the GDP growth differential is considerably higher. (v) Excluding the United Kingdom from our sample as an investor's home country does not substantially change our estimation results. (vi) For weight-based total and weight-based newcomer deals, the results remain very similar. To sum up, we can conclude that our results presented in Table 4 are not sensitive to a broad range of variations.

In this section, we found evidence in line with the partnership hypothesis. Countries with a mature private equity industry are more successful in attracting private equity from abroad than countries that lack such an industry or in which such an industry is immature. This level effect also holds when we take into account that foreign private equity investors have accumulated experience in particular DCs. Apart from this level effect of the maturity of the private equity industries in the DC and foreign country, we also expect an amplification effect with respect to the growth differential. To this amplification effect we turn next.

#### *The amplification effect*

The maturity of the private equity industry may also create an amplification effect in the sense that it influences the role played by the growth differential on cross-border deals. Under the rivalry hypothesis, the growth differential interacted with a dummy variable for a mature private equity industry in the DC should show up negatively. Private equity investors enter a country with a mature private equity industry only if the growth differential is sufficiently large to compensate them for the high transaction costs they face as compared to investors from the DC. Under the partnership hypothesis, in contrast, the growth differential interacted with a dummy variable for a mature private

equity industry in the DC should have a positive impact. Private equity investors enter a country with a mature private equity industry even if the growth differential is small compared to a differential of another DC that lacks a private equity industry. The growth differential can be smaller because a syndicate with an investor from the DC may reduce transaction costs of the cross-border deal and create an additional value in the portfolio companies.

When investigating this idea within the empirical data, we further take into account the possibility that the response of cross-border deals to growth differentials may not only depend on the maturity of the private equity industry in the DC but also on the maturity of the industry in the foreign country. In foreign countries with sophisticated private equity industries, an average private equity investor may have much more experience in structuring financial deals so that it is less costly for him to structure a cross-border deal. Moreover, more intense competition may lead to the decision to go abroad. Therefore, private equity investments originating in countries with a mature private equity industry may respond stronger to a given growth differential than investments from foreign countries in which the private equity industry is still under construction.

Regressions results relevant to the amplification effect are shown in Table 5. For both measures of the private equity industry maturity, we find that total as well as newcomer cross-border deals depend significantly positively on the growth differential interacted with a dummy variable for more mature private equity industries. These results further support the partnership hypothesis: A given growth differential is more attractive to foreign private equity investors if they can save on transaction costs by syndicating a cross-border deal with an investor from the DC.

The influence of the maturity of the private equity industry, the growth differential and the control variables used to capture business environment as well as cultural and geographical proximity in the amplification-effect model presented in Table 5 is very similar to that found in the level-effect model presented in Table 4. More specifically, the signs and significance levels of marginal effects do not change for the newcomer cross-border deals. For the total cross-border deals, we even observe that neither the signs, nor the size, nor the significance levels of the marginal effects change substantially when we include the growth differential interacted with a dummy variable, which equals one for mature private equity industries.

Again, we perform a large number of additional regressions (equivalently to the level-effect model) in order to find out whether the results we discussed are sensitive to various sources of changes. Including interaction terms does not change the insights concerning the legal tradition. When we base the dummy variable, which is equal to one for a mature private equity industry, on the private equity index from 1990, the amplification effect remains significant only for total deals. When we use the growth differential averaged over 1998-2004, the marginal effects and the z-values of the basis growth differential as well as the growth differential interacted with a dummy variable for mature private equity industries in the DC are substantially higher. The results are robust to excluding the United Kingdom from the group of foreign countries. Most of the outcomes from the basic models and the robustness checks also hold for both endogenous variables based on weight-based deals.

### *5 Is it syndication?*

Our partnership hypothesis is based on the assumption that syndication of private equity deals takes place across borders. Therefore, in this section we look into the differences between pure cross-border deals, in which no investor from the DC participates, and syndicated cross-border deals, in which at least one investor from the DC participates.

Table 6 gives the number of pure (without an investor from the DC) and syndicated (with at least one investor from the DC) total cross-border deals for all country pairs in our sample. Some countries, such as Austria, China and Portugal, attract more pure cross-border deals than syndicated cross-border deals, while others, such as the United Kingdom and the United States, attract much more syndicated than pure cross-border deals. In total, we observe 1,141 pure cross-border deals and 2,450 syndicated cross-border deals, when using the total count-based measure. These numbers indicate that syndication across borders plays a considerable role in private equity finance. The examples of countries given above suggest that syndication takes place more often if the private equity industry in the DC is more mature. We turn to this issue next.

In line with the partnership hypothesis we expect that the number of syndicated deals relative to the total number of cross-border deals that a DC has attracted (syndication rate) is positively correlated with the maturity of the private equity industry in the DC. For each DC, Table 7 reports the two

measures of the private equity industries' maturity and the syndication rates for count-based and weight-based total and newcomer deals. Syndication rates vary substantially across the DCs: China, Poland, Hungary and India have very low syndication rates, while Israel, the United Kingdom and the United States have very high syndication rates. We present correlation coefficients between the syndication rates and the maturity of the private equity industries in the DCs at the bottom of the table. Based on the full number of DCs and the total deals, the correlation between the syndication rate and the private equity index is about 0.75 for count-based and weight-based deals. Excluding the United States from the correlation calculation reduces the correlation coefficient by about 0.05, excluding the United Kingdom and the United States decreases the correlation coefficient by about 0.07. When using only newcomer deals instead of total deals, the correlation coefficients increase slightly. Similar conclusions hold for the correlation coefficients between cross-border deals and the number of private equity investors. These positive and statistically significant correlation coefficients indicate that syndication with experienced partners from the DC is of particular importance in private equity transactions, especially for newcomers. This finding further supports the partnership hypothesis.

On a country-pair basis, we create a variable, *PS*, which defines three country-pair groups according to the relation between the number of pure and syndicated cross-border deals. The first group contains country pairs without any cross-border deal. The second group consists of country pairs with more pure cross-border deals than syndicated deals. The third group comprises country pairs with more syndicated than pure cross-border deals. For the total count-based cross-border deals, we have 137 country pairs without any cross-border deals, 86 country pairs with more pure than syndicated cross-border deals and 99 country pairs with more syndicated than pure cross-border deals (see Table 8).

If syndication with a private equity investor from the DC reduces transaction costs of cross-border deals or if transnational syndicates create a higher value added to their portfolio firms, then syndicated deals should react more strongly to the maturity of the private equity industry in the DC than pure cross-border deals.<sup>2</sup> Indeed, the multinomial logit model (see Table 8) with the dependent variable *PS*

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<sup>2</sup> The number of pure and syndicated cross-border deals does not, however, reveal the conditions under which private equity investors prefer pure cross-border deals and under which conditions they prefer syndicated cross-border deals. This decision process cannot be analyzed with the cross-border country dataset we used here since we do not observe any pure or syndicated cross-border deals for several country pairs. Therefore, we dedicate this analysis to future research.

and the same exogenous variables that were used in Section 4 shows that the probability of being in the 3<sup>rd</sup> group, which is characterized by more syndicated than pure cross-border deals, is positively influenced by the private equity index of the DC. The probability of being in the 2<sup>nd</sup> group with more pure than syndicated cross-border deals is negatively affected by the private equity index of the DC. The former effect is largely statistically significant for both the total and the newcomer deals, whereas the latter is not significant. This evidence further supports the partnership hypothesis.

The partnership hypothesis also makes predictions about the marginal effects of the growth differential for pure and syndicated cross-border deals. The growth differential should be relevant for syndicated but less so for pure cross-border deals. The reasoning here is as follows: For very small growth differentials no cross-border deal is undertaken due to the high transaction costs of cross-border deals. For medium growth differentials only syndicated cross-border deals are undertaken because transaction costs of pure deals are higher than those of syndicated deals. For a high growth differential even pure cross-border deals might become viable. This suggests that the marginal effect of the growth differential should be lower for pure cross-border deals than for syndicated cross-border deals. We find indeed that the probability of being in the 3<sup>rd</sup> group with more syndicated than pure newcomer deals depends more strongly on GDP growth than the probability of being in the 2<sup>nd</sup> group.

We carry out a large number of additional regressions. (i) We employ the private equity index from 1990 instead of the average over 1998 and 1999. (ii) We use the size of the domestic private equity industry instead of the private equity index. (iii) We employ the GDP growth rate averaged over 1998-2004 instead of the GDP growth rate averaged over 1998 and 1999. (iv) We exclude the United Kingdom from our sample as an investor's home country.

Our additional regressions yield a number of interesting insights. The private equity index from 1990 behaves similarly to the index averaged over 1998 and 1999. At least for newcomer deals, similar results hold when we use the number of private equity investors instead of the private equity index. When we use the growth differential averaged over 1998-2004, the significance of the GDP growth differential in the third group is considerably higher and it becomes insignificant in the second group. Excluding the United Kingdom does not substantially change our estimation results. Also here, the

significance of the growth differential in the second group disappears. Therefore, we conclude that the results presented in Table 8 are not sensitive to a broad number of variations.

## **6 Conclusion**

Cross-border private equity flows have increased substantially in recent years. In this study we analyze whether private equity investors who venture abroad see the presence of a mature private equity industry in the deal country as a source of rivalry or whether they regard it as a potential source of partnering. The evidence we find is in line with the partnership hypothesis: Deal countries with mature private equity industries are more successful in attracting foreign investors than deal countries with immature private equity industries. In addition, cross-border private equity deals respond more strongly to a given GDP growth differential when the deal country has a mature private equity industry than when it has only a poorly developed industry. We argue that foreign private equity investors without experience in a particular country lower the costs of their cross-border transactions by syndicating with ‘informed’ investors in the deal country.

Our discussion of cross-border private equity deals raises a couple of further research questions. First and foremost, it would be appealing to study whether similar conclusions hold for US private equity investors going abroad to find lucrative investment opportunities. Furthermore, in the international context, insights on how established European private equity investors structure their portfolios in terms of the countries and industries they select would be very useful to increase our understanding of the financial integration process in Europe. More specifically, it would be interesting to know whether country factors or sectoral factors drive the composition of private equity investors’ portfolios. In addition, the entrance strategy of European private equity investors has not received any attention in the academic literature. Being a partner in a transnational syndicate might follow being a partner in a national syndicate, after a certain time-lag. This time lag might be influenced by the sectors on which the private equity investor focuses. We leave these issues open for further research.

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*Table 1: Cross-border deals*

This table gives information on the number of total and newcomer cross-border deals either count-based or weight-based (weight-based numbers are rounded). Zero pairs are the number of country pairs for which we do not observe any cross-border deals. Total pairs indicate the number of all possible country-pair combinations.

	Total deals			Newcomer deals			Total pairs
	count-based	weight-based	zero pairs	count-based	weight-based	zero pairs	
<i>Foreign country</i>							
Austria	22	14	18	15	9	18	23
Belgium	186	64	9	63	25	10	23
Denmark	96	31	11	49	17	11	23
Finland	61	29	15	31	13	15	23
France	310	134	4	162	63	5	23
Germany	563	209	1	237	98	1	23
Ireland	37	15	21	12	5	21	23
Italy	82	32	10	49	20	10	23
Netherlands	377	129	1	174	67	2	23
Norway	50	16	17	26	9	17	23
Spain	40	23	15	30	17	15	23
Sweden	185	80	10	82	37	10	23
Switzerland	362	108	4	142	46	4	23
United Kingdom	1220	584	1	371	188	1	23
<i>Deal country</i>							
Australia	17	9	9	10	5	9	14
Austria	43	27	9	27	17	9	13
Belgium	95	43	5	51	24	5	13
Canada	55	18	5	37	12	5	14
China	17	10	10	12	6	10	14
Czech Republic	7	4	10	6	4	10	14
Denmark	71	32	4	35	19	4	13
Finland	97	52	5	51	22	5	13
France	350	154	3	117	51	3	13
Germany	329	155	2	116	49	2	13
Hungary	12	9	10	9	6	10	14
India	13	12	9	11	10	9	14
Ireland	89	36	6	49	19	6	13
Israel	73	24	5	43	15	5	14
Italy	91	66	7	38	25	7	13
Netherlands	91	49	3	56	29	3	13
Norway	42	25	4	27	17	4	13
Poland	15	10	9	12	9	9	14
Portugal	18	13	9	10	7	11	14
Spain	100	72	6	29	18	6	13
Sweden	181	91	3	87	43	4	13
Switzerland	107	52	3	70	32	3	13
United Kingdom	318	120	0	142	56	0	13
United States	1360	385	1	398	122	1	14
<b>Total</b>	<b>3591</b>	<b>1467</b>	<b>137</b>	<b>1443</b>	<b>614</b>	<b>140</b>	<b>322</b>

*Table 2: Descriptive statistics for exogenous variables*

This table gives descriptive statistics for the exogenous variables based on the deal countries (DCs). For data definitions and sources see Appendix.

	Name	Mean	Standard deviation	Minimum	Maximum
Exogenous variables of interest					
<i>Maturity of the PE industry</i>					
Private equity index	<i>PEI</i>	5.495	1.263	3.355	7.955
Private equity investors/population	<i>PEC</i>	0.221	0.210	0.001	0.807
<i>Growth rate</i>					
GDP growth	<i>g</i>	3.938	1.999	0.030	9.989
Control variables					
<i>Business Environment</i>					
Stock market capitalization/GDP	<i>CAP</i>	0.844	0.646	0.151	2.589
Patents/population	<i>HC</i>	0.353	0.291	0.001	1.001
Entrepreneurship index	<i>EN</i>	5.893	0.806	4.371	7.787
Corporate tax rate	<i>T</i>	0.293	0.073	0.080	0.384
<i>Cultural and geographical proximity</i>					
Ln distance	<i>Dist</i>	7.414	1.010	5.153	9.781
Same legal tradition	<i>D<sub>LT</sub></i>	0.478		0	1
FC & DC have common law	<i>D<sub>CL</sub></i>	0.031		0	1
Only DC has common law	<i>D<sub>DC,CM</sub></i>	0.224		0	1
Same language	<i>D<sub>L</sub></i>	0.071		0	1

*Table 3 Correlation between exogenous variables*

This table gives correlation coefficients between the exogenous variables. For variable definitions and sources see Appendix. \* denotes significance at the 10 percent level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1) PEI <sub>DC</sub>	1																
(2) PEI <sub>FC</sub>	-0.04	1															
(3) PEC <sub>DC</sub>	0.72*	-0.02	1														
(4) PEC <sub>FC</sub>	-0.02	0.51*	-0.04	1													
(5) Δ g	0.06	-0.31*	-0.05	-0.12*	1												
(6) D <sub>PEI,DC</sub> ·Δ g	0.16*	-0.19*	0.02	-0.07	0.33*	1											
(7) D <sub>PEC,DC</sub> ·Δ g	0.17*	-0.20*	0.01	-0.08	0.39*	0.72*	1										
(8) D <sub>PEI,FC</sub> ·Δ g	0.03	-0.07	-0.03	-0.02	0.28*	0.02	0.05	1									
(9) D <sub>PEC,FC</sub> ·Δ g	0.04	-0.09	-0.03	0.09*	0.43*	0.08	0.10*	0.32*	1								
(10) Δ CAP	0.33*	-0.24*	0.30*	-0.39*	-0.05	0.10*	-0.03	0.02	-0.14*	1							
(11) Δ HC	0.32*	-0.13*	0.48*	-0.52*	-0.19*	-0.03	-0.08	-0.06	-0.18*	0.55*	1						
(12) Δ T	0.12*	-0.09	-0.01	0.31*	-0.06	-0.01	0.08	0.00	0.17*	-0.38*	-0.50*	1					
(13) Δ EN	0.47*	-0.08	0.53*	-0.14*	0.24*	0.20*	0.16*	0.06	0.00	0.25*	0.13*	0.10*	1				
(14) Dist	-0.01	0.01	0.08	0.03	0.23*	0.06	0.09*	0.15*	0.16*	-0.05	-0.11*	0.12*	0.32*	1			
(15) D <sub>LT</sub>	0.02	-0.08	0.05	-0.01	-0.13*	-0.04	-0.05	-0.16*	-0.17*	0.15*	0.21*	-0.07	-0.19*	-0.38*	1		
(16) D <sub>CM</sub>	0.18*	0.16*	0.16*	0.02	-0.14*	-0.28*	-0.24*	0.01	-0.03	-0.01	0.05	0.09	0.17*	0.15*	0.19*	1	
(17) D <sub>DC,CM</sub>	0.52*	-0.08	0.42*	-0.01	0.28*	0.20*	0.21*	0.12*	0.16*	0.16*	0.06	0.05	0.53*	0.40*	-0.51*	-0.10*	1
(18) D <sub>L</sub>	0.04	-0.05	0.06	0.00	-0.06	-0.05	-0.06	0.01	0.01	0.04	0.06	0.04	0.10*	-0.04	0.22*	0.51*	-0.06

*Table 4: Level effects on the number of total and newcomer deals*

This table gives the marginal effects (for the unconditional expected value) of left-censored Tobit estimations with censoring value at 0 for total and newcomer count-based cross-border deals. The linear part of the model is as follows:

$$CB_{ij} = \beta' x_{ij} + u_{ij} ,$$

with

$$x_{ij} = (1, PE_{DC,i}, PE_{FC,j}, \Delta g_{ij}, \Delta CAP_{ij}, \Delta HC_{ij}, \Delta EN_{ij}, \Delta T_{ij}, Dist_{ij}, D_{LT,ij}, D_{L,ij}), PE \in \{PEI, PEC\} .$$

$\Delta$  denotes the differential between the deal country (DC) and the foreign country (FC). For data definitions and sources see Appendix. White-heteroscedasticity-consistent z-values are given in parentheses. \*\*\*, \*\*, \* denote significance at the 1, 5, and 10 percent level.

	1	2	3	4
	Total deals		Newcomer deals	
<i>Maturity of the PE industry</i>				
PEI <sub>DC</sub>	0.0086*** (3.59)		0.0042*** (3.71)	
PEI <sub>FC</sub>	0.0103*** (4.03)		0.0045*** (3.68)	
PEC <sub>DC</sub>		0.0563*** (3.36)		0.0337*** (4.39)
PEC <sub>FC</sub>		0.0476*** (2.61)		0.0206** (2.34)
<i>Growth differential</i>				
$\Delta g$	0.0042*** (3.89)	0.0038*** (4.34)	0.0019*** (3.61)	0.0018*** (4.26)
<i>Business environment</i>				
$\Delta CAP$	-0.0070** (-2.56)	-0.0066** (-2.38)	-0.0031** (-2.47)	-0.0027** (-2.28)
$\Delta HC$	0.0222** (2.26)	0.0195** (2.12)	0.0084* (1.83)	0.0053 (1.40)
$\Delta EN$	0.0062** (2.41)	0.0061* (1.80)	0.0032*** (2.71)	0.0023 (1.55)
$\Delta T$	0.0592** (2.01)	0.0340* (1.66)	0.0243* (1.72)	0.0121 (1.35)
<i>Cultural and geographical proximity</i>				
Dist	-0.0212*** (-7.00)	-0.0227*** (-7.17)	-0.0099*** (-7.49)	-0.0107*** (-7.72)
D <sub>LT</sub>	0.0036 (0.71)	-0.0002 (-0.04)	0.0034 (1.55)	0.0016 (0.79)
D <sub>L</sub>	0.0223*** (2.66)	0.0199** (2.09)	0.0099*** (2.84)	0.0092*** (2.59)
$\chi^2$	83.14	81.39	99.45	106.20
Number of observations	322	322	322	322
Number of zeros	137	137	140	140

*Table 5: Amplification effects on the number of total and newcomer deals*

This table gives the marginal effects (for the unconditional expected value) of left-censored Tobit estimations with censoring value at 0 for total and newcomer count-based cross-border deals. The linear part of the model is as follows:  $CB_{ij} = \beta' x_{ij} + u_{ij}$ , with

$$x_{ij} = (1, PE_{DC,i}, PE_{FC,j}, \Delta g_{ij}, D_{PE,DC} \Delta g_{ij}, D_{PE,FC} \Delta g_{ij}, \Delta CAP_{ij}, \Delta HC_{ij}, \Delta EN_{ij}, \Delta T_{ij}, Dist_{ij}, D_{LT,ij}, D_{L,ij}),$$

$PE \in \{PEI, PEC\}$

$\Delta$  denotes the differential between the deal country (DC) and the foreign country (FC). For data definitions and sources see Appendix. White-heteroscedasticity-consistent z-values are given in parentheses. \*\*\*, \*\*, \* denote significance at the 1, 5, and 10 percent level.

	1	2	3	4
	Total deals		Newcomer deals	
<i>Maturity of the PE industry</i>				
PEI <sub>DC</sub>	0.0080*** (3.32)		0.0040*** (3.49)	
PEI <sub>FC</sub>	0.0108*** (4.21)		0.0046*** (3.83)	
PEC <sub>DC</sub>		0.0545*** (3.29)		0.0332*** (4.39)
PEC <sub>FC</sub>		0.0509*** (2.76)		0.0213** (2.38)
<i>Growth differential</i>				
$\Delta g$	0.0041*** (3.54)	0.0032*** (3.12)	0.0019*** (3.33)	0.0014*** (2.95)
<i>Interacted growth differential</i>				
$D_{PEI,DC} \Delta g$	0.0043** (2.24)		0.0016* (1.9)	
$D_{PEI,FC} \Delta g$	-0.0028 (-1.10)		-0.0015 (-1.24)	
$D_{PEC,DC} \Delta g$		0.0065*** (2.98)		0.0027** (2.85)
$D_{PEC,FC} \Delta g$		-0.0016 (-0.82)		-0.0001 (-0.09)
<i>Business environment</i>				
$\Delta CAP$	-0.0070** (-2.54)	-0.0068** (-2.49)	-0.0031** (-2.41)	-0.0028** (-2.38)
$\Delta HC$	0.0235** (2.36)	0.0191** (2.10)	0.0090* (1.92)	0.0048 (1.27)
$\Delta EN$	0.0056** (2.23)	0.0053 (1.62)	0.0257* (1.80)	0.0082 (0.84)
$\Delta T$	0.0625** (2.10)	0.0286 (1.33)	0.0029** (2.52)	0.0021 (1.46)
<i>Cultural and geographical proximity</i>				
Dist	-0.0210*** (-6.95)	-0.0228*** (-7.27)	-0.0099*** (-7.47)	-0.0108*** (-7.79)
$D_{LT}$	0.0027 (0.52)	-0.001 (-0.21)	0.0030 (1.34)	0.0015 (0.76)
$D_L$	0.0241*** (2.84)	0.0222** (2.29)	0.0107*** (3.05)	0.0099*** (2.77)
$\chi^2$	87.11	84.48	105.76	109.73
Number of observations	322	322	322	322
Number of zeros	137	137	140	140

*Table 6: Pure and syndicated cross-border deals*

This table gives the number of pure cross-border deals in which no investor from the deal country is involved (p), and the number of syndicated cross-border deal in which at least one investor from the deal country is involved (s) calculated as total count-based deals.

Foreign country	Austria		Belgium		Denmark		Finland		France		Germany		Ireland		Italy		Netherlands		Norway		Spain		Sweden		Switzerland		United Kingdom	
Deal country	p	s	p	s	p	s	p	s	p	s	p	s	p	s	p	s	p	s	p	s	p	s	p	s	p	s	p	s
Australia	0	0	1	0	0	0	0	0	0	0	2	3	0	0	0	0	0	1	0	0	0	0	0	0	6	0	2	2
Austria			0	0	0	0	0	0	0	0	16	8	0	0	0	0	1	1	0	0	0	0	0	0	1	2	9	5
Belgium	0	0			0	1	0	0	7	13	5	4	0	0	2	2	9	27	0	0	2	0	0	0	0	2	14	7
Canada	0	0	0	0	0	1	4	1	0	6	4	5	0	0	1	0	4	6	0	0	0	0	1	1	4	5	4	8
China	0	0	0	0	0	0	0	0	2	2	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	6	0
Czech Republic	2	0	1	2	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Denmark	0	0	1	0			2	6	1	0	4	1	0	0	0	0	1	3	0	8	0	0	8	14	3	3	6	10
Finland	0	0	0	0	2	5			2	3	1	3	0	0	0	2	0	5	0	0	0	0	15	16	2	1	22	18
France	0	1	13	36	0	5	0	0			12	25	0	0	3	7	12	26	0	0	5	2	6	6	8	20	60	103
Germany	6	4	0	8	2	9	0	0	8	22			0	0	1	1	7	21	0	1	0	2	2	4	8	40	85	98
Hungary	5	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	1
India	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	3	0	2	0	3	1
Ireland	0	0	0	9	0	0	0	0	2	1	2	4			0	0	0	8	0	0	0	0	3	2	4	1	17	36
Israel	0	0	2	3	0	0	0	1	0	3	6	19	0	0	1	6	2	6	0	0	0	0	2	0	0	3	3	16
Italy	0	0	2	0	0	0	0	0	21	7	3	3	0	0			2	2	0	0	0	0	0	0	3	2	33	13
Netherlands	0	0	4	10	0	1	0	1	3	4	9	12	0	0	1	0			0	0	1	1	3	0	5	1	21	14
Norway	0	0	0	0	1	0	4	0	1	1	1	0	0	0	1	0	3	0			0	0	8	8	1	2	8	3
Poland	0	0	0	0	1	0	0	0	2	0	5	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	5	0
Portugal	0	0	0	0	0	0	0	0	2	0	1	1	0	0	0	0	1	1	0	0	5	2	0	0	0	0	4	1
Spain	0	0	0	2	0	0	0	0	11	2	0	1	0	0	3	4	4	3	0	0			0	0	0	2	48	20
Sweden	0	0	0	3	4	16	14	13	4	4	6	3	0	0	1	0	8	18	5	10	0	0			4	5	28	35
Switzerland	0	0	3	0	1	0	0	0	8	18	20	17	0	0	1	1	3	4	0	2	1	1	1	4			12	10
United Kingdom	1	3	7	21	4	9	0	6	11	30	11	46	8	24	4	17	24	37	3	5	7	4	6	3	8	19		
United States	0	0	7	51	3	31	1	8	27	80	47	243	0	5	7	16	9	112	2	14	1	6	9	60	21	173	64	363

*Table 7: The maturity of private equity industries and syndication rates*

This table gives the value of the private equity index (PEI), the number of private equity investors relative to population (PEC) and the syndication rate (in %) on the basis of count-based and weight-based total and newcomer cross-border deals for all deal countries. At the bottom lines of the table the correlation coefficients between the maturity of the private equity industry and the syndication rates are depicted. \*\*\* denotes significance at the 1 percent level.

	1	2	3	4	5	6
	PEI	PEC	Syndication rate			
			Total deals		Newcomer deals	
			count	weight	count	weight
Australia	5.2	0.2156	35.3	17.4	50.0	27.6
Austria	4.3	0.1363	37.2	18.5	51.9	25.7
Belgium	5.7	0.1939	58.9	36.8	64.7	40.2
Canada	6.8	0.3079	60.0	37.3	75.7	48.5
China	4.1	0.0013	11.8	7.8	25.0	21.7
Czech Republic	4.3	0.0586	42.9	33.3	33.3	33.3
Denmark	6.5	0.2985	63.4	39.1	57.1	33.0
Finland	7.2	0.4813	54.6	29.3	68.6	44.3
France	5.2	0.0757	66.0	38.3	70.9	42.3
Germany	4.6	0.0984	63.8	33.4	73.3	40.4
Hungary	4.6	0.0393	16.7	3.9	22.2	6.1
India	3.4	0.0014	7.7	2.1	9.1	2.6
Ireland	6.7	0.2822	68.5	50.8	81.6	60.8
Israel	7.1	0.8067	78.1	58.0	79.1	60.3
Italy	3.9	0.0243	29.7	13.7	39.5	17.1
Netherlands	7.2	0.1558	48.4	26.2	58.9	31.1
Norway	6.1	0.2653	33.3	19.4	51.9	32.0
Poland	4.6	0.0339	0.0	0.0	25.0	14.8
Portugal	4.4	0.0484	27.8	9.6	30.0	11.9
Spain	4.8	0.0364	34.0	15.6	51.7	27.6
Sweden	6.3	0.6393	59.1	35.6	63.2	38.9
Switzerland	4.5	0.4134	53.3	24.7	64.3	33.3
United Kingdom	6.6	0.2357	70.4	46.4	69.7	44.1
United States	8.0	0.4675	85.4	61.8	84.4	59.2
Correlation coefficients of the syndication rate with PEI						
Full sample			0.743***	0.767***	0.763***	0.801***
... excluding the United States			0.698***	0.718***	0.735***	0.769***
... excluding the United States and the United Kingdom			0.680***	0.701***	0.724***	0.764***
Correlation coefficients of the syndication rate with PEC						
Full sample			0.672***	0.681***	0.666***	0.713***
... excluding the United States			0.645***	0.657***	0.640***	0.691***
... excluding the United States and the United Kingdom			0.662***	0.677***	0.646***	0.697***

*Table 8: Level effect on the number of pure and syndicated cross-border deals*

This table gives results of a multinomial logit model for different syndication rate levels. The underlying model

$$\text{is } \Pr(PS_{ij} = k) = e^{\beta_k' x_{ij}} / \sum_{l=1}^3 e^{\beta_l' x_{ij}}, k = 1, 2, 3,$$

with  $x_{ij} = (1, PEI_{DC,i}, PEI_{FC,j}, \Delta g_{ij}, \Delta CAP_{ij}, \Delta HC_{ij}, \Delta EN_{ij}, \Delta T_{ij}, Dist_{ij}, D_{LT,ij}, D_{L,ij})$ .

Results for total deals are reported in columns 1 and 2, results for newcomer deals in columns 3 and 4. Columns 1 and 3 report marginal effects for country pairs that have more syndicated than cross-border deals. Columns 2 and 4 report marginal effects for country pairs with more pure than syndicated cross-border deals.  $\Delta$  denotes the differential between the deal country (DC) and the foreign country (FC). For data definitions and sources see Appendix. White-heteroscedasticity-consistent z-values are given in parentheses. \*\*\*, \*\*, \* denote significance at the 1, 5, and 10 percent level.

	1	2	3	4
	Total deals		Newcomer deals	
	Group 3	Group 2	Group 3	Group 2
<i>Maturity of the private equity industry</i>				
PEI <sub>DC</sub>	0.1199*** (4.43)	-0.0238 (-0.81)	0.1344*** (4.32)	-0.0424 (-1.57)
PEI <sub>FC</sub>	0.0816*** (2.60)	-0.0446 (-1.50)	0.0701** (2.06)	-0.0323 (-1.18)
<i>Growth differential</i>				
$\Delta g$	0.0283** (2.13)	0.0249** (2.01)	0.0318** (2.18)	0.0187* (1.79)
<i>Business environment</i>				
$\Delta CAP$	-0.0173 (-0.46)	-0.0849** (-2.28)	-0.0082 (-0.20)	-0.0781** (-2.31)
$\Delta HC$	0.3082*** (3.03)	-0.1524 (-1.50)	0.0945 (0.84)	0.0507 (0.54)
$\Delta EN$	0.0526 (1.41)	0.0624* (1.71)	0.0727* (1.76)	0.0463 (1.45)
$\Delta T$	0.8966** (2.35)	-0.5321 (-1.49)	0.6117 (1.56)	-0.0611 (-0.19)
<i>Cultural and geographical proximity</i>				
Dist	-0.1453*** (-4.32)	-0.0747** (-2.09)	-0.1524*** (-4.03)	-0.0725** (-2.14)
D <sub>LT</sub>	-0.0155 (-0.25)	0.1168* (1.79)	0.0308 (0.46)	0.0387 (0.63)
D <sub>L</sub>	0.3850*** (3.71)	-0.092 (-1.01)	0.3164*** (3.02)	-0.0249 (-0.27)
$\chi^2$	111.74		103.70	
Number of observations	322		322	
Group 1 (no deal)	137		140	
Group 2 (pure >=syndicated)	86		70	
Group 3 (pure <syndicated)	99		112	
Tests on equality of group 2 and 3 ( $\chi^2$ )				
PEI <sub>DC</sub>	10.34***		11.21***	
PEI <sub>FC</sub>	7.28***		4.04**	
$\Delta g$	0.19		0.11	

## Appendix: Data description and sources

### Endogenous variables

- CB denotes the number of (total count-based, total weight-based, newcomer count-based, newcomer weight-based) cross-border private equity deals calculated from individual deal data (source: Bureau van Dijk's ZEPHYR database). Cross border deals are multiplied by  $100,000/(0.5 \cdot \text{pop}_{\text{DC}} + 0.5 \cdot \text{pop}_{\text{FC}})$ , where pop denotes the population, DC denotes the deal country and FC the foreign country (source: OECD Statistical Compendium 2005).
- PS relates to pure and syndicated cross-border deals. It takes the value 1 if no cross-border deal took place between the DC and the FC, 2 if the number of pure cross-border deals is not lower than the number of syndicated cross-border deals, 3 if the number of syndicated cross-border deals is higher than the number of pure cross-border deals. Pure and syndicated cross-border deals are calculated from individual deal data. A deal is classified as syndicated cross-border deal if an investor from a foreign country syndicates the deal with an investor from the deal country.

### Maturity of the private equity industries

- PEI denotes the private equity index measuring the quality of private equity industries averaged over the years 1998 and 1999. The higher the value, the more mature is the industry (source: World Competitiveness Yearbook (various issues)).
- PEC denotes the number of domestic private equity investors originally founded in a country before 2000 (source: VCPro database). The number of private equity investors is multiplied by 100,000 and then scaled by the population of the country.
- $D_{\text{PE},C}$  denotes a dummy variable which is equal to one if the maturity of the private equity industry *PE* (which is either the private equity index (PEI), or the number of private equity investors (PEC)) of the country *C* (which is either the deal country (DC) or the foreign country (FC)) is above the 75-percentile sample value, and zero otherwise.

### Economic growth

- g denotes the percentage real GDP growth rate averaged over the years 1998 and 1999 (source: WB 2006).

### Business environment

- CAP denotes the stock market capitalization (source: Stock market factbook (various issues)) relative to GDP (source: WB 2006) averaged over the years 1998 and 1999.
- HC denotes the number of patent applications by residents relative to population averaged over the years 1998 and 1999 (source: WB 2006).
- EN denotes the index of the entrepreneurial environment averaged over the years 2002 and 2005 (source: World Competitiveness Yearbook (various issues)).
- T denotes the corporate tax rate averaged over the years 1998 to 2003 (source: Ernst and Young (various issues)).

### Cultural and geographical proximity

- Dist denotes the logarithm of the distance between the deal country and the foreign country in kilometers (source: [www.cepii.fr](http://www.cepii.fr)).
- $D_{\text{LT}}$  denotes a dummy variable equal to one if the deal country and the foreign country have the same legal tradition. We distinguish between a civil and a common law tradition (source: La Porta *et al.* 1998).
- $D_{\text{CL}}$  denotes a dummy variable equal to one if both the deal and the foreign country have a common law tradition (source: La Porta *et al.* 1998).
- $D_{\text{DC,CM}}$  denotes a dummy variable equal to one if the foreign country does not have a common law tradition, while the deal country has a common law tradition (source: La Porta *et al.* 1998).
- $D_{\text{L}}$  denotes a dummy variable equal to one if the same language is spoken in the deal and the foreign country (source: [www.cepii.fr](http://www.cepii.fr)).