



Cross-border buyout pricing

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Abstract

Using a dataset of 1149 global private equity transactions, we find that cross-border buyouts are associated with significantly higher valuation multiples than domestic ones. We attribute this finding to informational disadvantages of foreign acquirers. Consistent with this idea, we find that the spread in valuation multiples narrows when the target operates in a country with high accounting standards, when it was publicly listed prior to the buyout, and when information production is facilitated due to large firm size. Further results suggest that local partnering in a syndicate serves as an effective remedy to avoid adverse pricing effects. The spread in valuation multiples is also less pronounced for large buyout funds, presumably because they draw on sufficient organizational resources to cope with cross-border-related transaction costs.

Keywords Private equity · Leveraged buyout · Cross-border · Liability of foreignness · Valuation

JEL Classification G23 · G24 · G3

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1 Introduction

Cross-border transactions have rapidly increased over the past decades and account for a significant share of foreign direct investment nowadays. Private equity (PE) firms have spurred this development. Recent numbers suggest that cross-border buyouts recorded an all-time high in 2018, with 1858 cross-border deals worth a total of \$456 billion.¹ This surge is best explained by high levels of fund inflows, in combination with saturated home markets and a quest for portfolio diversification (Buchner et al. 2018).

Despite its importance for the global mergers and acquisitions (M&A) market, there is little evidence on cross-border buyout activity. This is in contrast to cross-border M&A deals of non-PE bidders (e.g., Erel et al. 2012; Goergen and Renneboog 2004; Moeller and Schlingemann 2005; Rossi and Volpin 2004). Extant literature associates these deals with positive announcement returns for target shareholders because acquirers hold worse information than sellers and thus suffer from adverse selection problems such as overbidding (Humphery-Jenner et al. 2017). A priori, these problems should be amplified in the PE context given the opaque nature of targets, which are typically not listed on a stock exchange and do not have much disclosure requirements.

When PE firms operate across borders, they face a number of pricing-related impediments. First, as they lack local ties, they may draw on fewer deal opportunities, which reduces the chance to find uncontested and attractively priced targets. Second, foreign PE firms suffer from inferior information production due to geographical and cultural distance. This creates frictions for an accurate assessment of target's value as well as deal's overall value creation potential. As a result, foreign PE firms face latent risk of overpayment, especially when they are used to a domestic track record and fail to adequately price in foreign market threats as well as cross-border-related transaction costs. Third, disadvantages due to a lack of country and firm-specific expertise likely manifest in lower negotiation power of foreign PE sponsors vis-à-vis sellers and hence limit the ability to negotiate favorable prices.

Studying a sample of 1149 leveraged buyouts over the period 1997–2010, we find evidence consistent with adverse pricing effects in cross-border buyouts. Our baseline results suggest that cross-border buyouts are associated with a 25–37% higher EV/Sales multiple than their domestic counterparts. This finding holds when controlling for a wide array of control variables and fixed effects as well as when using propensity score matching in a counterfactual research design. It is also robust to using alternative dependent variables such as EV/EBITDA multiples and abnormal pricing measures, which set the buyout multiple in relation to the median valuation multiple of publicly listed peers in the same industry and year.

Further results suggest that an information asymmetry channel can best explain the adverse pricing effect. We find that the spread between cross-border and domestic buyout multiples is considerably smaller when the target operates in a transparent

¹ For further information, see recent market insights from international law firm Hogan Lovells. Available [online](#).

information environment, as measured by La Porta et al. (1998)'s index of accounting standards, because this mitigates informational disadvantages of foreign PE firms. The same holds true when information production is facilitated on the firm level, such as when the target was publicly listed prior to the buyout or when it is subject to greater public scrutiny due to large firm size.

As a robustness check, we make use of an exogenous shock to the information environment caused by close political elections. The idea is that close election races create unforeseeable policy uncertainty that puts "outsiders" without access to soft information at a disadvantage. We find that domestic PE firms pay significantly lower multiples after close elections as compared to normal times, whereas the opposite holds true for foreign PE firms in cross-border buyouts. This finding lends further support to an information asymmetry channel and suggests that foreign PE firms fail to adequately price in uncertainty due to unfamiliarity with the local context.

We also test for remedies to avoid adverse pricing effects in cross-border buyouts. Our results suggest that local partnering, i.e., joining forces with a domestic PE firm in a syndicate, effectively mitigates informational disadvantages of foreign PE firms. In fact, cross-border buyouts with local syndicate partners are associated with lower valuation multiples than purely domestic buyouts, which suggests that there are synergies between domestic PE firm's knowledge of the local business environment as well as foreign PE firm's international experience (Bertoni and Groh 2014; Chemmanur et al. 2016; Dai et al. 2012). Our results also indicate that the spread between domestic and cross-border buyout multiples is almost negligible in the segment of large-cap buyout funds. This finding is consistent with the idea that large funds draw on sufficient resources to cope with the additional cross-border-related transaction costs.

By analyzing the pricing of cross-border buyouts, we contribute to previous studies on determinants and implications of cross-border PE and venture capital (VC) activity. Our results are most related to Cao et al. (2015) who examine the effect of creditor rights on cross-border LBO activity and pricing. For a sub-sample of public-to-private buyouts, they find that premiums for target shareholders are negatively correlated with cross-border buyouts. Our findings, in contrast, suggest that cross-border buyouts are associated with higher buyout prices. The most likely explanation for the divergent results is that our sample is not restricted to public-to-private buyouts and thus also includes non-listed targets. Due to this alternative sampling strategy, we employ enterprise value multiples rather than equity-related offer premiums, which means that results cannot easily be compared. More importantly, Cao et al. (2015)'s focus is on the institutional environment, not on foreign investor's access to information, which is arguably not much different from a domestic investor in case of publicly listed targets. Given the fact that 87% of all transactions in our sample involve non-listed entities with weak disclosure requirements and poor information production, it is not surprising that we detect, for the first time, a valuation impact of cross-border PE buyouts that is related to information asymmetries of foreign investors.

Although our focus is on leveraged buyouts (LBOs), results are also broadly related to prior literature on performance implications of cross-border VC

transactions. Buchner et al. (2018) document underperformance of cross-border VC investments relative to equivalent domestic transactions in terms of deal-level returns. Bertoni and Groh (2014) show that the probability of exiting a VC investment via trade sale is positively correlated to the additional set of M&A opportunities brought by cross-border investors. Espenlaub et al. (2015) find that macro variables such as economic/market activity and legal systems explain time-to-exit differences between domestic and cross-border investors. Nahata et al. (2014)'s findings suggest that cultural distance between countries of the portfolio company and its lead investor positively affects VC success due to incentives for rigorous ex ante screening. Devigne et al. (2013) find that companies initially backed by domestic VC investors exhibit higher growth in the short-term compared to companies backed by cross-border investors, whereas in the medium-term, this effect reverses. Focusing on China as an emerging market, Humphery-Jenner and Suchard (2013a) find that foreign VC's likelihood of a successful exit is contingent on collaboration with a joint venture partner as well as on the investment stage and existing portfolio diversification. In a related vein, Humphery-Jenner and Suchard (2013b) report that foreign VCs increase portfolio company's likelihood to list on a foreign exchange and use a top lawyer, banker, or accountant when doing so. Cumming et al. (2016) show that private firms that have an international investor base have a higher probability of exiting via an initial public offering (IPO) and higher IPO proceeds. Finally, Devigne et al. (2016)'s results show that domestic investors have a high tendency to escalate their commitment to a failing course of action, while cross-border investors terminate their investments efficiently. Other than that we focus on mature companies acquired through an LBO, and that we study valuation multiples rather than time to exit, exit routes or deal returns, we depart from previous literature by unravelling the effects of information production in cross-border transactions including moderating factors on the macro (accounting standards) and micro level (public listing status and firm size).

Furthermore, our study contributes to extant literature on the "liability of foreignness" in a PE context as well as on local partnering as a strategy to overcome it. Cumming and Dai (2010) as well as Cumming and Johan (2006) find evidence for a local bias of PE firms and attribute it to PE firm's desire to avoid informational disadvantages that result from geographical distance. Humphery-Jenner et al. (2017) argue that PE backing serves as a signal to mitigate adverse selection problems in cross-border M&As caused by informational disadvantages of foreign acquirers. We add to these studies by providing evidence consistent with information asymmetries being the driver of adverse pricing effects in cross-border buyouts. Because we also investigate the moderating role of syndication, we contribute to a large strand of research on local partnering (Dai et al. 2012; Dai and Nahata 2016; Mäkelä and Maula 2006; Liu and Maula 2016; Meuleman and Wright 2011; Tykvová and Schertler 2014). While most of these studies relate local partnering to exit success, we are the first to show that it also matters for entry pricing.

Finally, our findings relate to previous literature on buyout pricing and multiple valuation in PE. Achleitner et al. (2011) investigate leverage and experience of PE firms as determinants of buyout pricing. Axelson et al. (2013) explore the relationship between economy-wide credit conditions and buyout pricing. Arcot et al.

(2015) explore the pricing of secondary buyouts and how it relates to buy pressure. We depart from these studies by providing novel evidence on an economically sizeable impact of cross-border buyouts, which is important for explaining cross-sectional variation in buyout multiples.

The remainder of this paper is organized as follows. Section 2 discusses testable hypotheses. Section 3 is devoted to the sample construction process and distribution as well as to variables and summary statistics. Section 4 discusses results and robustness tests. Section 5 concludes.

2 Hypotheses

Buyout pricing is important for PE firms as it affects so-called multiple expansion, i.e., the difference between entry and exit pricing, which is one of the three major sources of equity returns next to de-leveraging and operating improvements (Achleitner et al. 2011). To facilitate multiple expansion, PE firms intend to “buy low” and “sell high”. The “buy-low” component is particularly critical to all subsequent value creation measures because the more PE firms pay for the portfolio firm in the initial buyout, the more difficult it gets to expand the multiple and, as a consequence, the more value needs to be generated through other value creation levers such as operating improvements. While buyout prices are clearly subject to market waves and financing conditions (Axelson et al. 2013), there is also evidence for cross-sectional differences that are attributable to skill rather than luck (Puche and Braun 2019). Access to private information, for example, is crucial to establish a proprietary deal flow, i.e., to find uncontested targets, and accurately assess target’s intrinsic value as well as value creation potential. Especially the latter is difficult in the PE context given the opacity that is associated with acquiring a non-listed entity.

When PE firms operate across borders, they face several obstacles that threaten buyout pricing. Most importantly, information production is poor due to lack of local ties and non-familiarity with the local business environment (Dai et al. 2012). This may limit the number of targets out of which foreign PE firms can choose, thus reducing the chance to find targets that are available at attractive prices. At the same time, foreign PE firms may find it more difficult than domestic ones to accurately assess target’s value and business prospects (Conn et al. 2005). Communication barriers and cultural differences, for example, create frictions for the verification of soft information relevant for business valuation such as quality of the management team, strength of stakeholder relationships, reputational capital in the local market or the feasibility of the growth trajectory (Uysal et al. 2008). As a result, there is an information asymmetry problem between the seller management and the foreign PE firm that puts the latter at a disadvantage in price negotiations (Ahlers et al. 2016). Foreign PE firms may furthermore lack legitimacy or suffer from seller mistrust (Bell et al. 2012), which creates a disadvantage over domestic peers that likely translates into pressure to pay higher prices. Buchner et al. (2018) suggest that foreign PE firms may also be forced to accept higher prices, and subsequently lower returns, due to lack of investment opportunities in saturated home markets. In sum, these arguments lead us to our first hypothesis.

H1 Cross-border buyouts are associated with higher valuation multiples than domestic buyouts due to informational disadvantages of foreign acquirers.

Previous literature suggests that foreign buyers are sensitive to target's information environment. Because foreign PE firms face informational frictions that impede processing of soft information, they are more dependent on hard information, such as firm's historical financial performance, to make up for their informational disadvantages. Haselmann and Wachtel (2011) find evidence for this in the banking context. Their results suggest that foreign banks tend to lend to more transparent firms compared to their domestic counterparts when the financial system is small and opaque. Dai et al. (2012) find that foreign VCs are more likely to invest in more information-transparent ventures when investing alone, i.e., without a syndicate partner. How much hard information is available is a function of the disclosure regulations in target's host country. Thus, the quality of the accounting standards plays a crucial role for foreign market participants (Erel et al. 2012). When accounting standards are high, foreign PE firms can better assess the quality of the target and its intrinsic value due to improved information availability. We conjecture that this reduces the information asymmetry with the seller management and thus the risk of overpayment compared to domestic PE firms.²

H2 The pricing spread between cross-border and domestic buyouts narrows when accounting standards are high.

There are also factors on the firm level that determine the information environment such as public listing status prior to the buyout. In case of so-called public-to-private buyouts, the target is a publicly listed firm which entails much greater transparency and information production than in other buyout types with private targets such as private-to-private, divisional or financial buyouts (Brav 2009; Erel et al. 2012; Shen and Reuer 2005). As foreign PE firms can easily collect information about the asset in a public-to-private buyout, e.g., through analyst reports and financial statements, they face less valuation uncertainty and thus less informational disadvantages relative to domestic PE firms (Capron and Shen 2007; Officer et al. 2009; Mantecón 2009). Following our previous argumentation, we expect that this reduces the pricing spread between cross-border and domestic PE buyouts.

H3 The pricing spread between cross-border and domestic buyouts narrows when the target is publicly listed, i.e., in case of public-to-private buyouts.

Information production should also be facilitated in case of large firm size. There is a rich strand of literature suggesting that information asymmetries between firm managers and capital providers decrease as firm size increases (e.g., Chari et al. 1988; González and González 2011). Large firms have greater

² Previous literature in accounting is consistent with the idea of a reduction of information asymmetries through higher disclosure requirements. See, for example, Brown and Hillegeist (2007).

financial visibility and attract more media coverage (Baker et al. 1999; Wang and Ye 2015). They thus produce more information than small firms, which should be particularly valuable for foreign investors with inferior access to information. In line with this conjecture, Buchner et al. (2018) find that cross-border deals are larger than domestic ones on average.

H4 The pricing spread between cross-border and domestic buyouts narrows when the target is large.

Previous literature discusses several remedies to overcome adverse selection problems in cross-border buyouts. Most importantly, PE firms may team up with local partners in order to gain access to local market knowledge and private information (Mäkelä and Maula 2008). When forming a syndicate with a local partner, the foreign PE firm benefits from a greater pool of resources as well as from larger informal networks to local advisors, industry partners and political actors (Devigne et al. 2013). The screening process likely benefits from this owing to more effective due diligence as well as better assessment of management capabilities and business plans (Chemmanur et al. 2016). Consistent with these arguments, Tykvová and Schertler (2011) find that foreign VCs syndicate with local partners to gain deal access, overcome the complexity of investing in distant regions and offset lack of within-country experience. Dai et al. (2012) provide evidence that partnership with local VC firms helps to alleviate information asymmetry and monitoring problems. A priori, when informational disadvantages of foreign PE firms are associated with adverse buyout pricing, and when local partnering alleviates this problem, then it is reasonable to assume that pricing spreads between cross-border and domestic buyouts vanish when foreign PE firms team up with local partners in a syndicate.

H5 The pricing spread between cross-border and domestic buyouts narrows when foreign PE firms involve a local partner through syndication.

Foreign PE firms may also overcome obstacles for cross-border buyout pricing themselves when establishing networks across borders or through learning gains (Liu and Maula 2016). Humphery-Jenner (2012) argues that large PE funds have better connections to financial institutions, which grants them superior access to local information, e.g., via investment banks. Large funds thus benefit from better access to informal networks and exhibit advantages in information production vis-à-vis smaller funds. Furthermore, large funds are more likely to internationalize their portfolio (Cumming and Dai 2011). That means they draw on experience from prior cross-border buyouts, which likely helps to cope with valuation uncertainty or even mitigate it (De Clercq and Dimov 2008). Large funds may also afford to hire local experts or internationalize human capital when investing across borders, which reduces informational disadvantages and adverse implications for buyout pricing. These arguments lead us to our final hypothesis.

H6 The pricing spread between cross-border and domestic buyouts narrows when foreign PE firm's fund size is large.

3 Data

We use Bureau van Dijk's (BvD) Zephyr database to identify a global sample of PE buyouts. BvD data is frequently used in the PE literature, especially when portfolio firm accounting data is required as it is the case in our study (e.g., Bernstein et al. 2019; Rigamonti et al. 2016; Tykvova and Borell 2012). We employ a similar sampling strategy as in Hammer et al. (2017) and Hammer et al. (2018) and select all institutional buyouts between 1 January 1997 and 31 December 2010 where deal financing is labelled as "private equity" or "leveraged buyout". We exclude venture capital, expansion capital, uncompleted deals and pure management buyouts without PE firm involvement. This leaves us with a sample of 9,548 global PE buyouts. As a measure of buyout's pricing, we use enterprise value to sales (EV/Sales) multiples as suggested by Arcot et al. (2015). Deal enterprise values are from Zephyr and available for a sub-sample of 4373 buyouts. We collect portfolio firm's sales figures as of the buyout year from BvD's Orbis database, which reduces the sample to 1149 buyouts.

Table 1 presents the distribution of the sample in several dimensions. Panel A indicates that most buyouts in the sample were conducted between 2003 and 2007. The time series documents that buyout activity during the observation period was volatile. The first rise from 1997 to 2000 was followed by a slight decline until 2002, a subsequent rise until 2007 and a plunge during the Global Financial Crisis. Table 1 also presents distributions for the sub-samples of domestic and cross-border buyouts, i.e., those where the lead PE firm is not located in the target's country. The time series distribution of cross-border and domestic deals corresponds to the overall sample distribution. Panel B presents the distribution of the sample across target countries. The majority of observations is from Europe, and especially from the UK, due to stricter disclosure regulations than in other parts of the world, which lead to relatively better availability of target accounting figures. The opposite holds true for US deals, which are underrepresented in our sample.³ In the cross-border sub-sample, we cover relatively few UK deals. This can be explained by the fact that almost every PE sponsor in our sample has a local presence in the UK, such that there is little chance for being backed by a non-UK PE sponsor and, in turn, for a cross-border buyout. Panel C presents the distribution of the sample across industries. Generally, buyouts in our sample are well balanced across industries. The fact that 11.8% of all buyouts in our sample are from "business services" is most likely due to the attractiveness of this sector for the PE market (Kaplan and Strömberg 2009).

We add alternative dependent variables and control variables in various dimensions. Table 2 presents all variables that we use in the regression models including construction details and sources.

³ All results in this paper remain unchanged when excluding non-European deals.

Table 1 Sample distribution

Panel A: Distribution by entry year

Entry year	Total sample		Cross-border		Domestic	
	N	%	N	%	N	%
1997	17	1.5	3	1.2	14	1.5
1998	38	3.3	7	2.9	31	3.4
1999	63	5.5	15	6.1	48	5.3
2000	67	5.8	21	8.6	46	5.1
2001	64	5.6	12	4.9	52	5.7
2002	57	5.0	11	4.5	46	5.1
2003	97	8.4	24	9.8	73	8.1
2004	108	9.4	25	10.2	83	9.2
2005	68	5.9	9	3.7	59	6.5
2006	152	13.2	31	12.7	121	13.4
2007	179	15.6	38	15.6	141	15.6
2008	107	9.3	20	8.2	87	9.6
2009	60	5.2	11	4.5	49	5.4
2010	72	6.3	17	7.0	55	6.1
Total	1149	100.0	244	100.0	905	100.0

Panel B: Distribution by target country

Country	Total sample		Cross-border		Domestic	
	N	%	N	%	N	%
Austria	9	0.8	4	1.6	5	0.6
Australia	5	0.4	0	0.0	5	0.6
Belgium	23	2.0	16	6.6	7	0.8
Bulgaria	4	0.3	4	1.6	0	0.0
Canada	7	0.6	3	1.2	4	0.4
China	2	0.2	0	0.0	2	0.2
Czech Republic	10	0.9	4	1.6	6	0.7
Germany	49	4.3	18	7.4	31	3.4
Denmark	2	0.2	1	0.4	1	0.1
Estonia	2	0.2	2	0.8	0	0.0
Egypt	3	0.3	3	1.2	0	0.0
Spain	55	4.8	19	7.8	36	4.0
Finland	8	0.7	1	0.4	7	0.8
France	172	15.0	37	15.2	135	14.9
United Kingdom	558	48.6	50	20.5	508	56.1
Israel	5	0.4	2	0.8	3	0.3
India	4	0.3	1	0.4	3	0.3
Italy	53	4.6	26	10.7	27	3.0
Japan	7	0.6	0	0.0	7	0.8
Republic of Korea	3	0.3	3	1.2	0	0.0

Table 1 (continued)

Panel B: Distribution by target country						
Country	Total sample		Cross-border		Domestic	
	N	%	N	%	N	%
Lithuania	6	0.5	3	1.2	3	0.3
Luxembourg	2	0.2	1	0.4	1	0.1
Malaysia	3	0.3	2	0.8	1	0.1
The Netherlands	24	2.1	8	3.3	16	1.8
Norway	12	1.0	4	1.6	8	0.9
Poland	8	0.7	2	0.8	6	0.7
Portugal	5	0.4	3	1.2	2	0.2
Romania	9	0.8	6	2.5	3	0.3
Sweden	41	3.6	12	4.9	29	3.2
Thailand	2	0.2	0	0.0	2	0.2
United States	47	4.1	1	0.4	46	5.1
Rest of world	9	0.8	8	3.3	1	0.1
Total	1149	100.0	244	100.0	905	100.0

Panel C: Distribution by industry						
Industry	Total sample		Cross-border		Domestic	
	N	%	N	%	N	%
Food products	41	3.6	9	3.7	32	3.5
Beer and liquor	7	0.6	4	1.6	3	0.3
Recreation	41	3.6	6	2.5	35	3.9
Printing and publishing	39	3.4	9	3.7	30	3.3
Consumer goods	34	3.0	9	3.7	25	2.8
Apparel	11	1.0	2	0.8	9	1.0
Healthcare, medical equipment, pharmaceutical products	48	4.2	12	4.9	36	4.0
Chemicals	22	1.9	11	4.5	11	1.2
Textiles	9	0.8	2	0.8	7	0.8
Construction and construction materials	89	7.7	17	7.0	72	8.0
Steel works etc	13	1.1	4	1.6	9	1.0
Fabricated products and machinery	38	3.3	8	3.3	30	3.3
Electrical equipment	20	1.7	4	1.6	16	1.8
Automobiles and trucks	18	1.6	5	2.0	13	1.4
Aircraft, ships, and railroad equipment	8	0.7	4	1.6	4	0.4
Mining, oil and gas extraction, non-metallic minerals	8	0.7	3	1.2	5	0.6
Utilities	16	1.4	7	2.9	9	1.0
Communication	51	4.4	20	8.2	31	3.4
Business equipment	46	4.0	11	4.5	35	3.9
Business supplies and shipping containers	25	2.2	5	2.0	20	2.2
Transportation	51	4.4	9	3.7	42	4.6
Wholesale	67	5.8	12	4.9	55	6.1

Table 1 (continued)

Panel C: Distribution by industry

Industry	Total sample		Cross-border		Domestic	
	N	%	N	%	N	%
Retail	99	8.6	16	6.6	83	9.2
Restaurants, hotels, motels	35	3.0	9	3.7	26	2.9
Banking, insurance, real estate, trading	37	3.2	8	3.3	29	3.2
Personal services	50	4.4	4	1.6	46	5.1
Business services	136	11.8	12	4.9	124	13.7
Computer software	60	5.2	15	6.1	45	5.0
Everything else	30	2.6	7	2.9	23	2.5
Total	1149	100.0	244	100.0	905	100.0

This table presents the sample distribution across entry years (Panel A), target countries (Panel B) and industries (Panel C)

As major dependent variable for our regressions, we use the $LN(EV/Sales)$ multiple of the buyout. Because the distribution of the plain $EV/Sales$ multiple is somewhat right-skewed, we construct versions of it where we either winsorize or trim at the 1st and 99th percentile level. In our robustness tests, we also make use of an *abnormal EV/Sales* multiple where we subtract the median valuation multiple of publicly listed peers in the same industry and year as the buyout target. The main advantage of using $EV/Sales$ multiples, instead of alternative measures for entry valuations such as $EV/EBIT$ or $EV/EBITDA$, is that this metric is frequently available because sales figures, and consequently multiples, can never turn negative. As a robustness check, we run regressions using $EV/EBITDA$ multiples which are observable for a sub-sample of 870 observations. Information on target's EBITDA is from Orbis. Table 3 presents summary statistics. The mean (median) $EV/Sales$ multiple is 1.96 (1.11) and reduces to 1.93 as well as 1.82 through winsorizing and trimming, respectively.

The main explanatory variable in this paper is an indicator variable for *cross-border* buyouts. In contrast to most other papers dealing with cross-border buyouts, which base their definition only on PE sponsors' headquarter location, we also account for local presence through offices or subsidiaries. We obtain information on PE firm's local presence as of the buyout date from Hammer et al. (2020). As Table 3 documents, 21% of the PE deals in our sample are cross-border buyouts.

We collect control variables on various levels. On the buyout level, we control for the deal strategy by including a dummy for buy-and-build strategies *B&B* into our regression models. The summary statistics indicate that 28% of all buyouts in our sample pursue such a strategy, which is in line with Hammer et al. (2017) reporting a proportion of 26%. We insert a dummy variable *management* to control for the possibility of private information about firm's valuation in management buyouts. We also control for syndicates, i.e., transactions with more than one PE sponsor, as they are associated with pricing discounts (Officer et al. 2010). In accordance

Table 2 Variable definitions

Variable	Description
LN(EV/Sales)	Natural logarithm of the disclosed deal enterprise value divided by sales in the year of the buyout. Source: BvD Zephyr BvD Orbis
LN(winsorized EV/Sales)	Natural logarithm of the EV/Sales multiple winsorized at the 1st and 99th percentile levels. Source: BvD Zephyr BvD Orbis
LN(trimmed EV/Sales)	Natural logarithm of the EV/Sales multiple trimmed at the 1st and 99th percentile levels. Source: BvD Zephyr BvD Orbis
Abnormal EV/Sales	EV/Sales multiple of a specific buyout less of the median EV/Sales multiple of the peer group. Peer groups are defined on the basis of entry year and Fama French industry classification code as depicted in Table 1. Source: BvD Zephyr BvD Orbis
EV/EBITDA	Disclosed deal enterprise value divided by EBITDA in the year of the buyout. Source: BvD Zephyr BvD Orbis
Cross-border	Indicator variable that equals one if the lead PE sponsor neither has a head-quarter nor a local office in the country where the portfolio firm is located at the time of the buyout, and is zero otherwise. Source: BvD Zephyr Hand-collected data on PE firm headquarters and locations
B&B	Indicator variable that equals one if the portfolio firm makes add-on acquisitions during the holding period, and is zero otherwise. Source: BvD Zephyr
Management	Indicator variable that equals one if the buyout is categorized as “management buyout”, “management buy-in” or “buy-in management buyout”, and is zero otherwise. Source: BvD Zephyr
Syndicate	Indicator variable that equals one if the portfolio firm is backed by more than one PE sponsor, and is zero otherwise. Source: BvD Zephyr
Public-to-private	Indicator variable that equals one if the portfolio firm has been a publicly listed entity before the buyout, and is zero otherwise. Source: BvD Zephyr
Divisional	Indicator variable that equals one if the portfolio firm has been a corporate division or subsidiary before the buyout, and is zero otherwise. Source: BvD Zephyr
Financial	Indicator variable that equals one if the portfolio firm has been owned by another PE firm before the buyout, and is zero otherwise. Source: BvD Zephyr
LN(acquisition experience)	Natural logarithm of one plus the number of acquisitions completed by the portfolio firm prior to buyout. Source: BvD Zephyr
LN(deal value)	Natural logarithm of the disclosed deal enterprise value of the buyout. Source: BvD Zephyr
LN(high-yield spread)	Natural logarithm of the BofA Merrill Lynch global high yield option-adjusted spread, measured on a monthly basis. Source: BofA Merrill Lynch Global Research
LN(fund size)	Natural logarithm of the fund volume (USD million) of the PE sponsor. In case of a syndicate, the variable is averaged over all PE sponsors. Source: ThomsonOne
Novice	Indicator variable that equals one if the PE sponsor is less than six years old at the time of the buyout, and is zero otherwise. Source: Bloomberg Reuters PE firm websites

Table 2 (continued)

Variable	Description
Affiliated	Indicator variable that equals one if the PE firm is affiliated to a bank, insurance company, pension fund, family office, governmental institution or any other financial or non-financial corporation, and is zero otherwise. Source: Bloomberg Reuters
High acc standards	Indicator variable that equals one if the target country's rating on accounting standards is above median, and is zero otherwise. Source: La Porta et al. (1998)
Large cap	Indicator variable that equals one if the target's deal value is greater than the sample mean, and is zero otherwise. Source: Own calculation
Local partner	Indicator variable that equals one for a cross-border buyout where a foreign lead PE sponsor cooperates with a domestic PE sponsor, i.e., the "local partner", in a syndicate, and is zero otherwise. Source: Hand-collected data on PE firm headquarters and locations
Large fund	Indicator variable that equals one if the fund volume of the sponsoring PE fund is above the sample average, and is zero otherwise. Source: BvD Zephyr ThomsonONE
Close election	Indicator variable that equals one when a close national election took place in the target company's country during the six months before the buyout, i.e., when the margin of victory between largest and smallest party (parliamentary election) or between winner and contender in the final election round (presidential election) is smaller than 5%, and is zero otherwise. Source: The World Bank—IDB database

This table presents definitions and construction details for all dependent and independent variables used in this paper

with prior literature (Achleitner and Figge 2014), we include a battery of dummies controlling for distinct entry channels, i.e., vendor sources. This set of control variables includes dummies for *public-to-private*, *divisional*, and *financial*, with *private-to-private* being the omitted base category in the regression models. *Public-to-private* also serves as interaction term with *cross-border* to test for H3. As Table 3 shows, 13% of the deals represent public-to-private buyouts, which compares to 6% in Strömberg (2008) whose sample ends in 2007 rather than 2010 as in this study. These numbers document that, although large in volume, public-to-private buyouts account for only a small part of the global buyout market. They also attract a distinct group of PE firms, usually very large funds that may engage in public-to-private buyouts to deploy so-called "dry powder", i.e., uncalled fund capital.⁴ Thus, when being interested in representative results on cross-border buyout pricing, it is necessary to expand the sample beyond public-to-private buyouts. This is a crucial feature of this dataset and a key differentiating factor to previous literature. Most importantly, Cao et al. (2015) utilize a sample of 2589 global LBOs between 1995 and 2007 obtained from DEALOGIC and SDC, which serves as their primary sample

⁴ The 2018 Bain Global Private Equity Report, for example, reports a total of 170 public-to-private buyouts, worth \$227 billion in 2018. It concludes that these unusually high numbers are driven by record amounts of dry powder.

Table 3 Summary statistics

	N	Mean	S.D	Q1	Median	Q3
EV/Sales	1149	1.96	2.53	0.57	1.11	2.33
Winsorized EV/Sales	1149	1.93	2.35	0.57	1.11	2.33
Trimmed EV/Sales	1126	1.82	1.95	0.60	1.11	2.29
Abnormal EV/Sales	1149	0.00	1.06	-0.70	0.01	0.72
EV/EBITDA	870	9.05	5.14	5.28	8.06	11.69
Cross-border	1149	0.21	0.41	0.00	0.00	0.00
B&B	1149	0.28	0.45	0.00	0.00	1.00
Management	1149	0.26	0.44	0.00	0.00	1.00
Syndicate	1149	0.18	0.38	0.00	0.00	0.00
Public-to-private	1149	0.13	0.34	0.00	0.00	0.00
Divisional	1149	0.29	0.45	0.00	0.00	1.00
Financial	1149	0.25	0.43	0.00	0.00	0.00
Acquisition experience	1149	1.24	7.91	0.00	0.00	1.00
Deal value (USD million)	1149	559.10	2638.04	24.46	70.74	237.62
High-yield spread	1149	558.96	275.07	333.8	491.67	719.95
Fund size (USD million)	648	1623.09	3260.59	192.24	534.00	1655.41
Novice	648	0.16	0.37	0.00	0.00	0.00
Affiliated	648	0.21	0.40	0.00	0.00	0.00
High acc standards	1149	0.56	0.50	0.00	1.00	1.00
Large cap	1149	0.14	0.35	0.00	0.00	0.00
Local partner	1149	0.01	0.09	0.00	0.00	0.00
Large fund	1149	0.71	0.45	0.00	1.00	1.00
Close election	1149	0.10	0.30	0.00	0.00	0.00

This table presents summary statistics for all dependent and independent variables used in this paper

to study the effect of creditor rights on cross-border buyout activity. Their pricing analyses are limited to 455 public-to-private buyouts for which they look at premiums paid to shareholders, being defined as the offer price divided by stock price pre-announcement. We depart from their approach by studying enterprise value multiples, which are available for all type of buyouts, and not just for public-to-private transactions. It is also noteworthy that our sample covers the Global Financial Crisis of 2008–2009.

On the portfolio firm level, we follow Hammer et al. (2017) and include a variable $LN(acquisition\ experience)$ which is equal to the natural logarithm of one plus the number of acquisitions that the portfolio firm completed prior to the buyout. This is important because previous literature shows that, with every additional deal, companies improve their deal-making skill and ability to accurately estimate the value of a company (Mohite 2016). We also include $LN(deal\ value)$ as a proxy for portfolio firm's size as there is a positive correlation with entry valuations (Achleitner et al. 2011). As Table 3 shows, the average deal value in our sample amounts to \$559 million. *Large cap* is a binary version of

Table 4 Univariate difference tests

	Cross-border	Domestic	Diff
Mean	2.46	1.82	0.64***
Median	1.58	1.04	0.54***
N	244	905	1149

This table presents univariate comparisons of means and medians of the EV/Sales multiple. The symbols ***, **, * denote significance at 1%, 5% and 10%, respectively

deal value being equal to one if portfolio firm's deal enterprise value exceeds the sample mean, and is zero otherwise. This variable is used as an interaction term with *cross-border* to test for H4. To control for firm's financing environment at the time of the buyout, we collect data on option-adjusted high-yield spreads following Hammer et al. (2018). This is important because financing conditions at entry are correlated with buyout pricing (Axelson et al. 2013).

On the PE firm level, we add $LN(\text{fund size})$ because extant literature finds that there is a relationship between fund inflows and portfolio company valuations (Cumming and Dai 2011). The funds in our sample have an average volume of \$1623 million. *Large fund* is a binary version of *fund size* being equal to one if the PE fund's volume is above the sample mean. This variable is used as an interaction term with *cross-border* to test for H6. We also construct a variable to control for *novice* PE firms to account for "grandstanding" incentives and the associated relationship with portfolio company valuations (Gompers 1996). *Affiliated* is a dummy that we include to control for PE firm's affiliation to a bank, insurance company, pension fund, family office, governmental institution or industrial corporation. Those PE firms may follow goals other than pure value maximization. For example, in case of affiliation to the government, PE firms may focus on stimulating regional PE activity (Cumming et al. 2017). Note that we obtain most of the PE firm variables from ThomsonONE, but can only find complete information for a sub-sample of 648 buyouts.

Finally, our sample comprises moderator variables that are necessary to test some of our hypotheses or to conduct robustness checks. *High acc standards* is needed to test for H2. It is an indicator variable equal to one if the target country's rating on accounting standards, as in La Porta et al. (1998), is above the sample median, and zero otherwise. To test for H5, we construct a binary variable *local partner*, which is equal to one for cross-border buyouts where the foreign PE firm syndicates with a local PE sponsor. Note that local partnering is a relatively rare phenomenon. In our sample, 244 observations are cross-border buyouts (21%); 64 of those cross-border buyouts are realized through syndicates; and only 10 of those cross-border syndicates involve a local partner. We finally add a variable *close election* to the sample, which indicates close national elections during the observational period. We use this variable in the robustness section to test whether our information-based explanation for cross-border pricing holds when an exogenous shock to the information environment occurs.

4 Results

4.1 Baseline results

Table 4 presents univariate comparisons of *EV/Sales* multiples across cross-border and domestic buyouts. As it turns out, the mean *EV/Sales* multiple of cross-border buyouts is at 2.45 as compared to 1.82 in case of domestic buyouts. The difference of 0.64 is equivalent to a 35% higher *EV/Sales* multiple and statistically significant at the 1% level. The same is true when using medians instead of means.

To test for H1 in a multivariate framework, we specify the following three OLS regression models:

$$LN\left(\frac{EV}{Sales}\right)_i = \alpha + \beta_1 \times \overline{Cross-border}_i + \overline{PE} + \overline{Country} + \overline{Industry} + \overline{Year} + \varepsilon_i \quad (1)$$

$$LN\left(\frac{EV}{Sales}\right)_i = \alpha + \beta_1 \times \overline{Cross-border}_i + \overline{Buyout\ controls} + \overline{Portfolio\ firm\ controls} + \overline{PE} + \overline{Country} + \overline{Industry} + \overline{Year} + \varepsilon_i \quad (2)$$

$$LN\left(\frac{EV}{Sales}\right)_i = \alpha + \beta_1 \times \overline{Cross-border}_i + \overline{Buyout\ controls} + \overline{Portfolio\ firm\ controls} + \overline{PE\ firm\ controls} + \overline{Country} + \overline{Industry} + \overline{Year} + \varepsilon_i \quad (3)$$

where *Buyoutcontrols* represents a vector of buyout-level control variables including *B&B*, *management*, *syndicate*, *public-to-private*, *divisional* and *financial*. *Portfolio firm controls* represents a vector of portfolio firm-level control variables including *LN(acquisition experience)*, *LN(deal value)* and *LN(high-yield spread)*. *PE firm controls* represents a vector of PE firm-level control variables including *LN(fund size)*, *novice*, and *affiliated*. *PE*, *Country*, *Industry*, and *Year* represent PE firm, country, industry and entry year fixed effects, respectively. All regression models cluster standard errors on world region level.

Table 5 presents the results. The *cross-border* coefficient in specification (1) suggests that cross-border buyouts are associated with a 37% higher *EV/Sales* multiple compared to domestic buyouts, which supports H1. The economic significance is also quite similar to what univariate differences suggest. The R^2 of regression model (1) is already relatively high with 59% due to the inclusion of PE firm fixed effects, which absorb any latent and time constant heterogeneity on the PE firm level. The high statistical significance of the *cross-border* coefficient is noteworthy as the inclusion of PE firm fixed effects reduces degrees of freedom to a large extent. In specification (2), we add various controls on the buyout and portfolio firm level such that R^2 increases to 64%. The *cross-border* coefficient remains economically significant and suggests a 35% higher multiple in case of cross-border buyouts. Statistical significance is still prevalent at the 5% level. In specification (3), when dropping

Table 5 Baseline results

	LN(EV/Sales)		
	(1)	(2)	(3)
Cross-border	0.368*** (0.07)	0.354** (0.11)	0.245*** (0.06)
B&B		-0.083*** (0.01)	-0.110* (0.05)
Management		-0.025 (0.03)	-0.052 (0.06)
Syndicate		-0.094 (0.11)	-0.031 (0.07)
Public-to-private		-0.058 (0.07)	-0.361*** (0.10)
Divisional		-0.148 (0.14)	-0.212*** (0.03)
Financial		-0.021 (0.05)	-0.084** (0.03)
LN(acquisition experience)		-0.172 (0.12)	-0.106 (0.18)
LN(deal value)		0.339*** (0.08)	0.362*** (0.07)
LN(high-yield spread)		-0.146 (0.11)	-0.132 (0.09)
LN(fund size)			-0.006 (0.03)
Novice			0.123 (0.11)
Affiliated			0.113 (0.07)
Sponsor FE	Yes	Yes	No
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Entry year FE	Yes	Yes	Yes
Constant	Yes	Yes	Yes
R ²	0.59	0.64	0.40
N	1149	1149	648

This table presents OLS regressions to test H1. Omitted category for the entry channels is private-to-private. Standard errors are clustered by world regions (Asia, Australia, Central Europe, Eastern Europe, Scandinavia, UK, US, Canada and Rest of World) and reported in parentheses. The symbols ***, **, * denote significance at 1%, 5% and 10%, respectively

PE firm fixed effects and including a set of PE firm control variables, the model R² drops to 40% because the selected controls that we add explain less variation than PE firm fixed effects. The sample size reduces to 648 observations as PE firm controls are not available for the whole sample. Nevertheless, the main effect of *cross-border* remains intact. Coefficients suggest a 25% higher multiple in case of *cross-border* buyouts, with this effect being statistically significant at the 1% level. Note that coefficient signs of control variables from regression model (2) remain similar after the inclusion of PE firm control variables and the exclusion of PE firm fixed effects.

The coefficients of the control variables are largely in line with existing literature. We find that entry valuations are higher for large firms, and lower when high-yield spreads increase, as documented by Achleitner et al. (2011). Furthermore, management participation is negatively correlated with entry pricing, as suggested by Lowenstein (1985) and Kaplan (1989). Controls also confirm Renneboog et al. (2007) who document that public-to-private buyouts exhibit lower entry valuations.

Table 6 Interaction effects

	LN(EV/Sales)				
	(1)	(2)	(3)	(4)	(5)
Cross-border	0.319*** (0.04)	0.273*** (0.05)	0.385*** (0.04)	0.297*** (0.03)	0.599*** (0.08)
Cross-border × high acc standards	-0.218** (0.09)				
Cross-border × public-to private		-0.232* (0.12)			
Cross-border × large cap			-0.320*** (0.09)		
Cross-border × local partner				-0.909*** (0.19)	
Cross-border × large fund					-0.580*** (0.15)
Interacted variable stand-alone	Yes	Yes	Yes	No	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Entry year FE	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes
R ²	0.44	0.44	0.34	0.44	0.44
N	648	648	648	648	648

This table presents OLS regressions to test H2-H6. Controls are as in specification (3) of Table 5. Standard errors are clustered by world regions (Asia, Australia, Central Europe, Eastern Europe, Scandinavia, UK, US, Canada and Rest of World) and reported in parentheses. The symbols ***, **, * denote significance at 1%, 5% and 10%, respectively

The coefficient of *affiliated* is positive and statistically insignificant. In unreported regressions, we split up *affiliated* and insert various dummies for affiliation to (i) banks, (ii) insurances, (iii) pension funds, (iv) family offices, (v) governmental institutions and (vi) industrial corporations. As it turns out, none of the coefficients is statistically significant and the model R^2 drops. We therefore conclude that our baseline regression model (3) is valid.

To test for H2–H6, we augment regression model (3) and include various interaction terms of *cross-border* with *high accounting standards* (H2), *public-to-private* (H3), *large cap* (H4), *local partner* (H5) and *large fund* (H6). Table 6 presents the results.

Results in column (1) provide evidence for H2. We find that the coefficient of the interaction term *cross-border* x *high acc standards* is negative and statistically significant at the 5% level, while the stand-alone coefficient of *cross-border* remains positive and statistically significant at the 1% level. Coefficient sizes suggest that, when accounting standards are low, a cross-border buyout pays a 32% higher multiple than a domestic buyout. When accounting standards are high, cross-border buyouts are only associated with a 10% higher multiple than domestic buyouts, as can be seen when netting the respective coefficients. Thus, cross-border buyouts are still associated with slightly higher pricing, but a more transparent information environment reduces the pricing spread considerably. This finding is consistent with the idea that stricter disclosure regulations help foreign PE firms to cope with informational disadvantages and valuation uncertainty in an unfamiliar context.

Columns (2) and (3) test for sensitivity of cross-border buyout pricing to target characteristics. Consistent with the idea that target's public listing status and large firm size reduce informational disadvantages of foreign PE firms, we find that cross-border buyouts are only associated with a 4% higher multiple than domestic buyouts in case of public-to-private buyouts, and a 6.5% higher multiple in case of large-cap targets. Both effects are statistically significant at the 10 and 1% levels, respectively, and confirm H3 as well as H4. In unreported regressions, we also test for sensitivity of cross-border buyout pricing to other entry channels by running regressions with separate interaction terms with *divisional* and *financial*. However, none of the interaction terms shows statistically significant effects. We interpret this as being consistent with an information asymmetry channel driving the higher cross-border multiples, as only public-to-private buyouts are associated with improved information production due to the strict reporting requirements and public scrutiny.

Columns (4) and (5) investigate remedies for adverse pricing effects in cross-border buyouts. We find that the coefficient of the interaction term *cross-border* x *local partner* is negative and statistically significant at the 1% level.⁵ Net effects of

⁵ Note that the stand-alone coefficient of *local partner* cannot be included in column (4) because local partnering is only possible in case of cross-border buyouts. The coefficient of a stand-alone variable *local partner* in the augmented model would measure effects of domestic buyouts (*cross-border*=0) with local partner (*local partner*=1), which is not possible per definition because any domestic buyout is local by nature.

Table 7 Propensity score matching

Panel A: Matching diagnostics

	Cross-border	
	Before matching	After matching
B&B	0.205** (0.08)	0.220 (0.15)
Management	0.223*** (0.04)	0.215 (0.24)
Syndicate	0.373 (0.34)	0.237 (0.17)
Public-to-private	-0.022 (0.23)	-0.130 (0.28)
Divisional	-0.078 (0.06)	-0.027 (0.21)
Financial	-0.137*** (0.03)	-0.134 (0.21)
LN(acquisition experience)	-0.006 (0.06)	0.074 (0.13)
LN(deal value)	0.170*** (0.05)	0.105 (0.07)
LN(high-yield spread)	-0.015 (0.46)	-0.017 (0.37)
LN(fund size)	0.088 (0.06)	0.069 (0.07)
Novice	0.076*** (0.02)	0.156 (0.21)
Affiliated	0.265 (0.19)	0.185 (0.18)
World region FE	Yes	Yes
Industry FE	Yes	Yes
Entry year FE	Yes	Yes
Constant	Yes	Yes
R ²	0.24	0.08
N	648	648

Panel B: Treatment effects

	LN(EV/Sales)
ATET NN = 1	0.316*** (0.12)
ATET NN = 5	0.265** (0.10)
ATET NN = 10	0.237*** (0.08)
ATET NN = 15	0.263*** (0.09)
ATET NN = 25	0.279*** (0.08)

This table presents propensity score matching as a robustness test of the baseline results. In panel A, we estimate probit regressions before and after matching on the basis of propensity scores. In panel B, we estimate average treatment effects on the treated (ATET) on the propensity score-matched sample using varying numbers of nearest neighbours (NN). World region fixed effects span Asia, Australia, Central Europe, Eastern Europe, Scandinavia, UK, US, Canada and Rest of World. The symbols ***, **, * denote significance at 1%, 5% and 10%, respectively

the two regression coefficients presented in (4) suggest that mixed syndicates, i.e., those where foreign and domestic PE firms join forces, are associated with *EV/Sales* multiples lower than those of purely domestic buyouts. This result is in line with Dai et al. (2012) who find that mixed syndicates have positive implications for exit performance in the venture capital context. The coefficient of *cross-border* × *large fund*

in column (5) is also negative and statistically significant at the 1% level. Net effects suggest an almost negligible difference of 2% between cross-border and domestic *EV/Sales* multiples when large funds back the deal. In sum, results are consistent with both H5 and H6 and suggest that foreign PE firms can effectively mitigate adverse pricing effects through local partnering or large fund size.

4.2 Robustness tests

Despite the fact that our baseline models control for a rich set of variables and fixed effects, we acknowledge the possibility of endogenous results and address it in two ways. First, we rely on propensity score matching (PSM) to mimic the characteristics of a randomized control trial. In a first step, we model the propensity to receive backing from a foreign PE firm using a probit regression with controls and fixed effects as in regression model (3).⁶ The estimated propensity scores are used to find domestic buyouts that are comparable in observable characteristics. In a second step, treatment effects can be estimated using the *EV/Sales* multiples of the propensity-score matched domestic buyouts as counterfactual outcomes.

Table 7 presents the results. In Panel A, we investigate the matching quality by running probit regressions with the *cross-border* indicator as the dependent variable on both the unmatched and matched sample. As it turns out, no variable significantly discriminates between cross-border and domestic buyouts any more after matching, and model R^2 drops from 24 to 8%. This suggests that coefficients are sufficiently balanced across the two buyout types, i.e., that pricing spreads cannot be explained by systematic differences in the model covariates after matching. In Panel B, we present average treatment effects on the treated (ATET) based on 1, 5, 10, 15 and 25 nearest neighbors. The results suggest that cross-border buyouts increase *EV/Sales* multiples by a minimum of 24% and a maximum of 32% depending on the number of nearest neighbors. These outcomes are in a similar range as the baseline estimates. We thus conclude that our results are not biased by an undue correlation with observable characteristics.

Second, following Bhattacharya et al. (2017), we make use of an exogenous shock to the information environment caused by close political elections as an additional robustness check. The idea is that close election races are associated with increased policy uncertainty that can hardly be predicted until election day (Julio and Yook 2012). The unexpected uncertainty increases information asymmetries between insiders and outsiders (Nagar et al. 2019) and puts foreign PE firms at a disadvantage in buyout pricing due to non-familiarity with the local environment. It is reasonable to assume, for example, that foreign PE firms fail to adequately price in uncertainty and thus end up with a higher buyout valuation than domestic peers with proper access to soft information. To test this conjecture, we go through every deal in the sample and check whether a close election took place in target's country during the 6 months before the buyout. We

⁶ The only difference is that we replace country fixed effects with world region fixed effects because several countries in the sample have too few observations to find matches.

Table 8 Exogenous shock to the information environment

	LN(EV/Sales)
Cross-border	0.181** (0.07)
Close election	-0.467*** (0.11)
Cross-border × close election	0.584** (0.24)
Controls	Yes
Country FE	Yes
Industry FE	Yes
Entry year FE	Yes
Constant	Yes
R ²	0.44
N	648

This table presents OLS regressions using close political elections as an exogenous shock to the information environment as a robustness test of the baseline results. Controls are as in specification (3) of Table 5. Standard errors are clustered by world regions (Asia, Australia, Central Europe, Eastern Europe, Scandinavia, UK, US, Canada and Rest of World) and reported in parentheses. The symbols ***, **, * denote significance at 1%, 5% and 10%, respectively

define an election as being close when the margin of victory between largest and smallest party (parliamentary election) or between winner and contender in the final election round (presidential election) is smaller than 5%. We then augment regression model (3) and include *close election* as well as its interaction term with *cross-border*. Table 8 presents the results.

Consistent with the idea that policy uncertainty is priced in by insiders, we find that domestic buyouts are associated with a 47% lower *EV/Sales* multiple after close political elections. The opposite holds true for foreign PE firms in cross-border buyouts, which pay a 40% higher *EV/Sales* multiple than in normal times (as can be seen when netting the coefficients of *cross-border* and *cross-border x close election*). Thus, our results suggest that the spread between domestic and cross-border buyout multiples increases in times of political uncertainty, when good information production is arguably most important to resolve valuation uncertainty. This finding lends further support to our information-asymmetry based explanation for higher cross-border buyout prices.

In further robustness checks, we explore whether our results are sensitive to alternative dependent variables and standard error clustering. Table 9 presents the results. In Panel A, we re-estimate regression model (3) using *winsorized EV/Sales*, *trimmed EV/Sales*, *abnormal EV/Sales* as well as *LN(EV/EBITDA)* as alternative dependent variables. Coefficients of our main explanatory variable *cross-border* remain positive and statistically significant, which confirms our baseline results. The economic significance is somewhat smaller in case of *LN(EV/EBITDA)* as the dependent variable and suggests an 8% greater multiple. However, using *LN(EV/EBITDA)* comes at the expense of a smaller sample size because of missing information or negative EBITDA figures, such that results are

Table 9 Alternative dependent variables and standard error clustering

Panel A: Alternative dependent variables				
	Winsorized EV/Sales	Trimmed EV/Sales	Abnormal EV/Sales	LN(EV/EBITDA)
Cross-border	0.257*** (0.07)	0.232*** (0.06)	0.215** (0.07)	0.080** (0.03)
Controls	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Entry year FE	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes
R ²	0.38	0.37	0.30	0.41
N	648	636	648	499
Panel B: Alternative standard error clustering				
	LN(EV/Sales)			
	S.E.s clustered by country		S.E.s clustered by country × entry year	
Cross-border	0.245*** (0.07)		0.245** (0.11)	
Controls	Yes		Yes	
Country FE	Yes		Yes	
Industry FE	Yes		Yes	
Entry year FE	Yes		Yes	
Constant	Yes		Yes	
R ²	0.40		0.40	
N	648		648	

This table presents OLS regressions using alternative dependent variables and standard error clustering as a robustness test of the baseline results. Controls are as in specification (3) of Table 5. In Panel A, standard errors are clustered by world regions (Asia, Australia, Central Europe, Eastern Europe, Scandinavia, UK, US, Canada and Rest of World) and reported in parentheses. The symbols ***, **, * denote significance at 1%, 5% and 10%, respectively

not directly comparable to our baseline results. In Panel B, we check for sensitivity of standard errors to alternative clustering on country as well as country × entry year level. We find that statistical significance of the *cross-border* coefficient is slightly affected in case of double-clustered standard errors, but still evident at the 5% level.

4.3 Discussion

Our results provide strong evidence for adverse pricing effects in cross-border buyouts and are consistent with previous literature documenting underperformance of cross-border transactions in terms of returns in the VC context (Buchner et al. 2018). Several tests suggest that adverse pricing effects are best explained by an information asymmetry channel. This is striking given the fact that PE firms are

sophisticated financial intermediaries, which are usually associated with superior access to information. Nahata et al. (2014) argue that cultural distance in cross-border venture capital deals provides strong incentives for ex ante screening. Following this line of thought, PE firms may anticipate the possibility of negative performance implications of cross-border buyouts, which could lead to downward adjustment of target's valuation and a lower buyout multiple.

There are several possible explanations for systematically higher cross-border multiples because of inferior access to information. First, previous literature argues that PE firms typically opt for cross-border buyouts when they draw on strong domestic track record and cannot find sufficient targets any more in the home market (Buchner et al. 2018). Thus, due to prior success in the home market, PE firms may underestimate the additional efforts it takes to successfully invest in other markets. We refer to this as "hubris" in the sense of Seth et al. (2000). Following the idea of Cumming and Dai (2011), cross-border buyouts may also suffer from a limited attention problem. That is, PE firms typically draw on lean organizations and may be tempted to spread staff too thinly across investments. This may apply to cross-border buyouts as they account for only a small proportion of the overall portfolio, and thus have relatively little importance. Reputational risks are also lower in case of underperformance or failure of cross-border buyouts as compared to buyouts in the home market for which PE firms claim to have competitive advantage.

5 Conclusion

This paper provides first large-scale empirical evidence for adverse pricing effects in cross-border private equity buyouts. In our baseline estimates, we find that EV/Sales multiples of cross-border buyouts are 25–37% higher than those of domestic counterparts. Consistent with the idea that informational disadvantages of foreign acquirers explain this baseline effect, we find that the spread between cross-border and domestic buyout multiples narrows when information production is improved through high accounting standards in target's country. Similar effects are observable on the firm level. That is, when information production is facilitated because of public listing status prior to the buyout or large firm size, valuation differences reduce considerably. Further results suggest that local partnering mitigates adverse pricing effects. The same holds true for large buyout funds, presumably because they draw on sufficient organizational resources to cope with cross border-related transaction costs.

Our study has several implications for future research. First, it is worth exploring whether higher prices in cross-border buyouts translate into smaller multiple expansion as compared to domestic buyouts. If this were to hold true, we would expect more emphasis on other value creation measures such as operating improvements. At the same time, operating improvements should be more difficult to achieve for a foreign PE owner due to impediments for monitoring. This raises the broader question of how foreign PE firms cope with agency conflicts during the holding period. One possibility is to open local branches, which likely mitigate adverse selection and moral hazard problems, but are also costly. An avenue for future research may

be to look at market entry modes of foreign PE firms and assess the costs and benefits of a physical presence in the host country. Second, more research is warranted on the relationship between cross-border buyout prices and organizational learning. Our estimates control for time-constant sources of heterogeneity on the PE firm level, which means that our empirical setup does not allow for investigation of learning gains over time. That is, with every cross-border buyout, foreign PE firms gain experience and garner expertise about the specifics and nature of the foreign deal environment, which likely helps to develop the ability to identify promising targets, value them correctly and negotiate for an attractive price. One way to study such experiential learning gains empirically is to look at the time series of valuation multiples within PE firms. Third, there is a dearth of research on the human capital dimension in cross-border buyouts. Rather than syndicating with a local partner, foreign PE firms may decide to hire local staff to cope with informational disadvantages. Future research could therefore examine whether multiples of cross-border buyouts are lower when local lead partners are responsible for the deal. The three additional remedies that we propose to future research, i.e., local branches, experiential learning and local human capital, could also be related to each other. For example, it is possible that PE firms establish local branches when they fail to achieve learning gains or attract skilled human capital. One way to investigate such interrelations would be to provide evidence from the field through surveys with PE firm managers.

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