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Mid-market private equity investments as a tool to enlarge company size in Spain

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ABSTRACT

This paper investigates the impact of private equity (PE) investments on company performance in the Spanish mid-market segment, focusing on the differential effects of buyout versus growth capital transactions. Using a difference-in-differences methodology with propensity score matching, we compare the performance of 155 PE-backed companies with 158 matched non-PE-backed companies from 2013 to 2020. Our results show that PE-backed companies experience significantly greater post-investment performance in terms of growth in employment, sales, and total assets. Importantly, these effects persist even after controlling for the amount of capital injected, underscoring the value of non-financial resources provided by PE investors. Furthermore, we find that only buyout-backed companies maintain significantly superior performance when controlling for the funding received, suggesting that majority ownership and control mechanisms are critical for value creation. Our findings contribute to the literature by highlighting the heterogeneous real effects of PE and the strategic role of investor involvement, especially in bank-based economies with limited access to alternative financing.

1. Introduction

Understanding the role of private equity (PE, henceforth) firms in influencing the performance of their portfolio companies has been an important issue for both academics and practitioners over the past two decades (Cumming and Johan, 2007; Dai, 2022; Wood and Wright, 2009, among others). A substantial body of research has documented the positive impact of PE firms on the operating performance (including productivity, sales, employment, and profitability) of their investees, across both the US and Europe (Acharya et al., 2013; Amess and Wright, 2007; Boucly et al., 2011; Cohn et al., 2022; Guo et al., 2011; Scellato and Ughetto, 2013; Wilson et al., 2012; Wright et al., 1992, among others). Most of the PE literature, however, focuses on buyouts carried out in the US and the UK, sometimes distinguishing among different types of leveraged acquisitions (Davis et al., 2025; Meuleman et al., 2009). Moreover, the existing evidence predominantly centers on US public-to-private buyouts involving very large companies (Smith, 1990), a type of transaction that has become relatively uncommon in recent years. These large-scale deals, which have been particularly prevalent in both the US and the UK, attracted significant media attention before and after the global financial crisis (Cumming et al., 2019). Conversely, other forms of buyouts and PE transactions have received comparatively limited attention in academic literature.

PE is a very important tool to provide rapid growth solutions for existing small and medium-sized enterprises (SMEs), especially in

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bank-oriented economies where access to external equity funding is limited (i.e., very few SMEs are eligible to receive venture capital (VC) financing or have access to the stock market). PE transactions include different types of deals, such as growth investments in profitable established companies, replacement deals that enable ownership restructuring in family-owned companies, turnaround initiatives targeting businesses facing financial distress, and leveraged acquisitions of majority stakes in consolidated companies (buyouts). PE investments can therefore facilitate rapid growth, enable partial exits of existing owners, support the restructuring of underperforming companies, and, most notably, create a private market for unlisted SMEs through buyout deals.

PE investments differ in how capital is used: in growth and turnaround deals, funding is directly invested to scale the target company's operations, while in replacement and buyout transactions, the capital primarily goes to the sellers. Therefore, while in the former case investee companies benefit from both financial and non-financial support provided by PE firms, in the latter, non-financial resources alone improve the performance of target companies.

According to agency theory (Jensen, 1993), the positive real effects of PE on portfolio companies are primarily attributed to enhanced monitoring and the alignment of interests between investee managers and general partners. However, we agree with Meuleman et al., (2009) that a strategic entrepreneurship perspective- rooted in the resource-based view of the company (Ireland et al., 2003)- offers a more comprehensive framework for explaining that valuable resources are also essential to achieving sustainable competitive advantage. In addition to funding, non-financial managerial resources are especially important for SMEs in mid-market PE investments. Managers of target companies often possess local experience and operate with limited strategic objectives. External specialized investors typically introduce a new strategic vision for the target company (e.g., shifting from a local or regional focus to a broader national or international orientation). Such a shift usually requires changes in management culture and entails leveraging their broader network of contacts (Wood and Wright, 2009).

The aim of this study is to examine the role of PE in fostering company growth within an economy predominantly composed of SMEs, such as Spain, particularly by supporting the emergence of larger companies across various industrial sectors. We examine whether the provision of valuable resources by PE firms leads to stronger performance (i.e., growth patterns) in investee companies compared to their non-PE-backed counterparts, and whether this effect can be attributed to more than just the capital infusion associated with PE investments. More precisely, we also seek to assess the extent to which increased performance in investee companies is mostly driven by the provision of non-financial resources by comparing buyout with growth transactions.

Buyouts can enhance organizational efficiency by streamlining operations and reducing costs (Meuleman et al., 2009) and create value through comprehensive corporate restructuring, which often involves changes to management and the implementation of new governance practices. On average, buyouts are larger in size compared to growth deals (Alférez, 2025), which may be a critical factor in fostering investee's performance. In addition, PE investors typically hold a majority stake in buyouts, whereas growth investments are more commonly characterized by minority ownership stakes. It follows that PE managers may face greater challenges in implementing the desired strategic changes when holding a minority stake in the investee company, particularly in the context of family-owned companies (Martí et al., 2013). Hence, compared to buyouts, growth investments benefit from valuable financial resources to increase performance, but are smaller in size and do not grant PE investors full ownership control.

We focus on the Spanish market, where overall VC and PE investment activity in 2024 amounted to €6.3 billion across 785 transactions (Alférez, 2025), ranking behind only the UK, France, and Germany in Europe (Invest Europe, 2025). Hence, Spain stands as one of the most representative European countries in terms of PE activity, while simultaneously exhibiting a business structure heavily dominated by very small SMEs. As of December 2024, 99.8% of Spanish companies employed fewer than 250 workers, and 98.9% had fewer than 50 employees (Cifras PYME, 2025). Over 80% of the amount invested in Spain in 2024 was allocated to PE deals, mostly mid-market buyouts, whereas a comparable proportion of the number of transactions involved VC investments (Alférez, 2025). After three decades, hundreds of companies have profited from PE activity in Spain, thus leading to the emergence of relevant players in various industrial sectors.

We concentrate on PE investments with equity commitments ranging from €10 to €100 million[1] (i.e., mid-market deals) carried out in Spain between 2013 and 2020. In that period, 273 mid-market PE deals were closed in Spain (Source: Spaincap/Webcapitalriesgo). We obtained complete investment and accounting data for 251 transactions (representing 91.9% of the population), comprising 111 buyouts, 110 growth investments, 21 replacements and 9 turnaround deals.

The remainder of the paper is organized as follows. Section 2 discusses background literature and develops our predictions. Section 3 introduces the data, describes the explanatory variables used in the empirical analysis and provides some relevant descriptive statistics. Section 4 presents the econometric models and discusses the results. Section 5 concludes and summarizes the paper.

2. Literature background and hypotheses development

2.1. The debate around the role of PE

The idea that PE improves target companies' performance by imposing stricter oversight on management was first introduced by Jensen (1989). The author noted that the change in ownership resulting from a PE transaction is expected to generate economic efficiencies due to the disciplinary effect of debt, which reduces the misallocation of managerial resources. In addition, PE investors impose oversight and control over companies' investment strategies, which further enhances operational efficiency and provides more

[1] The Spanish Venture Capital and Private Equity Association (SPAINCAP) defines mid-market deals as those in which the PE investor initially commits between €10 and €100 million in equity in the target company or newco created to structure the transaction (Alférez, 2025).

effective financial incentives for managers. Some scholars have criticized Jensen's theory for referring to public-to-private transactions only, which now account for only a minority of buyouts (Meuleman et al., 2009), and have also raised concerns that PE investment could be detrimental to corporate investment strategies in the long run (Hitt et al., 1991, 1996), driven by the willingness of investors to capitalize quickly on the investment through practices such as 'quick flips', i.e. initial public offerings (IPOs) of companies soon after a buyout. Meuleman et al. (2009) argue that a strategic entrepreneurship perspective—grounded in the resource-based view of the firm (Ireland et al., 2003)— offers a more comprehensive framework for understanding the role of non-financial resources in enhancing investee firm performance within the context of mid-market PE investments. The involvement of external PE investors brings a broader strategic vision, enabling managers in target companies to expand their strategic objectives by leveraging enhanced access to networks and professional advisory services provided by PE firms. They also provide needed equity funding in the case of growth and turnaround transactions.

2.2. The impact of PE on portfolio company performance

The influence of PE firms on the performance of their portfolio companies has been a central topic of interest for both scholars and practitioners over the past two decades (Cumming and Johan, 2007; Dai, 2022; Wood and Wright, 2009). What PE funds have in common is that they are structured as partnerships, composed of general partners and limited partners, and that their overall objective is to improve the performance of investee companies and/or unlock value through acquisitions. PE investors can increase the value of their portfolio companies through various strategies, such as improving operational performance, increasing productivity, investing in innovation and having a positive impact on employment (see, for example, Davis et al., 2025; Harris et al., 2005; 2014; Kaplan and Schoar, 2005; Lerner et al., 2011). The positive impact of PE firms on the operating performance and profitability of portfolio companies is also confirmed in other works (Amess and Wright, 2007; Boucly et al., 2011; Cohn et al., 2022; Fracassi et al., 2022; Guo et al., 2011; Kaplan, 1989; Muscarella and Vetsuypens, 1990; Scellato and Ughetto, 2013; Smith, 1990; Wilson et al., 2012; Wright et al., 1992), with some exceptions (Desbrières and Schatt, 2002; Jelic and Wright, 2011). Evidence of improvements in portfolio companies' productivity (Harris et al., 2005) and investment in innovation (Lerner et al., 2011; Ughetto, 2010) has also been reported, along with positive spillovers to the broader industrial environment (Jensen et al., 2006). Focusing on the real effects of PE firms, a large number of studies have considered different measures of performance, including sales, total assets and employment growth of PE-backed companies (Amess and Wright, 2007; Boucly et al., 2011; Jelic and Wright, 2011; Muscarella and Vetsuypens, 1990; Wilson et al., 2012), which generally point to improved post-deal performance. The evidence on the employment effects of PE deals is instead more mixed (Amess et al., 2014).

Based on the arguments presented above, we propose the following hypothesis:

H1. *PE-backed companies show higher levels of growth than non-PE-backed companies*

2.3. The impact of PE firm heterogeneity on portfolio company performance: growth vs. Buyout deals

The PE industry has undergone significant changes over time and PE firms have become more specialized, targeting companies with different characteristics and structuring transactions differently (Guo et al., 2011). Rather than constituting a homogeneous group, PE funds differ not exclusively in terms of the stage and sector of the target companies (Block et al., 2019), but also in terms of their relationships with other providers of capital (Braun et al., 2020) and with the companies' management. Such relationships are characterized by different agency tensions and may explain differences in performance outcomes (Goergen et al., 2014; Phalippou, 2014; Wood and Wright, 2009). The literature has not yet provided a detailed picture of the performance consequences of PE firm heterogeneity on investee companies. While there is strong evidence that PE creates value, which in turn stimulates job creation (Amess and Wright, 2007; Jelic and Wright, 2011), different types of buyout deals have been found to have different effects on employment.[2] Radu-Dragomir Manac et al., (2022) examine variations in PE fund performance (proxied by net IRR or multiples of invested capital) by distinguishing eleven different types of PE funds. The authors show that funds typically associated with riskier areas of activity (e.g., balanced funds, expansion/late-stage funds, mezzanine funds, natural resources funds, real estate funds, and venture funds) generally underperform relative to buyout funds. Davis et al. (2025) examine the heterogeneity of buyouts using a dataset comprising approximately 9800 PE buyouts of US companies from 1980 to 2013. They find that the effects on employment, job reallocation and productivity vary significantly across the type of buyout, the prevailing credit conditions, the different PE groups and the evolution of macroeconomic and credit conditions. Thus, they claim that the real effects of buyouts on target companies are more complex and varied than expected.

Growth deals focus on mature companies characterized by low leverage and limited free cash flow, but with significant potential to expand through the infusion of capital. Such companies have the potential for massive expansion and often play the role of industry leaders, but do not have the resources and capabilities to take advantage of these opportunities. As a result, they seek capital resources from external partners, such as PE firms specialized in growth and corporate restructuring (Meuleman et al., 2009). Investments made by PE firms sponsoring growth funds are guided by well-defined strategies aimed at achieving sustainable growth (Stewart, 2012).

[2] For management buy-ins (MBIs), concerns have been raised about job losses resulting from a profit-maximizing strategy (Amess and Wright, 2007). Instead, management buy-outs (MBOs), private-to-public deals and secondary buy-outs have been found to increase employment (Amess and Wright, 2007; Boucly et al., 2011).

Similar patterns can be seen in turnaround deals, where investee companies are experiencing a severe crisis of competitiveness, but the injection of new capital and restructuring can bring about a turnaround. To achieve growth, PE firms use their networks, relationships and experience. Growth deals are generally smaller in size and more frequently involve minority stakes held by PE investors. In these cases—particularly in family-owned companies—PE managers may face greater challenges in implementing strategic changes due to their limited control (Martí et al., 2013).

Buyouts typically involve the acquisition of equity in mature companies that are already financially self-sufficient but have potential for growth and improvements in management practices. Buyouts are generally seen as a mechanism for improving organizational efficiency, streamlining processes and reducing unit costs (Meuleman et al., 2009). PE buyouts seek to add value through a deep transformation of the corporate structure, which may include the replacement of the existing management team or its subordination to new management practices established by the buyer. In fact, PE firms sponsoring buyouts seek to increase the value of their portfolio companies through governance engineering, which involves optimizing the governance structure of the target company (e.g., restructuring the board of directors to include representatives of the PE firm as well as new external members). This managerial restructuring is further facilitated by the fact that PE investors hold a majority ownership stake in buyout transactions. Thus, general partners exercise control over the company's board, appoint managers, and often use a higher proportion of equity-based compensation to align management incentives. In leveraged buyouts, the use of debt exerts pressure to reduce costs to optimize free cash flow. In this way, buyout PE firms are well equipped to solve any agency problems (Jensen et al., 2006; Meuleman et al., 2009) that may arise with the target company, thereby enhancing value and growth. In addition, buyout transactions are, on average, larger than growth deals (Alférez, 2025). This is a factor that may play a critical role in enabling faster post-investment growth, especially by providing easier access to traditional external sources of funding (i.e., financial institutions) to increase investee performance.

Building on these arguments regarding ownership control and value-creation mechanisms, and on the premise that PE-backed buyouts are better equipped to generate growth-enhancing value than other PE non-buyout deals, we propose the following hypothesis:

H2. *PE-backed buyouts show higher levels of growth compared to other PE non-buyouts (i.e., deals sponsored by PE growth funds)*

3. Data and sample statistics

We isolated the impact of PE backing on the performance of investee companies by means of a difference-in-differences (DD) estimator applied to the growth of PE-backed and control group companies. The DD estimator was computed as the difference in outcome for PE-backed companies around the year of the PE investment, relative to the difference in outcome of the control group companies around the matching year (for recent applications to the VC context, see Bernstein et al., 2016; Dutta and Folta, 2016; Quas et al., 2021). Therefore, we had to build both a sample of PE-backed companies and a matched sample of control group companies.

3.1. Definition of a sample of PE-backed companies

273 mid-market PE deals were reported in Spain between 2013 and 2020 (Source: Spaincap/Webcapitalriesgo[3]). Although we had both the opportunity and the data to extend the sample period back to 2005, we deliberately selected 2013 as the starting year. Transactions conducted prior to this date—relatively limited in number because of the financial crisis—could have introduced an upward bias in the results. This is because the unusually high unemployment rates and depressed levels of sales and profitability prevailing during that period would have generated artificially low baseline references for many firms, thereby overstating subsequent growth effects. Moreover, we selected 2020 as the final year to ensure that companies invested in the last year of our sample period would have at least 3 years of post-investment observations.[4] We were able to fully trace 251 transactions (91.9% of the universe) -including add-ons- and obtain accounting and employment data from Orbis. We obtained pre-investment and post-investment data on principal and add-on target companies. In the case of buyouts, we accounted for the add-ons included in the acquisition process. The number of add-ons incorporated ranged from 0 to 17.

The initial sample of 251 companies receiving PE capital is composed of 111 buyout, 110 growth, 21 replacement capital, and 9 turnaround deals. Buyouts are referred to as acquisitions of majority stakes in mid-size target companies, usually including the involvement of original managers. None of them were public-to-private transactions. Growth investments are equity capital injections in existing companies to allow them to expand their geographic focus and/or product base. Replacement capital deals are minority stake PE acquisitions that allow for the exit of some shareholders in established companies. In turnaround operations, PE investors acquire financially distressed companies to re-structure assets and negotiate with employees and financial institutions the rebirth of

[3] Spaincap (formerly, ASCRI) is the new acronym of the Spanish Private Equity and Venture Capital Association. Webcapitalriesgo is the data provider responsible for collecting the information on investment and divestment activity to produce Spaincap's annual activity reports since 2000.

[4] As treated and untreated companies belong to the same industry, we do not believe that the COVID crisis significantly affected the results.

the company.[5] We built a company-year panel dataset including investment data on stage, amount, timing, type of investor, and syndication (Source: SPAINCAP/Webcapitalriesgo), and accounting and employment data (Source: Orbis) to develop our estimation strategy. We collected accounting data from 2009 to 2022.

3.2. Definition of a matched control group

To construct the control group, we identified Spanish companies that did not receive PE financing by drawing from the population of companies operating in Spain (Source: Orbis). More precisely, since we have access to full VC and PE activity data, we excluded from the control group firms that received VC or income loans from a government-backed institution called ENISA in order to ensure to select untreated companies in our control group and excluding confounding factors as to ensure that the effect is purely attributable to PE. Specifically, we selected companies that operate in the same geographical region and belong to the same industry—defined at the two-digit level of the NACE Rev. 2 classification—as those included in our PE-backed sample. Furthermore, we restricted the sample to companies with at least three consecutive years of available accounting data. The final control group consists of 369 companies.

The key assumption underlying the consistency of the DD estimator is that the average change in the outcome variable would have been the same for treated companies (i.e., PE-backed) and untreated companies (i.e., control group) in the absence of treatment. We thus followed the suggestion by Roberts and Whited (2013) to apply the DD approach to a sample of more homogeneous treated and untreated companies, selected with a matching algorithm. Some studies argue that the DD methodology in combination with matching significantly improves the quality of non-experimental evaluation results (Abadie, 2005; Blundell and Costa Dias, 2000). Therefore, for the treated PE-backed companies, we selected a counterfactual of matched control group companies, using the following matching algorithm.

First, we applied a coarsened exact matching (CEM) (Iacus et al., 2012) in the year before the financing event. CEM allows for the ex-ante control of the balancing of the matched sample. As matching variables, we used the age, NACE industry code (3 digits), year and foundation year of the companies.[6] CEM identifies the strata of all the combinations of the coarsened continuous and the categorical matching variables and eliminates all treated and untreated companies that do not share common characteristics with companies in the other group one year before the initial investment. This procedure reduced our sample to 239 PE-backed companies and 348 control group companies.

Secondly, we performed, in each year, a company-level 1:5 propensity score matching (PSM) selecting the year before the first funding.[7] To compute the propensity score (i.e., the probability of being PE-backed), we used the natural logarithm of the company age ($lnAge_t$), NACE Rev2 classification (3 digits), region, and years binary variables as matching variables. We also included in the matching procedure the natural logarithm of employees ($lnEmployees_t$), total assets ($lnTotalAssets_t$), and sales ($lnSales_t$). Based on the propensity score, we then picked the closest (i.e., nearest neighbor) control group companies for each PE-backed company. This further procedure shrank our sample to 155 PE-backed companies (72 of which receive growth deals and the remaining 83 buyout) and 158 control group ones.[8]

Table 1 shows the distribution of PE-backed and control group companies effectively used in the estimation process across foundation year, industries, and regions. The two distributions are, as expected according to our matching procedure, not significantly different (Pearson $\chi2$ (47) = 41.752, p value = 0.689 for foundation year; Pearson $\chi2$ (9) = 2.542, p value= 0.980 for industries; Pearson $\chi2$ (13) = 6.390, p value= 0.931 for regions).

Within the sample included in our estimates, companies are equally founded in all sub-periods, with more recently founded companies under-represented to be able to observe the effects on the performance after the entry of PE investors. The most common activity sectors are information and communication (ICT) services, other manufacturing, and R&D services. In terms of regions, companies are concentrated in the Madrid region, Catalonia, and Valencia.

[5] We do not have detailed governance data to directly examine governance restructuring as a primary channel through which PE creates value. Buyout transactions are consistently associated with substantial changes in board composition, with the PE firm typically appointing a majority of board members. In contrast, in growth investments, PE firms generally appoint only a limited number of directors while the existing board structure is largely maintained. Moreover, in buyout transactions, full ownership is typically concentrated in a newly created holding entity ("newco"), as required by debt providers. In cases where less than 100% of the target's shares are acquired, incumbent shareholders contribute their shares to the newco, in which the PE firm holds a controlling stake.

[6] CEM requires to coarsen the data values into discrete bins. This is why we include as matching variables only categorical or collapsed categorical variables and we do not include accounting data. More specifically, including NACE industry codes is unnecessary, since the control group sample is already restricted to companies operating in the same sectors (and regions). However, applying CEM guarantees a higher balance and allows an exact match.

[7] Results are robust when using different PSM ratios (e.g. 1:1, 1:3). Results of these robustness checks are not reported in the text for the sake of brevity but are available from the authors upon request.

[8] The distribution of this subsample of matched PE-backed companies is significantly different from the distribution of the population of PE-backed companies. The two distributions are significantly different for industries (Pearson $\chi2$ (9) = 19.184, p value= 0.024) and for regions (Pearson $\chi2$ (16) = 36.895, p value= 0.002), while differences are not significant in terms of foundation year (Pearson $\chi2$ (56) = 66.708, p value = 0.155).

Table 1
Distribution of companies by foundation year, industry, and region.

	PE-backed		Control group		Total	
Foundation Year						
before 1990	36	23%	37	23%	73	23%
1991–2000	52	34%	45	28%	97	31%
2001–2010	51	33%	51	32%	102	33%
After 2011	16	10%	25	16%	41	13%
Total	**155**	**100%**	**158**	**100%**	**313**	**100%**
Region						
ANDALUCIA	16	10%	18	11%	34	11%
ARAGON	6	4%	3	2%	9	3%
ASTURIAS	1	1%	1	1%	2	1%
BALEARES	1	1%	1	1%	2	1%
CANARIAS	1	1%	2	1%	3	1%
CANTABRIA	1	1%	1	1%	2	1%
CASTILLA LA MANCHA	4	3%	5	3%	9	3%
CATALUÑA	29	19%	35	22%	64	20%
COMUNIDAD VALENCIANA	23	15%	25	16%	48	15%
GALICIA	4	3%	0	0%	4	1%
MADRID	50	32%	49	31%	99	32%
MURCIA	6	4%	6	4%	12	4%
NAVARRA	3	2%	2	1%	5	2%
PAIS VASCO	10	6%	10	6%	20	6%
Total	**155**	**100%**	**158**	**100%**	**313**	**100%**
NACERev2						
Manuf. of chemicals incl. pharmaceuticals and materials	2	1%	2	1%	4	1%
Manuf. of computers and equipment	11	7%	9	6%	20	6%
Other manufacturing	26	17%	33	21%	59	19%
Trade services	8	5%	8	5%	16	5%
ICT services	35	23%	32	20%	67	21%
Professional services	14	9%	15	9%	29	9%
Software	14	9%	19	12%	33	11%
R&D services	22	14%	22	14%	44	14%
Other services	19	12%	15	9%	34	11%
Other low technology sectors	4	3%	3	2%	7	2%
Total	**155**	**100%**	**158**	**100%**	**313**	**100%**

3.3. Descriptive statistics

Table 2 presents the summary statistics for the variables of interest across both groups, reported for the matching year and the subsequent years.

In the matching year, there are not statistically significant differences between PE-backed companies and those in the control group with respect to the number of employees and sales. However, significant differences emerge in terms of total assets, with PE-backed companies exhibiting a larger size relative to their non-PE-backed counterparts. It is important to note, however, that the DD methodology does not require treated and untreated companies to be identical at the time of treatment. Rather, a fundamental assumption underlying the DD approach is the so-called parallel trends assumption, which posits that, prior to treatment, the treated and control groups should exhibit similar trends in the outcome variable of interest (Roberts and Whited, 2013).

To assess the validity of this assumption, we examined the pre-treatment performance trajectories of PE-backed and control companies over the three years preceding the matching year. Specifically, we compared trends in the logarithms of average employment, sales, and total assets. The results indicate no statistically significant differences in pre-treatment trends across the two groups (p-values of 0.463 for employees, 0.929 for sales, and 0.160 for total assets), thereby supporting the suitability of the DD framework for our empirical analysis.

Further insights from the univariate analysis reveal that, within our sample, PE-backed companies receiving growth capital are significantly smaller at the time of matching—across all three size proxies (employees, sales, and total assets)—than those affected by a buyout transaction.[9]

Finally, the univariate evidence reported in Table 2 provides preliminary support for our predictions: following the receipt of PE

[9] Given the substantial differences between buyout and growth transactions, we performed additional analyses to rule out the possibility that such differences might drive our results. Specifically, we estimated the models separately for buyout and growth deals against the pooled matched sample, and the findings are consistent with those obtained from the analysis combining both groups.Furthermore, we implemented separate matching procedures for buyout and growth transactions and subsequently re-estimated the models for each subsample. Once again, the results are fully in line with those reported in the manuscript.Overall, these robustness checks suggest that differences in transaction type and size do not materially affect our findings. For the sake of brevity, these additional results are not reported in the manuscript, but they are available from the authors upon request.

Table 2
Descriptive statistics by group at matching and post-matching.

	PE-backed	Growth	Buyout	Difference growth vs. buyout	p-value		Control group	Difference PE-backed vs. control group	p-value	
At matching										
$lnEmployees_{i,t}$	4.779	4.538	5.009	-0.471	0.040	**	4.601	0.178	0.241	
	(0.110)	(0.147)	(0.175)	(0.228)			(0.105)	(0.151)		
$lnSales_{i,t}$	16.829	16.578	17.005	-0.427	0.087	*	16.730	0.099	0.548	
	(0.118)	(0.171)	(0.179)	(0.247)			(0.115)	(0.165)		
$lnTotalAssets_{i,t}$	16.915	16.717	17.073	-0.356	0.071	*	16.541	0.374	0.016	**
	(0.092)	(0.137)	(0.139)	(0.195)			(0.123)	(0.154)		
Post matching										
$lnEmployees_{i,t}$	5.128	4.963	5.267	-0.304	0.008	***	4.746	0.383	0.000	***
	(0.054)	(0.073)	(0.085)	(0.109)			(0.051)	(0.074)		
$lnSales_{i,t}$	17.25475	17.028	17.382	-0.353	0.002	***	16.83179	0.42296	0.000	***
	(0.054)	(0.087)	(0.075)	(0.114)			(0.067)	(0.085)		
$lnTotalAssets_{i,t}$	17.47982	17.212	17.741	-0.529	0.000	***	16.73471	0.74511	0.000	***
	(0.041)	(0.060)	(0.060)	(0.085)			(0.058)	(0.070)		

*p < 10%; **p < 5%; ***p < 1%, se in brackets.

investment, PE-backed companies exhibit higher performance compared to the control group. This effect is particularly pronounced among companies subject to buyout transactions, which display significantly stronger post-investment performance compared to those receiving growth capital.

These findings are further corroborated through a multivariate analysis, the results of which are presented and discussed in the following section.

4. Multivariate analysis

4.1. Empirical strategy

We analyze our prediction on investee's performance measured by employment, sales, and total assets growth on treated and untreated companies using a DD panel specification with company fixed effects. Our basic model (Model 1), testing Hp1, excluding control variables, is as follows:

$$Y_{i,t} = \alpha_0 + \alpha_1 d_{post_{matching\ i,t}} + \alpha_2 PE_{backed\,i} + \alpha_3 PE_{backed\,i} * d_{post_{matching\ i,t}} + \rho_i + \varepsilon_{i,t} \quad (1)$$

We define three dependent variables ($Y_{i,t}$), $lnTotalAssets_t$, $lnEmployees_t$, and $lnSales_t$, equal to the logarithm of total assets, number of employees, and sales of companies, respectively, plus 1. $d_{post_{matching\ i,t}}$ is binary variable separating the pre-matching period from the post-matching period: it changes from 0 to 1 in the year following the one in which a company has been selected in our matching procedure (i.e., for PE-backed companies it coincides with the year in which a company receives the first investment, for control group companies it coincides with the year of matching). Its coefficient captures the differences in size (in other terms, growth) around the financing event, i.e., the "first difference" of the DD estimator. PE_{backed} is a time-invariant binary variable equal to 1 for treated companies, i.e., those that received PE. Its coefficient would capture time-invariant differences between PE- and non-PE-backed companies. However, as we use a fixed-effect specification, we do not actually estimate the coefficient of PE_{backed}, and its effect is captured by companies' fixed effects. While the coefficient of $d_{post_{matching\ i,t}}$ should capture the difference in size around the financing year for both PE-backed and control group companies, the coefficient of the interaction between $d_{post_{matching\ i,t}}$ and $PE_{backed\,i}$ captures how much the differences in size for PE-backed companies around the financing event were larger (or smaller) than those for control group ones, i.e., the DD estimator. A positive and significant coefficient of interaction, in accordance with our hypothesis Hp1, would suggest a significant positive effect of PE financing on the performance of investee companies.

We included companies fixed effects (ρ_i). This approach is preferred to random-effect estimators when the treatment is not randomly assigned, and some individuals are more likely to be treated than others based on some time-invariant characteristics (Besley and Case, 2000). For instance, PE-backed companies may be systematically different from control group ones due to their inner quality or the long-term prospects of their businesses. The companies' fixed-effect terms should capture such differences.

A Hausman test confirmed that the fixed-effect estimator is more desirable than a random-effect estimator in our setting ($\chi 2$ (18) = 81.61 for employment growth, $\chi 2$ (18) = 1219.31 for total assets growth, and $\chi 2$ (18) = 88.61 for sales growth, all with p value < 1%). We also cluster standard errors at the company level to correct for both autocorrelation and heteroscedasticity (Bertrand et al., 2004).

In each model, we controlled for company age in logarithms ($lnAge_{i,t}$); liquidity, measured as the logarithm of cash and cash equivalents, lagged ($lnCash_{i,t-1}$); intangibles, measured by the ratio of intangibles to total assets, lagged ($Intangibles_{i,t-1}$),[10] Debt, measured by the logarithm of current and long term liabilities, lagged ($lnDebt_{i,t-1}$), and years binary variables.

Table 3 summarizes the definition of all variables of interest and provides summary statistics for the entire sample. The correlation matrix is shown in Table 4.

4.2. Impact of PE mid-market investments

The results of Model 1 are reported in the first three columns of Table 5, showing how the independent variables and controls influence company growth in terms of employment (I), sales (II), and total assets (III).

As to highlight the effect of the injection of financial resources and to isolate the PE value added effect, in the regressions, we also included in Model 1 as control the variable $lnAmount_{i,t}$, i.e., the cumulated amount of funding received from PE firms until year t by the focal company (the results are similar if we control for the non-cumulative amounts injected in each year). The amounts are expressed in terms of the logarithms of EUR received. The results of these estimations are reported in columns IV, V, and VI (respectively, for employees, sales, and total assets) of Table 5.

The control variables show that older companies with more cash, more debt, and more intangible assets lead to a higher growth in employees, assets, and sales.

The coefficient of $d_{post_{matching\ i,t}}$ is negative and significant at the 1% for employment, sales, and total assets. The coefficients are, respectively, equal to −0.100, −0.157 and −0.133 corresponding to decreases of 10.52% (exp(0.100) − 1) in employees, 17.00% (exp (0.157) − 1) in sales and 14.22% (exp(0.133) − 1) in total assets. The negative coefficient captures the disruptive effect of the COVID-19 shock in the final years of the observation period, contrasting with the post–financial crisis recovery that characterized its earlier phase. Following the global financial crisis, Spain experienced a prolonged recession with negative growth until 2013, followed by a cyclical rebound beginning in 2015 and subsequent moderate but sustained expansion. Aggregate output, however, did not recover to pre-crisis levels until 2017–2018. This recovery was abruptly reversed by the COVID-19 shock, which led to a 10.9% contraction in Spanish GDP in 2020. As a relatively larger share of transactions in our sample occurs in the later years of the period analyzed, the estimated negative effect is consistent with the prevailing macroeconomic conditions.[11] This result is robust across alternative growth measures, including employment, total assets, and sales.

More importantly, and consistent with our theoretical predictions, the interaction term between $PE_{backed\,i}$ and $d_{post_{matching\ i,t}}$ — corresponding to the DD estimator — captures the differential change in performance between PE-backed firms and their matched counterparts. The coefficient on this interaction term is positive and statistically significant at the 1% level across all three performance dimensions. Relative to control firms, PE-backed companies exhibit stronger post-transaction growth in employment (exp(0.282) − 1 = 32.58%), sales (exp(0.316) − 1 = 37.16%), and total assets (exp(0.372) − 1 = 45.06%). Economically, these magnitudes are substantial, indicating that PE-backed firms expand between one-third and nearly one-half more than comparable non-PE-backed firms following the transaction. Taken together, the results suggest that PE involvement enhances the growth trajectory of target firms even under adverse macroeconomic conditions, thereby providing strong support for our first research hypothesis (Hp1).

When replicating the analysis while controlling the amount of financial resources injected (Columns IV-VI), the results indicate that $lnAmount_{i,t}$ is not statistically significant across any growth dimensions. Interestingly, the coefficient of the interaction between $PE_{backed\,i}$ and $d_{post_{matching\ i,t}}$remains sizable and significant (at 1% level) for growth in employment, sales, and total assets. In terms of magnitude, we find similar results to those reported in the first three columns of Table 5: 25.23% (exp(0.225) − 1) increase in employment, 39.51% (exp(0.333) − 1) increase in sales, and 38.54% (exp(0.326) − 1) increase in total assets.

Taken together, the evidence supports the predictions of Meuleman et al. (2009), emphasizing that non-financial resources are central to enhancing the performance of portfolio companies in mid-market PE transactions. Beyond supplying financial capital, external PE investors also contribute strategic guidance and expertise. This enables managers of portfolio companies to expand their strategic scope by capitalizing on enhanced access to industry networks and specialized advisory services provided by PE firms.

Researchers often include the lagged dependent variable in the regressors of the DD specification to reduce endogeneity concerns (Bertrand et al., 2004). We embrace this approach including the lagged dependent variable in our models. The results of these models are reported in Table 6. Columns I-III refer to the model excluding the amount of financing as control (for employment, sales, and total assets growth, respectively), while in Columns IV-VI the models include the amount as further control.

Adding the autoregressive terms does not change our principal results related to a positive and significant effect of PE on the performance of investee companies even though the economic impact of the variable becomes lower. Without considering the amount of funding received, PE-backed companies grew 17.82% more in terms of employment, 23.74% more in sales, and 15.42% more in total assets after the PE event. Including the amounts received, the differences in employment, sales and total assets are, respectively, 16.42%, 29.30%, and 16.53%.

[10] As a robustness check, we also excluded intangible assets, as in buyout transactions these may incorporate goodwill. The results are consistent with those reported in the paper. For the sake of brevity, they are not included in the manuscript but are available from the authors upon request.

[11] As robustness check, we excluded observations from 2020 to eliminate the disruptive effect of the COVID-19 shock. Results, not shown in the text for the sake of brevity, confirm our principal results: excluding observations from 2020 does not materially alter the negative coefficient, suggesting that the result is largely driven by the severe macroeconomic contraction experienced in Spain after the macroeconomic adjustment dynamics associated with the post–financial crisis recovery during the earlier part of the sample.

Table 3
Descriptive statistics.

Variable	Description	Mean	St. dev.	Median	Min	Max	N. obs.
$lnAge_{i,t}$	Logarithm of years of age of company i in year t	2.891	0.597	2.944	0.693	4.043	2615
$Age_{i,t}$	Years from foundation of company i in year t	20.041	10.986	18	1	56	2615
$lnCash_{i,t-1}$	Logarithm of cash available plus 1 of company i, lagged by 1 year	14.565	1.936	14.787	0	19.450	2615
$Cash_{i,t}$	Cash available of company i in year t	8773.258	20101.390	3068.363	0	295151	2615
$Intangibles_{i,t-1}$	Percentage of intangible assets on total assets of company i lagged by 1 year	0.063	0.138	0.006	0	0.902	2615
$lnDebt_{i,t-1}$	Logarithm of debt plus 1 of company i, lagged by 1 year	13.911	4.385	15.166	0	20.850	2615
$Debt_{i,t}$	Current and long term liabilities of company I in year t (k€)	19900.000	64200.000	4577535	0	1190000	2615
$lnEmployees_{i,t}$	Logarithm of the number of employees, plus 1 of company i in year t	4.748	1.422	4.673	0	10.029	2615
$Employees_{i,t}$	Number of employees of company i in year t	368.381	1204.706	106	0	22681	2615
$lnSales_{i,t}$	Logarithm of Sales, plus 1 of company i in year t	16.847	1.676	16.989	0	21.016	2615
$Sales_{i,t}$	Sales of company i in year t (k€)	49852.000	81514.040	23879.670	0	1340125	2615
$lnTotalAssets_{i,t}$	Logarithm of Total Assets, plus 1 of company i in year t	16.849	1.450	16.956	10.494	21.135	2615
$TotalAssets_{i,t}$	Total assets of company i in year t (k€)	52137.270	102766.700	23117.520	36.081	1509904	2615
$d_{post_{matching\ i,t}}$	Binary variable that turns from 1 to 1 in the year in which a company i has been matched	0.564	0.496	1	0	1	2615
lnAmounti,t	Logarithm of the cumulated amount of funding received by company i in year t from PE	1.117	3.133	0	0	11.727	2615
Amounti,t	Cumulated amount of funding received by company i in year t from PE (k€)	2526.309	8661.534	0	0	123812	2615
$PE_{backed_growth_i}$	Binary variable equal to 1 for PE-backed companies receiving growth capital	0.229	0.420	0	0	1	2615
$PE_{backed_buyout_i}$	Binary variable equal to 1 for PE-backed companies involved in buyout deals	0.230	0.421	0	0	1	2615
$PE_{backed\,i}$	Binary variable equal to 1 for PE-backed companies	0.499	0.500	0	0	1	2615

Original values (not transformed into logarithms) in "italics". Source: Orbis and Webcapitalriesgo

Table 4
Correlation matrix.

	Variable	1	2	3	4	5	6	7	8	9	10	11	12
1	$lnAge_{i,t}$	1											
2	$lnCash_{i,t-1}$	**0.288**	1										
3	$Intangibles_{i,t-1}$	**-0.116**	0.032	1									
4	$lnDebt_{i,t-1}$	**0.193**	**0.308**	**0.217**	1								
5	$lnEmployees_{i,t}$	**0.313**	**0.505**	**0.202**	**0.492**	1							
6	$lnSales_{i,t}$	**0.411**	**0.541**	0.021	**0.489**	**0.693**	1						
7	$lnTotalAssets_{i,t}$	**0.376**	**0.670**	**0.177**	**0.606**	**0.686**	**0.764**	1					
8	$d_{post_{matching\ i,t}}$	**0.297**	**0.253**	0.031	**0.132**	**0.199**	**0.185**	**0.269**	1				
9	$lnAmount_{i,t}$	0.074	**0.140**	**0.053**	**0.073**	**0.079**	**0.083**	**0.122**	**0.624**	1			
10	$PE_{backed_growth_i}$	**-0.102**	0.020	**0.080**	0.027	**-0.090**	**-0.114**	**-0.054**	-0.050	**0.532**	*1*		
11	$PE_{backed_buyout_i}$	**0.148**	**0.327**	**0.134**	**0.183**	**0.235**	**0.235**	**0.344**	**0.112**	**-0.669**	**-0.985**	*1*	
12	$PE_{backed\,i}$	**0.082**	**0.262**	**0.170**	**0.146**	**0.122**	**0.122**	**0.223**	0.048	**0.620**	0.996	0.995	1

Polychoric correlations matrix. Variables are defined in Table 2. Bold values are significant at the 99% level.

4.3. Differential effect in growth versus buyout mid-market PE transactions

In Model 2, testing Hp2, we substituted the variable $PE_{backed\,i}$ with two binary variables that distinguish between companies backed by PE through buyout deals ($PE_{backed_buyout_i}$) and those backed through a growth investment strategy [12] ($PE_{backed_growth_i}$).

Accordingly, Model 1 is extended to test Hypothesis 2, as specified below (Model 2):

$$Y_{i,t} = \beta_0 + \beta_1 d_{post_{matching\ i,t}} + \beta_2 PE_{backed_buyout_i} + \beta_3 PE_{backed_growth_i} + \beta_4 PE_{backed_buyout_i} * d_{post_{matching\ i,t}} + \beta_5 PE_{backed_growth_i} * d_{post_{matching\ i,t}} + \rho_i + \varepsilon_{i,t} \quad (2)$$

The interactions between $d_{post_{matching}}$ and each of the two binary variables correspond to the DD estimators capturing the effect

[12] In this analysis, we excluded replacement and turnaround (30 deals in total) transactions. Estimates of model 1 on this restricted sample confirm our principal results. They are not shown in the text for the sake of brevity but are available from the authors upon request.

Table 5
Estimation results: Baseline. DD model.

	Employees		Sales		Total Assets		Employees		Sales		Total Assets	
	I		II		III		IV		V		VI	
$d_{post_{matching\ i,t}}$	-0.100	***	-0.157	***	-0.133	***	-0.100	***	-0.157	***	-0.134	***
	(0.036)		(0.055)		(0.039)		(0.036)		(0.055)		(0.039)	
$PE_{backed\,i} * d_{post_{matching\ i,t}}$	0.282	***	0.316	***	0.372	***	0.225	***	0.333	***	0.326	***
	(0.054)		(0.094)		(0.064)		(0.064)		(0.104)		(0.081)	
$\ln Amount_{i,t}$							0.013		-0.004		0.011	
							(0.009)		(0.015)		(0.011)	
$\ln Age_{i,t}$	0.684	***	1.001	**	0.651	***	0.671	***	1.005	**	0.640	***
	(0.211)		(0.503)		(0.219)		(0.213)		(0.504)		(0.222)	
$\ln Cash_{i,t-1}$	0.080	***	0.129	***	0.119	***	0.080	***	0.129	***	0.119	***
	(0.019)		(0.032)		(0.025)		(0.019)		(0.032)		(0.025)	
$Intangibles_{i,t-1}$	0.615	**	-0.172		0.895	***	0.620	**	-0.173		0.899	***
	(0.260)		(0.421)		(0.237)		(0.257)		(0.422)		(0.235)	
$\ln Debt_{i,t-1}$	0.029	***	0.058	**	0.031	***	0.029	***	0.058	**	0.031	***
	(0.006)		(0.023)		(0.006)		(0.006)		(0.023)		(0.006)	
constant	1.210		11.366	***	12.862	***	1.261	*	11.352	***	12.903	***
	(0.736)		(1.411)		(0.801)		(0.742)		(1.419)		(0.812)	
Years binary variables included	Yes		Yes		Yes		Yes		Yes		Yes	
N.observations	2615		2615		2615		2615		2615		2615	
N. companies	313		313		313		313		313		313	
R^2	0.410		0.240		0.487		0.413		0.240		0.488	

*p < 10%; **p < 5%; ***p < 1%, se in brackets.

Table 6
Estimation results: Baseline with autoregressive term. DD model.

	Employees		Sales		Total Assets		Employees		Sales		Total Assets	
	I		II		III		IV		V		VI	
Dependent $variable_{i,t-1}$	0.509	***	0.417	***	0.698	***	0.509	***	0.418	***	0.698	***
	(0.05)		(0.072)		(0.026)		(0.05)		(0.072)		(0.026)	
$d_{post_{matching\ i,t}}$	-0.056	**	-0.100	**	-0.038	*	-0.056	**	-0.099	**	-0.038	*
	(0.024)		(0.041)		(0.022)		(0.024)		(0.041)		(0.022)	
$PE_{backed\,i} * d_{post_{matching\ i,t}}$	0.164	***	0.213	***	0.152	***	0.152	***	0.257	***	0.153	***
	(0.033)		(0.072)		(0.033)		(0.037)		(0.079)		(0.037)	
$\ln Amount_{i,t}$							0.003		-0.010		0.000	
							(0.006)		(0.01)		(0.006)	
$\ln Age_{i,t}$	-0.009		-0.193		-0.158		-0.011		-0.184		-0.158	
	(0.146)		(0.405)		(0.104)		(0.147)		(0.405)		(0.104)	
$\ln Cash_{i,t-1}$	0.035	***	0.079	***	-0.005		0.035	***	0.079	***	-0.005	
	(0.011)		(0.022)		(0.008)		(0.011)		(0.022)		(0.008)	
$Intangibles_{i,t-1}$	0.187		-0.225		0.119		0.189		-0.228		0.119	
	(0.130)		(0.281)		(0.113)		(0.130)		(0.282)		(0.114)	
$\ln Debt_{i,t-1}$	0.011	***	0.037	**	-0.003		0.011	***	0.037	**	-0.003	
	(0.004)		(0.016)		(0.003)		(0.004)		(0.016)		(0.003)	
constant	1.813	***	9.031	***	5.847	***	1.823	***	8.988	***	5.846	***
	(0.438)		(1.229)		(0.517)		(0.44)		(1.24)		(0.518)	
Years binary variables included	Yes		Yes		Yes		Yes		Yes		Yes	
N.observations	2615		2615		2615		2615		2615		2615	
N. companies	313		313		313		313		313		313	
R^2	0.622		0.457		0.725		0.622		0.458		0.725	

*p < 10%; **p < 5%; ***p < 1%, se in brackets.

provided by each category of PE investment strategy (coefficient β_4 for buyout capital and β_5 for growth capital). According to our Hp2, we expect buyout capital to have a larger effect than growth capital, net of financial resources.

The results of these estimates are reported in Table 7. Panel A refers to employee growth, Panel B to sales growth, and Panel C to total assets growth. For each dependent variable, we report Model 1, modified to distinguish between growth and buyout capital, in column I. Column II adds the financed amount as a control, while Columns III and IV present the model with the autoregressive term as an additional control (without and with the amount financed, respectively).

The results of the models shown in Table 7 suggest that, when excluding the amount financed as control (Columns I and III), companies receiving both buyout and growth capital grow more than control group companies, whatever the proxy used. Focusing on the estimates with auto-regressive terms (Column III), the increase for growth capital PE-backed companies seems to be even higher in economic terms than for companies involved in buyout transactions for employees growth (16.77% for buyouts vs. 20.20% for growth transactions), while we obtain the opposite result for sales growth (29.05% for buyouts vs. 23.61% for growth transactions) and total

Table 7
Estimation results: buyout versus growth capital. DD model.

Panel A: Employees	**I**		**II**		**III**		**IV**	
$Employees_{i,t-1}$					0.504	***	0.504	***
					(0.05)		(0.05)	
$PE_{backed_buyout_i} * d_{post_{matching\ i,t}}$	0.218	***	0.218	***	0.155	***	0.155	***
	(0.075)		(0.075)		(0.042)		(0.042)	
$PE_{backed_growth_i} * d_{post_{matching\ i,t}}$	0.348	***	0.306		0.184	***	0.215	
	(0.076)		(0.229)		(0.048)		(0.131)	
$d_{post_{matching\ i,t}}$	-0.097	***	-0.097	***	-0.055	**	-0.055	**
	(0.036)		(0.036)		(0.025)		(0.024)	
$lnAge_{i,t}$	0.653	***	0.654	***	-0.016		-0.017	
	(0.214)		(0.214)		(0.148)		(0.148)	
$lnCash_{i,t-1}$	0.083	***	0.083	***	0.038	***	0.038	***
	(0.019)		(0.019)		(0.011)		(0.011)	
$Intangibles_{i,t-1}$	0.643	**	0.643	**	0.190		0.190	
	(0.261)		(0.261)		(0.134)		(0.134)	
$lnDebt_{i,t-1}$	0.031	***	0.031	***	0.012	***	0.012	***
	(0.006)		(0.006)		(0.004)		(0.004)	
$lnAmount_{i,t}$			0.005				-0.003	
			(0.024)				(0.014)	
constant	1.232	*	1.232	*	1.803	***	1.803	***
	(0.745)		(0.745)		(0.444)		(0.444)	
Years binary variables included	Yes		Yes		Yes		Yes	
N.observations	2477		2477		2477		2477	
N. companies	297		297		297		297	
R^2	0.412		0.412		0.621		0.621	
Panel B: Sales	**I**		**II**		**III**		**IV**	
$Sales_{i,t-1}$					0.415	***	0.414	***
					(0.072)		(0.072)	
$PE_{backed_buyout_i} * d_{post_{matching\ i,t}}$	0.326	***	0.326	***	0.255	***	0.255	***
	(0.098)		(0.098)		(0.073)		(0.073)	
$PE_{backed_growth_i} * d_{post_{matching\ i,t}}$	0.347	**	0.961		0.212	*	0.803	
	(0.144)		(0.69)		(0.108)		(0.537)	
$d_{post_{matching\ i,t}}$	-0.156	***	-0.153	***	-0.103	**	-0.101	**
	(0.055)		(0.056)		(0.042)		(0.041)	
$lnAge_{i,t}$	0.950	*	0.945	*	-0.220		-0.224	
	(0.514)		(0.514)		(0.415)		(0.414)	
$lnCash_{i,t-1}$	0.130	***	0.131	***	0.080	***	0.081	***
	(0.033)		(0.033)		(0.023)		(0.023)	
$Intangibles_{i,t-1}$	-0.129		-0.128		-0.215		-0.214	
	(0.421)		(0.418)		(0.288)		(0.283)	
$lnDebt_{i,t-1}$	0.065	**	0.066	**	0.040	**	0.040	**
	(0.026)		(0.026)		(0.018)		(0.018)	
$lnAmount_{i,t}$			-0.067				-0.065	
			(0.069)				(0.054)	
constant	11.386	***	11.373	***	9.074	***	9.063	***
	(1.424)		(1.421)		(1.239)		(1.232)	
Years binary variables included	Yes		Yes		Yes		Yes	
N.observations	2477		2477		2477		2477	
N. companies	297		297		297		297	
R^2	0.243		0.246		0.458		0.461	
Panel C: Total Assets	**I**		**II**		**III**		**IV**	
$Total\ Assets_{i,t-1}$					0.693	***	0.693	***
					(0.027)		(0.027)	
$PE_{backed_buyout_i} * d_{post_{matching\ i,t}}$	0.392	***	0.392	***	0.181	***	0.181	***
	(0.093)		(0.093)		(0.040)		(0.04)	
$PE_{backed_growth_i} * d_{post_{matching\ i,t}}$	0.415	***	0.236		0.158	***	0.202	
	(0.087)		(0.279)		(0.051)		(0.203)	
$d_{post_{matching\ i,t}}$	-0.133	***	-0.133	***	-0.037	*	-0.037	*
	(0.039)		(0.039)		(0.022)		(0.022)	
$lnAge_{i,t}$	0.621	***	0.622	***	-0.163		-0.164	
	(0.222)		(0.222)		(0.105)		(0.105)	
$lnCash_{i,t-1}$	0.117	***	0.117	***	-0.004		-0.004	
	(0.025)		(0.025)		(0.008)		(0.008)	
$Intangibles_{i,t-1}$	0.908	***	0.908	***	0.110		0.109	
	(0.241)		(0.242)		(0.119)		(0.118)	
$lnDebt_{i,t-1}$	0.032	***	0.032	***	-0.003		-0.003	
	(0.007)		(0.007)		(0.003)		(0.004)	

(*continued on next page*)

Table 7 (*continued*)

Panel A: Employees	I		II		III		IV	
$lnAmount_{i,t}$			0.02				-0.005	
			-0.029				-0.021	
constant	12.959	***	12.963	***	5.927	***	5.92	***
	(0.810)		(0.810)		(0.526)		(0.527)	
Years binary variables included	Yes		Yes		Yes		Yes	
N.observations	2477		2477		2477		2477	
N. companies	297		297		297		297	
R^2	0.492		0.492		0.726		0.726	

*p < 10%; **p < 5%; ***p < 1%, se in brackets.

assets growth (19.84% for buyouts vs. 17.12% for growth transactions).

Interestingly, when controlling for the amount financed (Columns II and IV), only target companies involved in buyout deals show significantly higher performance than control group companies across all growth proxies considered (i.e., employees, sales and total assets). Companies undergoing buyout transactions experience substantial post-investment improvements—employment rises by 16.77%, sales by 29.05%, and total assets by 19.84%—according to the estimates that incorporate the autoregressive term as an additional control (Column IV). We interpret this result by considering that companies receiving growth funds confirm to have the potential for massive expansion and often play the role of industry leaders, but do not have the resources and capabilities to take advantage of these opportunities. In this type of companies, PE managers may face greater challenges in implementing strategic changes due to their limited control (Martí et al., 2013), thus lowering their positive impact on company's performance. Conversely, buyout deals confirm their role in adding value through a deep transformation of the corporate structure, which may include the replacement of the existing management team or its subordination to new management practices established by the buyer. Hp2 is thus confirmed: PE-backed buyouts show higher levels of growth compared to other PE non-buyouts.

4.4. Robustness checks

To corroborate our results, we estimate a fixed-effects panel model on the full sample of 251 PE-backed companies and 369 non-matched control companies. These control group companies did not receive PE financing but operate in the same geographical region and industry as the PE-backed companies and have accounting data available for at least three consecutive years.

Specifically, we analyze the impact of PE investment on investee performance—measured by employment, sales, and total assets growth—using a fixed-effects panel estimator. The baseline model (Model 3), excluding control variables, is specified as follows:

$$Y_{i,t} = \gamma_0 + \gamma_1 d_{post_{PE\,i,t}} + \rho_i + \varepsilon_{i,t} \quad (3)$$

As in previous models, the dependent variable $Y_{i,t}$ is alternatively defined as $lnTotalAssets_t$, $lnEmployees_t$, and $lnSales_t$, equal to the logarithm of total assets, number of employees, and sales of companies, respectively, plus 1. The binary variable $d_{post_{PE\,i,t}}$ captures the effect of PE financing: it switches from 0 to 1 in the year following the first PE investment for PE-backed companies and always equals

Table 8
Estimation results: Baseline. FE model on total non-matched sample.

	Employees		Sales		Total Assets	
	I		II		III	
Dependent $variable_{i,t-1}$	0.513	***	0.339	***	0.599	***
	(0.037)		(0.053)		(0.056)	
$d_{post_{PE\,i,t}}$	0.138	***	0.225	***	0.168	***
	(0.035)		(0.07)		(0.043)	
$lnAmount_{i,t}$	0.001		-0.006		-0.002	
	(0.005)		(0.009)		(0.005)	
$lnAge_{i,t}$	-0.065		0.125		-0.101	*
	(0.077)		(0.274)		(0.06)	
$lnCash_{i,t-1}$	0.022	***	0.03		0.002	
	(0.008)		(0.019)		(0.007)	
$Intangibles_{i,t-1}$	0.19	**	-0.176		0.21	**
	(0.094)		(0.246)		(0.101)	
$lnDebt_{i,t-1}$	0.006	*	0.017		-0.002	
	(0.003)		(0.013)		(0.003)	
constant	2.165	***	10.261	***	7.191	***
	(0.314)		(0.952)		(0.892)	
Years binary variables included	Yes		Yes		Yes	
N.observations	5022		5022		5022	
N. companies	620		620		620	
R^2	0.529		0.271		0.639	

*p < 10%; **p < 5%; ***p < 1%, se in brackets.

zero for control group companies. Its coefficient γ_1 therefore measures differences in firm size—interpreted as growth—around the financing event. A positive and statistically significant coefficient would indicate a positive impact of PE financing on firm performance.

We include firm fixed effects ρ_i, which are preferred to random-effects estimators when treatment is not randomly assigned and companies may differ systematically in time-invariant characteristics affecting the likelihood of treatment (Besley and Case, 2000). For example, PE-backed companies may differ from control companies in terms of intrinsic quality or long-term growth prospects; companies fixed effects capture these unobserved heterogeneities.

In all specifications, we control for firm age (in logarithms, ($lnAge_{i,t}$); liquidity, measured as the logarithm of lagged cash and cash equivalents ($lnCash_{i,t-1}$); intangibles, measured as the ratio of intangible assets to total assets, lagged ($Intangibles_{i,t-1}$); debt, measured as the logarithm of lagged current and long-term liabilities ($lnDebt_{i,t-1}$); and years binary variables.

In Model 4 testing Hp2, we substituted the variable $d_{post_{PE\,i,t}}$ with two binary variables that distinguish between companies backed by PE through buyout deals ($d_{post_{PE_buyout\,i,t}}$) and those backed through a growth investment strategy ($d_{post_{PE_growth\,i,t}}$).

We thus modified Model 3 as to testing Hp2, as follows (Model 4):

$$Y_{i,t} = \sigma_0 + \sigma_1 d_{post_{PE_buyout\,i,t}} + \sigma_2 d_{post_{PE_growth\,i,t}} + \rho_i + \varepsilon_{i,t} \quad (4)$$

The results from this robustness check corroborate those of the main analysis. Table 8 reports the results of Model 3, while Table 9 presents those of Model 4, which tests the difference between buyout and growth capital. Both models employ the more comprehensive specification, including controls for the amount of PE financing received and the autoregressive term.

In addition, Besley and Case (2000) encourage the use of an instrumental variable approach when the DD framework could be potentially weakened by treatment endogeneity. Accordingly, as a robustness check, we resort to a dynamic panel model, with an AR (1) component and exogenous instruments: the difference-generalized method of moments approach (Arellano and Bond, 1991). Specifically, we consider the lagged dependent variable as predetermined and $lnAmount_{i,t}$, $\boldsymbol{d_{post_{matching\,i,t}}}$ and its interaction with $\boldsymbol{PE_{backed\,i}}$ as endogenous. We use the first differences of the predetermined variables from t − 1 and for control variables and the endogenous variables from t − 2 as moment conditions. As strictly exogenous instruments, we include year dummies and the amount of fund invested in mid-market PE in each Spanish region (Source: Webcapitalriesgo), lagged 1 year. We assume that this variable captures exogenous variations in the likelihood that a company will receive mid-market PE investments.

We use the robust two-step covariance matrix developed by Windmeijer (2005). The Arellano-Bond tests for AR(1) and AR(2) confirm that using the second lag of the differences in the variables as an instrument is a valid approach. Additionally, the Hansen test confirms that the instruments are exogenous.

Our results relating to the variable of interest, $\boldsymbol{PE_{backed\,i} * d_{post_{matching\,i,t}}}$, are robust in this model specification, as shown in the Table 10.

As further robustness check, we implemented a two-stage fixed effects model using the two-stage difference-in-differences approach from Gardner (2021). In the first stage we include all control variables, the autoregressive term and the amount invested. We clustered errors at company level. The results of these estimates, not reported in the text for the sake of brevity, indicate that the

Table 9
Estimation results: buyout versus growth capital. FE model on total non-matched sample.

	Employees		Sales		Total Assets	
	I		II		III	
Dependent variable$_{i,t-1}$	0.508	***	0.344	***	0.592	***
	(0.038)		(0.055)		(0.057)	
$d_{post_{PE_buyout\,i,t}}$	0.134	***	0.186	***	0.172	***
	(0.037)		(0.061)		(0.045)	
$d_{post_{PE_growth\,i,t}}$	0.173		0.641		0.189	
	(0.118)		(0.452)		(0.172)	
lnAmount$_{i,t}$	-0.001		-0.045		-0.001	
	(0.012)		(0.045)		(0.018)	
lnAge$_{i,t}$	-0.086		0.112		-0.11	*
	(0.08)		(0.288)		(0.063)	
lnCash$_{i,t-1}$	0.023	***	0.029		0.003	
	(0.008)		(0.02)		(0.007)	
Intangibles$_{i,t-1}$	0.209	**	-0.136		0.216	**
	(0.097)		(0.249)		(0.106)	
lnDebt$_{i,t-1}$	0.006	*	0.017		-0.003	
	(0.004)		(0.013)		(0.003)	
constant	2.235	***	10.194	***	7.304	***
	(0.327)		(0.995)		(0.923)	
Years binary variables included	Yes		Yes		Yes	
N.observations	4761		4761		4761	
N. companies	589		589		589	
R^2	0.525		0.268		0.636	

*p < 10%; **p < 5%; ***p < 1%, se in brackets.

Table 10
Estimation results: baseline. DIFF-GMM estimation.

	Employees		Sales		Total Assets	
Dependent variable$_{i,t-1}$	0.368	***	0.214	**	0.602	***
	(0.087)		(0.084)		(0.048)	
$d_{post_{matching\ i,t}}$	-0.191	**	-0.24	***	0.014	
	(0.09)		(0.085)		(0.058)	
$PE_{backed\ i} * d_{post_{matching\ i,t}}$	0.348	**	0.449	*	0.399	***
	(0.163)		(0.261)		(0.127)	
lnAmount$_{i,t}$	0.002		0.003		-0.032	
	(0.023)		(0.044)		(0.021)	
lnAge$_{i,t}$	0.254		0.483	*	0.088	
	(0.243)		(0.263)		(0.143)	
lnCash$_{i,t-1}$	0.025		0.086	**	0.007	
	(0.028)		(0.039)		(0.018)	
Intangibles$_{i,t-1}$	-0.046		-0.175		0.117	
	(0.214)		(0.28)		(0.253)	
lnDebt$_{i,t-1}$	0.013		0.009		-0.003	
	(0.009)		(0.013)		(0.008)	
Dummies year included	Yes		Yes		Yes	
N.observations	1433		1433		1433	
N. companies	220		220		220	
Wald χ^2	733.86	***	345.75	***	1886.84	***
AR(1)	-2.45	**	-1.97	**	-5.43	***
AR(2)	1.71		0.92		-1.64	
Hansen χ^2 (295)	204.1		205.75		202.23	

coefficient of the interaction is positive and significant along the three dimensions at the 1% confidence level (5% confidence level when considering sales growth). Compared with control group companies, PE-backed companies grew more in terms of employment (exp(0.146) − 1, i.e., 42.57%), sales (exp(0.176)− 1, i.e., 43.87%), and total assets (exp(0.139) − 1, i.e., 42.27%) after the transaction event. These results are, once again, consistent with our principal results.

Finally, we conduct additional robustness checks using the two matching algorithms (PSM and CEM) alternatively. The description of the procedure we resorted to and the estimation results are reported in the Appendix. The results are in line with those described in the previous sections.

5. Conclusions

5.1. Discussion

This study contributes to the literature on the real effects of PE by providing robust empirical evidence on how different types of mid-market PE transactions—specifically, buyouts and growth investments—affect the performance trajectories of target companies in a bank-based economy such as Spain. Leveraging a DD approach with matched samples and controlling for unobserved heterogeneity and endogeneity, we show that PE-backed companies experience significantly stronger post-investment performance than their non-PE-backed counterparts across three key performance indicators: employment, sales, and total assets growth.

Importantly, our results confirm that this superior performance cannot be fully explained by the capital infusion itself. When controlling for the amount of capital injected, the positive effect of PE involvement remains significant, pointing to the crucial role of non-financial resources—such as strategic guidance, managerial expertise, and access to networks—provided by PE firms. This finding aligns with the strategic entrepreneurship perspective (Meuleman et al., 2009) and highlights the complementarity between financial and non-financial value creation mechanisms in PE transactions.

Our second key finding concerns the heterogeneity of PE impacts. While both buyout and growth capital transactions appear to foster company's performance, once the funding received is controlled for, only buyout-backed companies continue to display significantly superior post-investment performance. This suggests that majority control and governance engineering—typically present in buyout deals—may be necessary conditions for PE investors to fully deploy their value-creation capabilities. In this regard, buyout deals confirm their role in adding value through a deep transformation of the corporate structure, which may include the replacement of the existing management team or its subordination to new management practices established by the PE investor.

Conversely, growth capital investments, which more often involve minority stakes and less operational control, appear less effective in translating PE involvement into measurable company performance increase once financial resources are accounted for. We interpret this result by considering that these investee companies claim to have the potential for massive expansion and often play the role of industry leaders, but do not have the resources and capabilities to take advantage of these opportunities. In this type of companies, PE managers may face greater challenges in implementing strategic changes due to their limited control (Martí et al., 2013), thus lowering their positive impact on company's performance.

5.2. Contributions and implications

This work offers several contributions to academic literature. First, it shifts the focus from large-scale U.S./U.K. public-to-private deals to mid-market transactions in a continental European context, helping to address the geographic and structural bias prevalent in PE research. Second, it empirically distinguishes between financial and non-financial contributions of PE investors, providing novel evidence that the latter are particularly relevant in SME-oriented economies. Third, it adds nuance to the debate on the heterogeneity of PE effects by showing that transaction type—and by extension, the degree of control—matters for value creation.

From a policy standpoint, our results suggest that mid-market PE, particularly in the form of buyouts, can serve as a powerful tool to foster company performance and professionalization in bank-dominated financial systems. This may justify public efforts to stimulate PE activity in underdeveloped capital markets. For practitioners, our findings emphasize the importance of aligning ownership structure and control mechanisms with the strategic objectives of PE funds to unlock the full value creation potential of these investments.

5.3. Limitations and future research

Despite the robustness of our findings, this study is not without limitations. First, while we control for observable company characteristics through matching and fixed effects, unobservable factors related to management quality or market positioning may still influence both PE selection and outcomes. Second, our focus on growth measures (employment, sales, and total assets) does not capture other dimensions of company performance such as innovation, productivity, or profitability. Third, the generalizability of our findings may be limited to similar mid-market contexts and may not extend to venture capital or large buyout transactions.

Future research could address these limitations by incorporating more granular data on governance practices and board composition post-transaction, or by studying the longer-term performance and exit outcomes of PE-backed companies. Additionally, cross-country comparative studies could help validate whether the patterns identified in Spain hold in other institutional contexts.

Author statement

All authors designed the study and developed the methodology. Josè Marti collected the data and Annalisa Croce conducted the empirical analysis. Elisa Ughetto wrote the theoretical section. All the authors contributed to interpretation of results and manuscript writing and revision.

CRediT authorship contribution statement

Annalisa Croce: Writing – original draft, Methodology, Investigation, Formal analysis, Data curation. **Marti Josè:** Writing – original draft, Methodology, Investigation, Data curation, Conceptualization. **Elisa Ughetto:** Writing – original draft, Methodology, Formal analysis, Conceptualization.

Declaration of Competing Interest

The authors report no conflict of interest to disclose.

Appendix

We conduct additional robustness checks using the two matching algorithms (PSM and CEM) alternatively.

First, we perform yearly PSM on the full sample of PE-backed firms and non-matched control firms, selecting PE-backed firms in the year preceding their first investment. To estimate the propensity score—i.e., the probability of receiving PE financing—we use the natural logarithm of firm age ($\ln Age_t$), NACE Rev. 2 industry classification (3-digit level), region, and years binary variables as matching variables. We additionally include firm size measures, namely the natural logarithm of the number of employees ($\ln Employees_t$), total assets ($\ln Total\ Assets_t$), and sales ($\ln Sales_t$).

Based on the estimated propensity scores, we match each PE-backed firm with its closest control firm using a nearest-neighbor matching algorithm. This procedure reduces the sample to 244 PE-backed firms—108 receiving growth deals and 136 buyout deals—and 471 control firms.

The Difference-in-Differences estimates obtained on this matched sample are consistent with those reported in the main analysis. These robustness checks are reported in Table A1 for Model 1 and Table A2 for Model 2, where we report the full specification including controls for the amount of PE financing received and the autoregressive term.

Table A1
Estimation results: baseline. DD model on matched sample (only PSM)

	Employees	Sales	Total Assets

(*continued on next page*)

Table A1 (*continued*)

	Employees		Sales		Total Assets	
	I		II		III	
	I		II		III	
Dependent variable$_{i,t-1}$	0.590	***	0.411	***	0.647	***
	(0.032)		(0.048)		(0.038)	
$d_{post_{matching\ i,t}}$	-0.085	***	-0.155	***	-0.068	***
	(0.019)		(0.048)		(0.020)	
$PE_{backed\,i} * d_{post_{matching\ i,t}}$	0.172	***	0.270	***	0.196	***
	(0.034)		(0.079)		(0.042)	
lnAmount$_{i,t}$	0.001		-0.003		-0.002	
	(0.004)		(0.008)		(0.005)	
lnAge$_{i,t}$	-0.044		-0.247		-0.088	
	(0.059)		(0.187)		(0.057)	
lnCash$_{i,t-1}$	0.015	***	0.045	**	0.003	
	(0.006)		(0.018)		(0.005)	
Intangibles$_{i,t-1}$	0.316	**	0.573		0.340	**
	(0.134)		(0.435)		(0.142)	
lnDebt$_{i,t-1}$	0.007	***	0.018	**	-0.004	
	(0.003)		(0.008)		(0.003)	
constant	1.743	***	9.78	***	6.268	***
	(0.201)		(0.757)		(0.616)	
Years binary variables included	Yes		Yes		Yes	
N.observations	6445		6445		6445	
N. companies	715		715		715	
R^2	0.573		0.333		0.682	

*p < 10%;
**p < 5%;
***p < 1%, se in brackets.

Table A2
Estimation results: buyout versus growth capital. DD model on matched sample (only PSM)

	Employees		Sales		Total Assets	
	I		II		III	
Dependent variable$_{i,t-1}$	0.589	***	0.416	***	0.645	***
	(0.032)		(0.049)		(0.039)	
$PE_{backed_\boldsymbol{buyout}_i} * d_{post_{matching\ i,t}}$	0.167	***	0.226	***	0.196	***
	(0.036)		(0.070)		(0.043)	
$PE_{backed_\boldsymbol{growth}_i} * d_{post_{matching\ i,t}}$	0.195	*	0.693		0.226	
	(0.100)		(0.462)		(0.159)	
$d_{post_{matching\ i,t}}$	-0.085	***	-0.156	***	-0.066	***
	(0.019)		(0.048)		(0.020)	
lnAmount$_{i,t}$	-0.001		-0.043		-0.003	
	(0.010)		(0.046)		(0.016)	
lnAge$_{i,t}$	-0.053		-0.260		-0.092	
	(0.061)		(0.190)		(0.059)	
lnCash$_{i,t-1}$	0.015	***	0.044	**	0.003	
	(0.006)		(0.018)		(0.005)	
Intangibles$_{i,t-1}$	0.318	**	0.615		0.348	**
	(0.137)		(0.439)		(0.145)	
lnDebt$_{i,t-1}$	0.007	***	0.018	**	-0.004	
	(0.003)		(0.008)		(0.003)	
constant	1.764	***	9.723	***	6.299	***
	(0.205)		(0.772)		(0.628)	
Years binary variables included	Yes		Yes		Yes	
N.observations	6204		6204		6204	
N. companies	686		686		686	
R^2	0.572		0.334		0.681	

*p < 10%; **p < 5%; ***p < 1%, se in brackets.

Second, we estimate a fixed-effects panel data model on a sample obtained using CEM as the sole matching algorithm, applied in the year preceding the financing event (Iacus et al., 2012). CEM allows for ex ante control over the balance of the matched sample. As matching variables, we use firm age, NACE industry classification (3-digit level), year, and firms' foundation year. CEM partitions the data into strata defined by all possible combinations of the coarsened continuous and categorical matching variables and discards treated and control firms that do not share common characteristics in the year prior to the initial investment. This procedure yields a final sample of 239 PE-backed firms and 348 control firms.

Once again, the estimates are in line with those presented in the paper. These additional robustness checks are reported in Table A3

for Model 3 and Table A4 for Model 4, where we report the complete specification including controls for the amount of PE financing received and the autoregressive term.

Table A3
Estimation results: Baseline. FE model on matched sample (only CEM)

	Employees		Sales		Total Assets	
	I		II		III	
Dependent variable$_{i,t-1}$	0.494	***	0.355	***	0.6	***
	(0.037)		(0.059)		(0.059)	
$d_{post_{PE\ i,t}}$	0.138	***	0.217	***	0.167	***
	(0.035)		(0.072)		(0.043)	
lnAmount$_{i,t}$	0.001		-0.006		-0.002	
	(0.005)		(0.009)		(0.005)	
lnAge$_{i,t}$	-0.077		-0.026		-0.129	**
	(0.083)		(0.286)		(0.065)	
lnCash$_{i,t-1}$	0.025	***	0.043	***	0.003	
	(0.008)		(0.015)		(0.007)	
Intangibles$_{i,t-1}$	0.187	*	-0.058		0.209	**
	(0.096)		(0.205)		(0.103)	
lnDebt$_{i,t-1}$	0.007	**	0.014		-0.003	
	(0.004)		(0.011)		(0.003)	
constant	2.243	***	10.311	***	7.267	***
	(0.339)		(0.981)		(0.954)	
Years binary variables included	Yes		Yes		Yes	
N.observations	4794		4794		4794	
N. companies	587		587		587	
R^2	0.533		0.287		0.64	

*p < 10%; **p < 5%; ***p < 1%, se in brackets.

Table A4
Estimation results: buyout versus growth capital. FE model on matched sample (only CEM)

	Employees		Sales		Total Assets	
	I		II		III	
Dependent variable$_{i,t-1}$	0.488	***	0.343	***	0.592	***
	(0.038)		(0.059)		(0.06)	
$d_{post_{PE_buyout\ i,t}}$	0.134	***	0.182	***	0.172	***
	(0.037)		(0.062)		(0.045)	
$d_{post_{PE_growth\ i,t}}$	0.178		0.635		0.188	
	(0.121)		(0.461)		(0.173)	
lnAmount$_{i,t}$	-0.002		-0.045		-0.002	
	(0.012)		(0.046)		(0.018)	
lnAge$_{i,t}$	-0.078		-0.019		-0.125	*
	(0.085)		(0.293)		(0.066)	
lnCash$_{i,t-1}$	0.027	***	0.046	***	0.004	
	(0.008)		(0.016)		(0.008)	
Intangibles$_{i,t-1}$	0.209	**	-0.016		0.216	**
	(0.099)		(0.209)		(0.108)	
lnDebt$_{i,t-1}$	0.007	*	0.015		-0.003	
	(0.004)		(0.012)		(0.003)	
constant	2.248	***	10.41	***	7.347	***
	(0.345)		(0.986)		(0.979)	
Years binary variables included	Yes		Yes		Yes	
N.observations	4574		4574		4574	
N. companies	561		561		561	
R^2	0.528		0.28		0.637	

*p < 10%; **p < 5%; ***p < 1%, se in brackets.

Data availability

Data will be made available on request.

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