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PRIVATE EQUITY AND INDUSTRY PERFORMANCE

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ABSTRACT

The growth of the private equity industry has spurred concerns about its potential impact on the economy more generally. This analysis looks across nations and industries to assess the impact of private equity on industry performance. Industries where PE funds have invested in the past five years have grown more quickly in terms of productivity and employment. There are few significant differences between industries with limited and high private equity activity. It is hard to find support for claims that economic activity in industries with private equity backing is more exposed to aggregate shocks. The results using lagged private equity investments suggest that the results are not driven by reverse causality. These patterns are not driven solely by common law nations such as the United Kingdom and United States, but also hold in Continental Europe.

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1. INTRODUCTION

In response to the global financial crisis that began in 2007, governments worldwide are rethinking their approach to regulating financial institutions. Among the financial institutions that have fallen under the gaze of regulators have been private equity (PE) funds (see, for instance, European Commission [2009]). There are many open questions regarding the economic impact of PE funds, many of which cannot be definitively answered until the aftermath of the buyout boom of the mid-2000s can be fully assessed.

This paper addresses one of these open questions, by examining the impact of PE investments across 20 industries in 26 major nations between 1991 and 2007. We focus on whether PE investments in an industry affect aggregate growth and cyclicality. In particular, we look at the relationship between the presence of PE investments and the growth rates of productivity, employment and capital formation. For our productivity and employment measures, we find that PE investments are associated with faster growth. One natural concern is that this growth may have come at the expense of greater cyclicality in the industry, which would translate into greater risks for investors and stakeholders. Thus, we also examine whether economic fluctuations are exacerbated by the presence of PE investments, but we find little evidence that this is the case.

Throughout our analysis we measure the growth rate in a particular industry relative to the average growth rate across countries in the same year. In addition, we use country and industry fixed effects, so that the impact of PE activity is measured relative to the average performance in a given country, industry, and year. For instance, if the Swedish steel industry has more PE investment than the Finnish one, we examine whether the steel industry in these

two countries performs better or worse over time relative to the average performance of the steel industry across all countries in our sample, and whether the variations in performance over the industry cycles are more or less dramatic.

Overall, we are unable to find evidence supporting the detrimental effects of PE investments on industries:

- Industries where PE funds have been active in the past five years grow more rapidly than other sectors, whether measured using total production, value added, or employment. In industries with PE investments, there are few significant differences between industries with a low and high level of PE activity.
- Activity in industries with PE backing appears to be no more volatile in the face of industry cycles than in other industries, and sometimes less so. The reduced volatility is particularly apparent in employment.
- These patterns continue to hold when we focus on the impact of private equity in continental Europe, where concerns about these investments have been most often expressed.
- We believe it is unlikely that these results are driven by reverse causality, i.e. PE funds selecting to invest in industries that are growing faster and/or are less volatile. The results are essentially unchanged if we only consider the impact of PE investments made between five and two years earlier on industry performance.

It is important to note that there are a number of limitations to this analysis. First, the question of economic growth and volatility is only one of many questions that regulators must grapple with when assessing the impact of PE investment. Second, we hope to deal more fully

with the question of reverse causality in subsequent versions of the study. Finally, it is still too early to assess the consequences of the economic conditions in 2008 and 2009, a period where the decrease of investment and absolute volume of distressed private equity-backed assets was far greater than in earlier cycles.

The plan of this study is as follows: In the second section, we develop the hypotheses to be tested. The third section describes the construction of the dataset and the results are presented in Section 4. The final section concludes.

2. INDUSTRY PERFORMANCE AND PRIVATE EQUITY

There are several alternative perspectives that can be offered as to how PE investments can affect the prospects of an industry. In this section, we begin by reviewing the suggestions about changes regarding overall performance; we then turn to hypotheses regarding the interaction between economic cycles and PE investments.

A. The impact of PE investments on industry performance

Our initial examination focuses on the performance of industries where PE funds have been active relative to industries where these investors have not been active.

A central hypothesis since Jensen [1989] has been that private equity has the ability to improve the operations of firms. By closely monitoring managers, restricting free cash flow through the use of leverage and incentivizing managers with equity, it is argued, private equity-backed firms are able to improve operations in the firms they back. In this article, Jensen suggested that these leveraged buyouts (LBOs) may not only affect the bought-out firm itself but

may also increase competitive pressure and force competitors to improve their own operations. John et al. [1992] present supporting empirical evidence that the threat of takeover serves as a spur for firms to voluntarily undertake restructurings.

The claim that private equity-backed firms have improved operations has been supported by a number of empirical studies, which focus on the effects on the individual private equity-backed companies. Kaplan [1989] examines changes in accounting performance for 76 large management buyouts of public companies between 1980 and 1986. He shows that in the three years after the transaction operating income, cash flow and market value all increase. He argues that these increases reflect the impact of improved incentives rather than layoffs. (Looking at more recent deals on US public-to-private transactions, however, Guo et al. [2009] find only weak evidence that gains in operating performance of bought-out firms exceed those of their peers.) Muscarella and Vetsuypens [1990] examine 72 "reverse LBOs" (RLBOs), that is, companies taken private which went public once again. These firms experienced a dramatic increase in profitability, which they argue is a reflection of cost reductions.

More recent studies have used large samples and a variety of performance measures to more directly assess whether private equity makes a difference in the management of the firms in which they invest. Bloom et al. [2009] survey over 4,000 firms in Asia, Europe and the US to assess their management practices. They show that private equity-backed firms are on average the best-managed ownership group in the sample, though they cannot rule out the possibility these firms were better managed before the PE transaction. Davis et al. [2009] compare all US-based manufacturing establishments that received PE investments between 1980 and 2005 with

similar establishments that did not receive PE investments.[1] They show that private equity-backed firms experienced a substantial productivity growth advantage (about two percentage points) in the two years following the transaction. About two-thirds of this differential is due to improved productivity among continuing establishments of the firms. Cao and Lerner [2009] examine the three- and five-year stock performance of 496 RLBOs between 1980 and 2002. RLBOs appear to consistently outperform other IPOs and the stock market as a whole. Large RLBOs that are backed by PE firms with more capital under management perform better, while quick flips – when PE firms sell off an investment soon after acquisition – underperform.

These findings might suggest that we would see superior performance for PE firms, regardless of the economic conditions. Moreover, if PE firms represent a significant fraction of the activity in certain industries (and tabulations in several countries, including the US and UK, suggest that this is the case), there may also be a positive effect at the industry level. Investigating the industry level also allows us to capture the 'contagion' effects arising if improvements in bought-out firms spur their competitors to improve. This effect is not captured by studies focusing on the individual portfolio companies.

While there has been little systematic evidence regarding the deleterious effects of private equity on firms and industries, critics have pointed to case studies that illustrate negative consequences of transactions. For instance, Rasmussen [2008] points to the buyout of Britain's Automobile Association, which led to large-scale layoffs and service disruptions while generating substantial profits for the transaction's sponsor, Permira. The Service Employees International Union has prepared a series of studies (for example, 2007, 2008) showing the

[1] Establishments are specific factories, offices, retail outlets and other distinct physical locations where business takes place.

deleterious effect that excessive leverage, cost-cutting and poor managerial decisions by PE groups can have on firms and industries through case studies such as Hawaiian Telecom, Intelsat, KB Toys and TDC. These cases suggest that the impact of private equity on industries may be more negative than suggested by the previous studies.

B. The impact of economic cycles

Numerous practitioner accounts over the years have suggested that the PE industry is highly cyclical, with periods of easy financing availability (often in response to the successes of earlier transactions) leading to an acceleration of deal volume, greater use of leverage, higher valuations, and ultimately more troubled investments (akin to the well-known 'corn-hog cycle' in agricultural economics).

This pattern is corroborated in several academic studies. Axelson et al. [2009] document the cyclical use of leverage in buyouts. Using a sample of 1,157 transactions completed by major groups worldwide between 1985 and 2008, they show that the level of leverage is driven by the cost of debt, rather than the more industry- and firm-specific factors that affect leverage in publicly traded firms. The availability of leverage is also strongly associated with higher valuation levels. Kaplan and Stein [1993] documented that the 1980s buyout boom saw an increase in valuations, reliance on public debt and incentive problems (for example, parties cashing out at the time of transaction). Moreover, in the transactions done at the market peak, the outcomes were disappointing: of the 66 largest buyouts completed between 1986 and 1988, 38% experienced financial distress, which they define as default or an actual or attempted restructuring of debt obligations due to difficulties in making payments. 27% actually did default on debt repayments, often in conjunction with a Chapter 11 filing. Kaplan and Schoar [2005] and

other papers provide indirect supporting evidence, showing that the performance of funds is negatively correlated with inflows into these funds. Private equity funds raised during periods of high capital inflows – which are typically associated with market peaks – perform far worse than their peers.

These findings corroborate the suggestions that availability of financing impacts booms and busts in the PE market. If firms completing buyouts at market peaks employ leverage excessively, we may expect industries with heavy buyout activity to experience more intense subsequent downturns. Moreover, the effects of this overinvestment would be exacerbated if PE investments drive rivals, not backed by private equity, to aggressively invest and leverage themselves. Chevalier [1995] shows that in regions with supermarkets receiving PE investments, rivals responded by adding and expanding stores.

An alternative perspective is suggested by some recent events in the PE industry, even though it has not been articulated by economic theorists or explored empirically. This suggestion is that private equity-backed firms may do better during downturns because their investors constitute a concentrated shareholder base, which can continue to provide equity financing in a way that might be difficult to arrange for other companies during downturns. To cite two recent examples of 'equity cures,' Terra Firma made a number of investments in EMI, while Kraton Polymers' equity investors (Ripplewood and CCMP) did likewise during the recent recession.[2] This perspective would imply that private equity-backed companies may actually outperform their peers during downturns, as they have access to equity financing that other firms did not

[2] See Sabbagh (2009) and http://www.sec.gov/Archives/edgar/data/1321730/000119312509171893/d10q.htm (accessed August 27, 2009).

have. The presence of liquid PE funds as shareholders may lead to fewer failures in difficult economic conditions.

A related argument, originally proposed by Jensen [1989], is that the high levels of debt in PE transactions force firms to respond earlier and more forcefully to negative shocks to their business. As a result, private equity-backed firms may be forced to adjust their operations more rapidly at the beginning of an industry downturn, enabling them to better weather a recession. Even if some private equity-backed firms eventually end up in financial distress, their underlying operations may thus be in better shape than their peers. This facilitates an efficient restructuring of their capital structure and lowers the deadweight costs on the economy. Consistent with this argument, Andrade and Kaplan [1998] study 31 distressed leveraged buyouts from the 1980s that subsequently became financially distressed, and found that the value of the firms post-distress was slightly higher than the value before the buyout, suggesting that even the leveraged buyouts that were hit most severely by adverse shocks added some economic value.

Finally, the structural differences between PE funds and other financial institutions may make them less susceptible to industry shocks. A major source of concern for financial institutions is the so-called 'run on the bank' phenomenon. Runs occur when holders of short-term liabilities, for example, depositors or repo counterparties, simultaneously refuse to provide additional financing and demand their money back. Other versions of this phenomenon arise when companies simultaneously draw down lines of credit, hedge fund investors simultaneously ask for redemptions of their investments, or a freeze in the market for commercial paper prevents structured investment vehicles (SIVs) from rolling over short-term commercial paper. It is unlikely that PE investments create dangers through this mechanism. Private equity funds are

typically prevented from borrowing themselves, and the funds' only claimants are their limited partners (LPs), which are typically bound by 10-year lock-up agreements. Hence, the funds have no short-term creditors that can run. By way of contrast, extensive loans are provided to the individual portfolio companies. However, these loans are typically made by a concentrated set of lenders, and are without recourse to other portfolio companies or the fund generally. Hence, an individual creditor's ability to be repaid is largely unaffected by the actions of other creditors, mitigating the incentive to run.

3. DATA SOURCES AND SAMPLE CONSTRUCTION

To analyze how PE investments affect industries, we combine two datasets, one containing information about PE investments compiled by Capital IQ, and another with industry activity and performance across the Organisation for Economic Cooperation and Development (OECD) member countries included in the OECD's Structural Analysis Database (STAN).

PE investment sample: We use the Capital IQ database to construct a base sample of PE transactions. The base sample contains all private placements and M&A transactions in Capital IQ where the list of acquirers includes (at least) one investment firm that has a reported investment interest in one of the following stages: Seed/startup, Early venture, Emerging growth, Growth capital, Bridge, Turnaround, Middle market, Mature, Buyout, Mid-venture, Late venture, Industry consolidation, Mezzanine/subdebt, Incubation, Recapitalization, or PIPES.

From the base sample, we select all M&A transactions classified as 'leveraged buyout,' 'management buyout,' or 'going private' that were announced between January 1986 and December 2007 and where the target company is located in an OECD country included in the

STAN database. We exclude transactions that were announced but not yet completed as well as transactions that did not involve a financial investor (for example, a buyout led and executed by the management team itself was excluded).

This results in a sample of about 14,300 transactions, involving 13,100 distinct firms. Since we only have information about the deal size for 50% of our transactions (though more of the larger transactions), we impute missing deal sizes by constructing fitted values from a regression of deal size on fixed effects for country, investment year and target industry. Using the imputed transaction sizes, we generate aggregate country-year-industry measures of PE volume in the form of summed deal sizes.

Industry data: The STAN database provides industry data across OECD countries compiled from national statistics offices. It contains economic information at the country, year and industry level. Thus, a typical observation would be the German transport equipment industry in 1999. STAN includes measures of productivity, employment and capital formation, as described in Table 1. Throughout this paper, we focus on the following measures of industry activity:

- Production (gross output), the value of goods and/or services produced in a year, whether sold or stocked, in current prices.
- Value added represents the industry's contribution to national GDP, i.e. output net of materials purchased. While the methodology for constructing this measure differs across nations, our focus here is on differences across time, which should reduce the effect of national differences in the measure.

- Labor costs, which comprise wages and salaries of employees paid by producers as well as supplements such as contributions to social security, private pensions, health insurance, life insurance and similar schemes.
- Number of employees, which is the traditional measure of employment, excluding self-employed and unpaid family members working in the business.
- Gross capital formation is acquisitions, less disposals, of new tangible assets, as well as such intangible assets as mineral exploration and computer software. This variable is the closest aggregate to capital expenditures. The two capital stock measures are indicators of the value of all capital equipment held. The gross stock measure does not factor in depreciation, while the net stock does reflect write-downs.
- Consumption of fixed capital measures the reduction in the value of fixed assets used in production resulting from physical deterioration or normal obsolescence.

Mapping Capital IQ and STAN industries: Industries in the STAN database are classified by the International Standard Industrial Classification (ISIC) code. To link these data to the industry-aggregated PE activity, we matched the ISIC codes with Capital IQ's industry classifications. We used the existing mapping from Capital IQ industry classification into SIC codes, and then used the existing matching between SIC and ISIC industries. The mapping of Capital IQ industry classifications to SIC codes includes only matches for the most detailed levels of the Capital IQ classifications. This poses a problem for more aggregated industries for which Capital IQ does not provide a match to a SIC and ultimately to ISIC. When the Capital IQ target industry is at a more aggregated industry level, we mapped all four-digit SIC codes that belong to the sub-categories of the industry classification of Capital IQ. In these cases, we had multiple four-digit SIC codes for a single Capital IQ industry. In some of the transactions all of

the four-digit SICs corresponded to the same ISIC industry classification, creating a one-to-one mapping. In cases where the four-digit SIC codes corresponded to different industries in the ISIC scheme, we considered the particular deals and selected the most suitable industry. In 390 transactions, we were not able to determine with certainty the appropriate match in ISIC, and those transactions were dropped, leaving us with 13,910 PE transactions with ISIC classifications. Finally, we grouped ISIC sub-industries to balance PE activity across industries. Table 2 presents the distribution of deals across industries.

This results in a sample of 11,135 country-industry-year observations during the years 1986 to 2007. For each country, industry and year, we measure PE activity as the volume of PE deals occurring in this country and industry during the previous five years. In particular, an observation is a *PE industry* if it had at least one PE investment in one of those five years. (This definition was motivated by holding periods reported by Strömberg [2008]). With this definition, we can only compare activity during 1991 to 2007, leaving us with 8,596 country-industry-year observations.

Tables 2, 3 and 4 present the distribution of deals across industries, years and countries. In each table, we first present the number of observations (an observation is a country-industry-year pair) and the number of those that were *PE industries*, as defined above. We then present the number of deals, transaction volume and the transaction volume including the imputed sizes of deals with missing information.

Several patterns are visible from Tables 2 through 4:

- The heavy representation of buyouts as a share of economic activity in traditional industries, such as 'Textiles, textile products, leather,' 'Machinery and equipment,' 'Pulp, paper, paper products, printing,' 'Electrical and optical equipment,' and 'Chemical, rubber, plastics and fuel products'.
- The acceleration in buyout activity, first modestly during the late 1980s and then especially in the mid-2000s.
- The greater level of activity in a handful of traditional hubs for PE funds, including the United States, the Netherlands, Sweden, and the United Kingdom.[3]

In Table 5, we compare the changes in the industry measures over time for PE and non-PE industries. The PE industries grow more quickly in terms of output and value added, as well in terms of employment. But for gross fixed capital formation, the PE industries have a slower growth rate.

4. ANALYSIS

A. Industry performance

We begin by examining the relationship between various industry characteristics and the role of private equity in the industry. In each case, we use the industry-country-year as an observation, and the explanatory variable is the relative growth rate along a given dimension (for example, employment). This adjusted rate is computed by subtracting the growth rate experienced in that industry, country and year from the average growth rate across countries in

[3] The level of transactions is extremely high in Luxembourg, due to the tendency of many firms to domicile there for tax reasons, even though the bulk of their operations are elsewhere. As a result, we omit Luxembourg from the analyses below.

that same industry and year. Demeaning the growth rate in this way is largely equivalent to including year-industry fixed effects, but it allows for an easier interpretation of the estimated parameters.

We employ several specifications. First, we look at specifications that include controls for each year, industry and country. For the exogenous variable, we include an indicator which denotes whether the industry is a PE industry or not, using the definition above. This definition does not use the imputed deal values, since it only depends on the presence of PE deals. Second, we use two indicators to capture whether an industry is a low or high PE industry. A low PE industry (*PE Low*) is a PE industry where the fraction of total imputed PE investments divided by total production (both normalized to 2008 USD) is smaller than the median (conditional on having a non-zero level of PE investment). Empirically, this median is 0.61%. Correspondingly, a high PE industry (*PE High*) is one where the fraction is greater than 0.61%. We also perform the analysis dividing PE activity into quartiles to better measure the differential effects of different activity levels. Third, we include dummies that are interactions between countries and industries (*Co-Ind FE*). These controls allow us to more precisely capture national differences in the industry dynamics: if there is any effect from a PE investment, it is because the growth rate is fast during that specific period.

The results in Table 6 indicate that industries with PE deals have significantly higher growth rates of production and value added. For instance, in the first regression, the coefficient of 0.906 implies that the total production of an average PE industry grows at an annual rate that is 0.906% higher than a non-PE industry. (Table 5 reports that the mean growth rate is 5.9%.) We report the significance of a statistical test for differences between high and low PE industries

and differences between the four quartiles of PE activity (all reported as $PE_L = PE_H$). We find few differences in total production between high and low PE industries, although the specification using quartiles suggests that the positive effect may be particularly strong for industries with an intermediate level of PE activity. Value added for an industry appears to be increasing in the amount of PE activity, with the differences between high and low PE industries being statistically and economically significant.

One concern is the direction of causality. It is possible that PE investors pick industries that are about to start growing and our results may reflect this industry choice rather than the causal effect of the investments on the industry. To mitigate this concern, we change our definition of the PE industry measure to only include investments during the period from two to five years prior to the observation, called the twice-lagged measure (the original PE measure included all five years prior to the observation). The results are reported in Table 7. We find that the results are very similar, indicating that the effect that we find is unlikely to be driven by PE investors entering countries and industries where they expect stronger immediate growth.

Table 8 considers measures of employment. PE industries appear to grow significantly faster in terms of labor costs and the number of employees. The annual growth rate of total labor cost is 0.5 to 1.4 percentage points greater for PE industries, and the number of employees grows at an annual rate that is 0.4 to 1.0 percentage points greater. These findings are particularly surprising, since a common concern is that PE investors act aggressively to reduce costs with little concern for employees. This concern is not necessarily inconsistent with our results. Despite initial employment reductions at private equity-backed firms, the greater subsequent growth in total production, observed in Table 6, may lead to subsequent employment growth in

the industry overall. Considering the specifications with PE activity quartiles, industries with more PE activity appear to have more rapid growth of total labor costs, but the growth rate of the number of employees is fastest in industries with more moderate levels of PE activity. Regardless of the level of PE activity, however, the PE industries' growth rates of labor costs and employment always exceed the rates for non-PE industries.

As above, we are concerned about the direction of causality, and Table 9 repeats the analysis using the twice-lagged PE measure. The magnitudes in Tables 8 and 9 are largely similar, suggesting that the effect we find is not mainly driven by PE investors picking industries with expectations of immediate employment growth.

Finally, in Table 10 we examine measures of fixed capital formation and consumption of fixed capital. These measures appear much more volatile than the production and employment measures, making it difficult to discern any relationship between PE investments and capital formation.

B. Cyclical patterns

We next turn to analyzing how private equity relates to industry cycles. For each industry and year, we calculate the average growth by averaging the growth rate of the productivity and employment measures across countries. This measures the annual aggregate shock in these variables (for example, production output in the steel industry fell by 2% on average in 2002 across the nations in our sample). We then investigate whether PE industries are more or less exposed to this shock by including the PE measure interacted with this average growth measure in the regressions. If PE industries are more sensitive to economic conditions, the coefficient on

the interaction term is positive: during upturns, these industries grow faster and during downturns they decline faster. A negative coefficient indicates a lower exposure to the aggregate shock than industries without PE investments. Once again, we use country and industry fixed effects, as well as country-industry fixed effect interactions.

In Tables 11 and 12, we examine the impact on production and employment. In the first table, the interaction terms are negative, which implies that PE industries are less sensitive to industry shocks. To interpret the coefficients, using the estimates in the first regression in Table 12, if an industry on average experiences a 5% increase in total labor costs in a given year (the aggregate shock), a PE industry will experience, on average, a 5.576% increase (5% + 1.591% + 5% x -0.203 = 5.576%). Conversely, following a 5% decrease in the wage bill, a PE industry will only experience, on average, a 2.394% decline (–5% + 1.591% + (–5%) x –0.203 = –2.394%). Hence, an aggregate swing from +5% to –5% (10% total difference) in aggregate growth rates translates into a swing from 5.6% to –2.4% (8% total difference) in the growth rates for PE industries. Both for the productivity and employment analyses, the coefficients are significantly negative in the simple specification and most of the coefficients in the employment analysis remain statistically significant when high and low PE industries are included separately. Overall, it appears that some PE activity translates into an industry whose employment changes less than average, but industries with a larger amount of PE activity may follow a growth pattern that is closer to that of the industry as a whole.

C. Geographic patterns

One concern is that the impact of private equity is different in continental Europe than in the United States and United Kingdom. Not only is the level of PE activity higher in the US and

UK than in most other nations, but the industry is more established, having begun in these two nations. We thus repeat the analysis, looking at US and UK versus Continental Europe (investments in Japan and South Korea are excluded from these analyses).

We report the results in Tables 13 and 14, which repeat the base specifications reported in Tables 6 and 8. All the main effects remain largely unchanged for the Continental Europe sample. The coefficients in the US and UK sample are generally not statistically significant but they are not statistically different from the coefficients for the Continental Europe sample either. This probably reflects the small size of the US and UK sample and the resulting large standard errors: for productivity, value added and labor costs the coefficients are smaller than in Continental Europe; for total employment the coefficient is larger.

D. Addressing causality concerns

One natural concern relates to the interpretation of these results. While it appears that private equity is associated with more rapid growth at an industry level in our analyses, it is natural to wonder which way the causation runs. Does the presence of private equity lead to better performance, or do PE investors invest where they (correctly) anticipate industries will grow?

We respond to this question in several ways. First, we look at PE investments during the five years before the measured growth. Second, as discussed above, we have also narrowed our measure to only include deals in the second through fifth year prior to the investment. If our effects are due to PE investors anticipating growth, they would have to be quite prescient.

In subsequent versions of this paper, we will also attempt to address this concern using an instrumental variables technique. To identify exogenous variation, we may use the size of the private pension pool in the nation and year, expressed as a percentage of GDP. This is similar in spirit to other papers in the venture capital literature, such as Kortum and Lerner [2000] and Mollica and Zingales [2007]. In the nations with larger pension pools, domestic PE funds are more likely to raise capital and invest it locally. This is an attractive instrumental variable, because pension policy is typically driven by broader socio-economic considerations, and not by the relative health of the local PE industry.

5. CONCLUSIONS

The growth of the PE industry has spurred concerns about its potential impact on the economy more generally. In this analysis, we look across nations and industries to assess the impact of private equity on industry performance.

The key results are, first, that industries where PE funds have invested in the past five years have grown more quickly, using a variety of measures. There are few significant differences between industries with limited and high PE activity. Second, it is hard to find support for claims that economic activity in industries with PE backing is more exposed to aggregate shocks. The results using lagged PE investments suggest that the results are not driven by reverse causality. Finally, these patterns are not driven solely by common law nations such as the United Kingdom and United States, but also hold in Continental Europe.

These findings suggest a number of avenues for future research. First, it would be interesting to look at finer data on certain critical aspects of industry performance, such as the

rates of layoffs, plant closings and openings, and product and process innovations. Second, it is important to better understand the mechanisms by which the presence of private equity-backed firms affects their peers. While Chevalier's [1995] study of the supermarket industry during the 1980s was an important first step, much more remains to be explored here. Finally, we are only able to look backwards in this analysis. The buyout boom of the mid 2000s was so massive, and the subsequent crash in activity so dramatic, that the consequences may have been substantially different from other economic cycles (see Kosman [2009]). The impact of the recent cycle will be an important issue to explore in the years to come.

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Table 1: Descriptions of OECD STAN industry variables

Industry variable	Description
Production (gross output)	Value of goods and/or services produced in a year, whether sold or stocked, measured at current prices
Value added	Industry contribution to national GDP. Value added comprises labor costs, consumption of fixed capital, taxes less subsidies, measured at current prices
Labor costs (compensation of employees)	Wages and salaries of employees paid by producers as well as supplements such as contributions to social security, private pensions, health insurance, life insurance and similar schemes
Number of employees	Persons engaged in domestic production excluding self-employed and unpaid family workers
Gross fixed capital formation	Acquisitions, less disposals, of new tangible assets (such as machinery and equipment, transport equipment, livestock, constructions) and new intangible assets (such as mineral exploration and computer software) to be used for more than one year, measured at current prices
Consumption of fixed capital	Reduction in the value of fixed assets used in production resulting from physical deterioration, normal obsolescence or normal accidental damage

Source: OECD, STAN database, 2003

Table 2: Distribution of deals by industry The sample consists of 8,596 country-industry-year observations of OECD countries between 1991 and 2007. *Observations* is the number of observations in the industry. *PE industries* contains the number of observations classified as *PE industries*. An industry is a *PE industry* if it had at least one PE investment during the previous five years. *Deals* is the number of deals, and *Deal volume* is the combined size of the deals (normalized to 2008 US$ billions). *Imputed deal volume* imputes the size for deals with missing size information.

Industry	Observations	PE industries	Deals	Deal volume	Imputed deal volume
Agriculture, hunting, forestry and fishing	432	84	54	6.18	10.25
Basic metals and fabricated metal products	431	234	782	77.20	130.64
Chemical, rubber, plastics and fuel products	431	223	757	116.17	169.29
Community, social and personal services	430	216	1,162	323.37	391.99
Construction	430	173	328	28.44	48.04
Electrical and optical equipment	431	229	879	146.87	193.08
Electricity, gas and water supply	431	84	109	100.90	123.29
Financial intermediation	426	232	586	156.39	212.19
Food products, beverages and tobacco	431	221	572	114.45	156.51
Hotels and restaurants	426	171	454	135.58	159.36
Machinery and equipment	431	255	1,316	135.92	219.85
Manufacturing and recycling	431	166	394	32.70	60.15
Mining and quarrying	429	98	157	32.87	45.73
Other non-metallic mineral products	431	131	163	19.35	30.32
Pulp, paper, paper products, printing, publishing	431	216	556	115.74	150.16
Real estate, renting and business activities	426	284	2,737	372.99	522.91
Textiles, textile products, leather	431	213	447	32.02	67.14
Transport equipment	431	113	111	15.73	23.07
Transport, storage and communications	430	231	595	257.11	296.96
Wholesale and retail trade – repairs	426	279	1,725	358.60	481.98
Total	8,596	3,853	13,884	2,578.58	3,492.91

Table 3: Distribution of deals by year *Observations* is the number of country-industry-year observations per year. *PE industries* contains the number of observations classified as *PE industries*. An industry is a *PE industry* if it had at least one PE investment during the previous five years. *Deals* is the number of deals, and *Deal volume* is the combined size of the deals (normalized to 2008 US$ billions). *Imputed deal volume* imputes the deal size for deals with missing size information.

Year	Observations	PE industries	Deals	Deal volume	Imputed deal volume
1986	n/a	n/a	95	19.56	27.15
1987	n/a	n/a	109	18.51	27.43
1988	n/a	n/a	157	42.83	60.77
1989	n/a	n/a	137	59.75	68.07
1990	n/a	n/a	120	21.41	32.47
1991	456	116	158	13.29	21.88
1992	469	139	178	15.73	26.80
1993	509	177	197	16.44	29.61
1994	516	191	262	15.57	25.68
1995	520	202	347	35.05	49.86
1996	520	204	431	43.53	57.30
1997	520	206	655	55.41	86.12
1998	520	202	871	94.46	144.40
1999	520	217	824	86.41	131.17
2000	520	228	780	105.44	138.76
2001	520	251	687	80.83	102.62
2002	520	269	722	93.28	122.11
2003	520	276	945	145.73	178.78
2004	520	293	1,217	203.73	278.14
2005	520	293	1,428	258.58	368.21
2006	520	316	1,788	404.54	552.20
2007	406	273	1,776	748.42	963.42
Total	8,596	3,853	13,884	2,578.48	3,492.93

Table 4: Distribution of deals by country The sample consists of 8,596 country-industry-year observations of OECD countries between 1991 and 2007. *Observations* is the number of observations in each country. *PE industries* contains the number of observations classified as *PE industries*. An industry is a *PE industry* if it had at least one PE investment during the previous five years. *Deals* is the number of deals, and *Deal volume* is the combined size of the deals (normalized to 2008 US$ billions). *Imputed deal volume* imputes the size for deals with missing size information.

Country	Observations	PE industries	Deals	Deal volume	Imputed deal volume
Australia	320	125	124	14.67	18.66
Austria	340	77	54	1.79	3.98
Belgium	340	129	118	13.00	22.70
Canada	340	218	294	99.48	117.61
Czech Republic	300	158	37	5.06	5.89
Denmark	340	94	143	9.79	17.33
Finland	340	161	192	7.66	16.06
France	339	274	1,294	122.34	179.05
Germany	340	220	598	109.79	187.06
Greece	324	30	7	4.45	6.14
Hungary	320	142	18	1.15	3.39
Ireland	340	104	49	19.09	21.07
Israel	339	6	4	0.00	0.01
Italy	340	210	345	42.83	58.94
Japan	328	70	73	20.79	26.71
Netherlands	340	204	323	85.15	125.95
Norway	340	73	71	5.00	9.53
Poland	286	171	41	2.34	2.61
Portugal	320	63	27	0.25	0.33
Slovakia	300	111	13	0.18	0.93
South Korea	340	47	20	4.81	4.81
Spain	320	171	222	38.98	42.86
Sweden	340	186	271	43.33	58.31
Switzerland	340	158	111	17.66	31.46
United Kingdom	340	318	2,312	390.44	441.10
United States	340	333	7,123	1,518.47	2,090.46
Total	8,596	3,853	13,884	2,578.48	3,492.93

Table 5: Industry growth variables The sample consists of 8,596 country-industry-year observations of OECD countries between 1991 and 2007. An industry is considered as a *PE industry* if it had at least a single PE deal in the previous five years. *P-value* provides the p-value of a test of equality of the means of PE and non-PE industries. See Table 1 for variable definitions.

	All industries			PE industries			Non-PE industries			
	Observations	Average growth	Std. dev.	Observations	Average growth	Std. dev.	Observations	Average growth	Std. dev.	P-value
Production (gross output)	7,351	5.9	8.8	3,318	6.2	8.5	4,033	5.7	9.1	0.03
Value added	8,238	5.6	10.2	3,635	5.8	9.8	4,603	5.5	10.5	0.17
Labor costs (compensation of employees)	7,831	5.1	7.5	3,398	5.3	7.4	4,433	5.0	7.6	0.18
Number of employees	6,269	0.0	5.0	2,862	0.3	4.1	3,407	-0.3	5.6	0.00
Gross fixed capital formation	7,004	7.1	76.6	3,223	6.8	27.6	3,781	7.5	101.1	0.67
Consumption of fixed capital	7,351	5.9	8.8	3,318	6.2	8.5	4,033	5.7	9.1	0.03

Table 6: PE activity and growth rate of productivity The table contains OLS regression coefficients. An observation is a country-industry-year pair. The endogenous variable is the deviation of the annual growth rate of production or value added (as defined by OECD) relative to the average rate in the same industry and year. The exogenous variables are an indicator for positive PE activity over the previous five years at the country-industry level (*PE*), indicators for whether the measured PE activity is below or above the median activity level (*PE Low* and *PE High*), and indicators for quartiles. The omitted base category is no PE activity over the previous five years. The regressions contain industry, country, and country-industry (*Co-Ind*) fixed effects as indicated. Standard errors are calculated with clustering at the country-year level and presented in parenthesis. $PE_L = PE_H$ contains the significance level of a Wald test of equality of the *PE Low* and *PE High* coefficients or the quartile coefficients. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, ** and *, respectively.

	(1) Production (gross output)	(2) Production (gross output)	(3) Production (gross output)	(4) Production (gross output)	(5) Production (gross output)	(6) Value added	(7) Value added	(8) Value added	(9) Value added	(10) Value added
PE	0.906***					1.117***				
	(0.241)					(0.270)				
PE Low		0.886***	1.033***				0.924***	0.893***		
		(0.243)	(0.300)				(0.279)	(0.338)		
PE High		0.932***	1.452***				1.377***	1.755***		
		(0.288)	(0.374)				(0.327)	(0.414)		
PE Q1				0.551**	0.850**				0.660**	0.731**
				(0.265)	(0.330)				(0.298)	(0.361)
PE Q2				1.224***	1.218***				1.188***	1.044***
				(0.293)	(0.345)				(0.338)	(0.396)
PE Q3				1.131***	1.549***				1.413***	1.702***
				(0.291)	(0.364)				(0.342)	(0.424)
PE Q4				0.786**	1.393***				1.398***	1.884***
				(0.358)	(0.466)				(0.392)	(0.498)
Industry FE	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No
Country FE	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No
Co-Ind FE	No	No	Yes	No	Yes	No	No	Yes	No	Yes
$PE_L = PE_H$		0.832	0.129	0.037**	0.206		0.093*	0.009***	0.087*	0.056*
Observations	6,976	6,976	6,976	6,976	6,976	7,013	7,013	7,013	7,013	7,013
R-squared	0.177	0.177	0.271	0.177	0.272	0.130	0.130	0.199	0.130	0.199

Table 7: Twice-lagged PE activity and growth rate of productivity The table contains OLS regression coefficients. An observation is a country-industry-year pair. The endogenous variable is the deviation of the annual growth rate of production or value added (as defined by OECD) relative to the average rate in the same industry and year. The exogenous variables are an indicator for positive PE activity over the previous four years -2 to -5, i.e. *not* including the year previous to the year where the growth in the endogenous variable is measured (*PE*), indicators for whether the measured PE activity is below or above the median activity level (*PE Low* and *PE High*) and indicators for quartiles. The omitted base category is no PE activity. The regressions contain industry, country and country-industry (*Co-Ind*) fixed effects as indicated. Standard errors are calculated with clustering at the country-year level and presented in parenthesis. $PE_L = PE_H$ contains the significance level of a Wald test of equality of the *PE Low* and *PE High* coefficients or the quartile coefficients. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, ** and *, respectively.

	(1) Production (gross output)	(2) Production (gross output)	(3) Production (gross output)	(4) Production (gross output)	(5) Production (gross output)	(6) Value added	(7) Value added	(8) Value added	(9) Value added	(10) Value added
PE	0.869***					1.140***				
	(0.239)					(0.269)				
PE Low		0.875***	0.982***				0.943***	0.906***		
		(0.241)	(0.285)				(0.280)	(0.324)		
PE High		0.862***	1.278***				1.395***	1.710***		
		(0.287)	(0.363)				(0.320)	(0.393)		
PE Q1				0.542**	0.775**				0.633**	0.647*
				(0.267)	(0.308)				(0.299)	(0.332)
PE Q2				1.210***	1.187***				1.251***	1.148***
				(0.282)	(0.328)				(0.343)	(0.395)
PE Q3				1.039***	1.298***				1.437***	1.619***
				(0.304)	(0.369)				(0.343)	(0.403)
PE Q4				0.736**	1.324***				1.414***	1.912***
				(0.339)	(0.436)				(0.389)	(0.483)
Industry FE	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No
Country FE	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No
Co-Ind FE	No	No	Yes	No	Yes	No	No	Yes	No	Yes
$PE_L = PE_H$		0.952	0.284	0.048**	0.418		0.079*	0.012**	0.057*	0.031**
Observations	6,976	6,976	6,976	6,976	6,976	7,013	7,013	7,013	7,013	7,013
R-squared	0.176	0.176	0.271	0.177	0.271	0.130	0.130	0.199	0.130	0.199

Table 8: PE activity and growth rate of employment The table contains OLS regression coefficients. An observation is a country-industry-year pair. The endogenous variable is the deviation of the annual growth rate of labor costs or total employment (as defined by OECD) relative to the average rate in the same industry and year. The exogenous variables are an indicator for positive PE activity over the previous five years at the country-industry level (*PE*), indicators for whether the measured PE activity is below or above the median activity level (*PE Low* and *PE High*) and indicators for quartiles. The omitted base category is no PE activity over the previous five years. The regressions contain industry, country and country-industry (*Co-Ind*) fixed effects as indicated. Standard errors are calculated with clustering at the country-year level and presented in parenthesis. $PE_L = PE_H$ contains the significance level of a Wald test of equality of the *PE Low* and *PE High* coefficients or the quartile coefficients. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, ** and *, respectively.

	(1) Labor costs (compensation of employees)	(2) Labor costs (compensation of employees)	(3) Labor costs (compensation of employees)	(4) Labor costs (compensation of employees)	(5) Labor costs (compensation of employees)	(6) Number of persons engaged	(7) Number of persons engaged	(8) Number of persons engaged	(9) Number of persons engaged	(10) Number of persons engaged
PE	0.684***					0.587***				
	(0.253)					(0.161)				
PE Low		0.540**	0.587*				0.710***	0.840***		
		(0.262)	(0.320)				(0.158)	(0.197)		
PE High		0.887***	1.203***				0.422**	0.646**		
		(0.281)	(0.370)				(0.195)	(0.258)		
PE Q1				0.071	0.112				0.549***	0.679***
				(0.290)	(0.346)				(0.167)	(0.216)
PE Q2				1.017***	1.054***				0.876***	1.018***
				(0.286)	(0.347)				(0.184)	(0.215)
PE Q3				0.907***	1.185***				0.661***	0.906***
				(0.294)	(0.379)				(0.207)	(0.258)
PE Q4				0.984***	1.410***				0.194	0.368
				(0.310)	(0.411)				(0.218)	(0.296)
Industry FE	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No
Country FE	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No
Co-Ind FE	No	No	Yes	No	Yes	No	No	Yes	No	Yes
$PE_L = PE_H$		0.075*	0.010**	0.001***	0.002***		0.039**	0.272	0.001***	0.002***
Observations	6,743	6,743	6,743	6,743	6,743	6,768	6,768	6,768	6,768	6,768
R-squared	0.225	0.225	0.304	0.227	0.305	0.052	0.052	0.173	0.053	0.174

Table 9: Twice-lagged PE activity and growth rate of employment The table contains OLS regression coefficients. An observation is a country-industry-year pair. The endogenous variable is the deviation of the annual growth rate of labor costs or total employment (as defined by OECD) relative to the average rate in the same industry and year. The exogenous variables are an indicator for positive PE activity over the previous four years -2 to -5, i.e. *not* including the year previous to the year where the growth in the endogenous variable is measured (*PE*), indicators for whether the measured PE activity is below or above the median activity level (*PE Low* and *PE High*) and indicators for quartiles. The omitted base category is no PE activity. The regressions contain industry, country and country-industry (*Co-Ind*) fixed effects as indicated. Standard errors are calculated with clustering at the country-year level and presented in parenthesis. $PE_L = PE_H$ contains the significance level of a Wald test of equality of the *PE Low* and *PE High* coefficients or the quartile coefficients. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, **, and *, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Labor costs (compensation of employees)	Labor costs (compensation of employees)	Labor costs (compensation of employees)	Labor costs (compensation of employees)	Labor costs (compensation of employees)	Number of employees	Number of employees	Number of employees	Number of employees	Number of employees
PE	0.594**					0.528***				
	(0.239)					(0.171)				
PE Low		0.426*	0.423				0.677***	0.743***		
		(0.245)	(0.292)				(0.169)	(0.205)		
PE High		0.824***	1.085***				0.318	0.495*		
		(0.273)	(0.345)				(0.215)	(0.283)		
PE Q1				-0.023	-0.052				0.574***	0.690***
				(0.275)	(0.314)				(0.181)	(0.209)
PE Q2				0.879***	0.898***				0.799***	0.842***
				(0.268)	(0.325)				(0.200)	(0.244)
PE Q3				0.947***	1.155***				0.789***	0.964***
				(0.295)	(0.358)				(0.226)	(0.280)
PE Q4				0.786**	1.167***				-0.189	-0.087
				(0.306)	(0.398)				(0.251)	(0.335)
Industry FE	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No
Country FE	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No
Co-Ind FE	No	No	Yes	No	Yes	No	No	Yes	No	Yes
$PE_L = PE_H$		0.040**	0.003***	0.001***	0.001***		0.033**	0.207	0.000***	0.000***
Observations	6,743	6,743	6,743	6,743	6,743	5,771	5,771	5,771	5,771	5,771
R-squared	0.225	0.225	0.304	0.226	0.305	0.067	0.068	0.195	0.070	0.198

Table 10: PE activity and growth rate of capital formation The table contains OLS regression coefficients. An observation is a country-industry-year pair. The endogenous variable is the deviation of the annual growth rate of gross fixed capital formation or consumption of fixed capital (as defined by OECD) relative to the average rate in the same industry and year. The exogenous variables are an indicator for positive PE activity over the previous four years -2 to -5, i.e. *not* including the year previous to the year where the growth in the endogenous variable is measured (*PE*), indicators for whether the measured PE activity is below or above the median activity level (*PE Low* and *PE High*) and indicators for quartiles. The omitted base category is no PE activity. The regressions contain industry, country and country-industry (*Co-Ind*) fixed effects as indicated. Standard errors are calculated with clustering at the country-year level and presented in parenthesis. $PE_L = PE_H$ contains the significance level of a Wald test of equality of the *PE Low* and *PE High* coefficients or the quartile coefficients. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, ** and *, respectively.

	(1) Gross fixed capital formation	(2) Gross fixed capital formation	(3) Gross fixed capital formation	(4) Gross fixed capital formation	(5) Gross fixed capital formation	(6) Consumption of fixed capital	(7) Consumption of fixed capital	(8) Consumption of fixed capital	(9) Consumption of fixed capital	(10) Consumption of fixed capital
PE	-0.890					0.106				
	(1.881)					(0.291)				
PE Low		-0.697	-1.145				-0.113	0.092		
		(1.601)	(1.352)				(0.316)	(0.362)		
PE High		-1.145	-0.372				0.366	0.401		
		(2.412)	(1.501)				(0.332)	(0.375)		
PE Q1				0.123	0.240				-0.567	-0.474
				(1.401)	(1.283)				(0.357)	(0.380)
PE Q2				-1.458	-2.307				0.347	0.641
				(2.038)	(1.719)				(0.371)	(0.438)
PE Q3				-0.803	0.192				0.196	0.141
				(2.458)	(1.626)				(0.454)	(0.489)
PE Q4				-1.691	-1.543				0.615**	0.841**
				(2.628)	(1.807)				(0.312)	(0.368)
Industry FE	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No
Country FE	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No
Co-Ind FE	No	No	Yes	No	Yes	No	No	Yes	No	Yes
$PE_L = PE_H$		0.733	0.533	0.694	0.226		0.096*	0.360	0.007***	0.004***
Observations	6,074	6,074	6,074	6,074	6,074	4,712	4,712	4,712	4,712	4,712
R-squared	0.004	0.004	0.054	0.004	0.054	0.115	0.116	0.192	0.116	0.192

Table 11: PE activity and productivity cycles The table contains OLS regression coefficients. An observation is the annual growth rate of the indicated productivity measure (subtracting its average growth rate across countries) at the country-industry-year level. The exogenous variable *PE x Avg growth* contains the interaction between *PE* and the average growth rate of the endogenous variable, averaged over countries. *PE* is an indicator for positive PE activity in the country-industry during the previous five years. The variables *PE Low x Avg* growth and *PE High x Avg growth* are constructed similarly, where *PE Low* and *PE High* are indicators for below or above median PE activity. The regressions contain industry, country and country-industry (*Co-Ind FE*) fixed effects as indicated. Standard errors are calculated with clustering at the country-year level and presented in parenthesis. $PA_L = PA_H$ contains the significance level of a Wald test of equality of the *PE Low x Avg growth* and *PE High x Avg growth* coefficients. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, ** and *, respectively.

	(1) Production (gross output)	(2) Production (gross output)	(3) Production (gross output)	(4) Value added	(5) Value added	(6) Value added
PE x Avg growth	-0.085**			-0.102*		
	(0.042)			(0.058)		
PE Low x Avg growth		-0.124**	-0.085		-0.159*	-0.112
		(0.057)	(0.060)		(0.088)	(0.095)
PE High x Avg growth		-0.051	-0.021		-0.036	-0.013
		(0.042)	(0.045)		(0.061)	(0.065)
PE	1.357***			1.678***		
	(0.311)			(0.390)		
PE Low		1.641***	1.517***		1.870***	1.568**
		(0.374)	(0.425)		(0.539)	(0.612)
PE High		1.123***	1.365***		1.549***	1.732***
		(0.350)	(0.422)		(0.451)	(0.523)
Industry FE	Yes	Yes	No	Yes	Yes	No
Country FE	Yes	Yes	No	Yes	Yes	No
Co x Ind FE	No	No	Yes	No	No	Yes
$PA_L = PA_H$		0.167	0.254		0.200	0.338
Observations	6,976	6,976	6,976	7,013	7,013	7,013
R-squared	0.177	0.178	0.271	0.131	0.131	0.199

Table 12: PE activity and employment cycles The table contains OLS regression coefficients. An observation is the annual growth rate of the indicated employment measure (subtracting its average growth rate across countries) at the country-industry-year level. The exogenous variable *PE x Avg growth* contains the interaction between *PE* and the average growth rate of the endogenous variable, averaged over countries. *PE* is an indicator for positive PE activity in the country-industry during the previous five years. The variables *PE Low x Avg growth* and *PE High x Avg growth* are constructed similarly, where *PE Low* and *PE High* are indicators for below or above median PE activity. The regressions contain industry, country and country-industry (*Co-Ind FE*) fixed effects as indicated. Standard errors are calculated with clustering at the country-year level and presented in parenthesis. $PA_L = PA_H$ contains the significance level of a Wald test of equality of the *PE Low x Avg growth* and *PE High x Avg growth* coefficients. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, ** and *, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Labor costs (compensation of employees)	Labor costs (compensation of employees)	Labor costs (compensation of employees)	Number of employees	Number of employees	Number of employees
PE x Avg growth	-0.203***			-0.098**		
	(0.041)			(0.045)		
PE Low x Avg growth		-0.277***	-0.229***		-0.172***	-0.114**
		(0.049)	(0.055)		(0.050)	(0.054)
PE High x Avg growth		-0.112**	-0.111*		-0.039	-0.036
		(0.050)	(0.059)		(0.055)	(0.063)
PE	1.591***			0.538***		
	(0.306)			(0.171)		
PE Low		1.910***	1.657***		0.750***	0.792***
		(0.361)	(0.415)		(0.173)	(0.206)
PE High		1.295***	1.517***		0.324	0.493*
		(0.345)	(0.431)		(0.215)	(0.282)
Industry FE	Yes	Yes	No	Yes	Yes	No
Country FE	Yes	Yes	No	Yes	Yes	No
Co x Ind FE	No	No	Yes	No	No	Yes
$PA_L = PA_H$		0.004***	0.080*		0.016**	0.213
Observations	6,743	6,743	6,743	5,771	5,771	5,771
R-squared	0.228	0.228	0.306	0.068	0.069	0.196

Table 13: International PE activity and productivity The table contains OLS regression coefficients. An observation is the annual growth rate of the indicated productivity measure (subtracting its average growth rate across countries) at the country-industry-year level, separating US/UK and Continental European countries. The exogenous variables are an indicator for positive PE activity over the previous five years at the country-industry level (*PE*), and indicators for whether the measured PE activity is below or above the median activity level (*PE Low* and *PE High*). The omitted base category is no PE activity over the previous five years. The regressions contain industry and country fixed effects as indicated. Standard errors are robust and presented in parenthesis. $PE_L = PE_H$ contains the significance level of a Wald test of equality of the *PE Low* and *PE High* coefficients, and $PE_{US} = PE_{CON}$ contains the significance level of a t-test of equality of the coefficients *PE* for US/UK and *PE* for Continental Europe. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, ** and *, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Production (gross output)	Production (gross output)	Production (gross output)	Production (gross output)	Value added	Value added	Value added	Value added
	US/UK	US/UK	CON	CON	US/UK	US/UK	CON	CON
PE	-0.299		0.878***		0.289		1.225***	
	(1.001)		(0.187)		(1.430)		(0.231)	
PE Low		-0.535		0.893***		-0.208		0.951***
		(1.006)		(0.213)		(1.444)		(0.260)
PE High		0.050		0.861***		1.024		1.526***
		(1.069)		(0.227)		(1.499)		(0.293)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$PE_L = PE_H$		0.257		0.892		0.049**		0.057*
$PE_{US} = PE_{CON}$	0.245		0.245		0.473		0.473	
Observations	660	660	5,037	5,037	660	660	5,074	5,074
R-squared	0.141	0.143	0.175	0.175	0.101	0.107	0.135	0.135

Table 14: International PE activity and employment The table contains OLS regression coefficients. An observation is the annual growth rate of the indicated employment measure (subtracting its average growth rate across countries) at the country-industry-year level, separating US/UK and Continental European countries. The exogenous variables are an indicator for positive PE activity over the previous five years at the country-industry level (*PE*), and indicators for whether the measured PE activity is below or above the median activity level (*PE Low* and *PE High*). The omitted base category is no PE activity over the previous five years. The regressions contain industry and country fixed effects as indicated. Standard errors are robust and presented in parenthesis. $PE_L = PE_H$ contains the significance level of a Wald test of equality of the *PE Low* and *PE High* coefficients, and $PE_{US} = PE_{CON}$ contains the significance level of a t-test of equality of the coefficients *PE* for US/UK and *PE* for Continental Europe. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, ** and *, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Labor costs (compensation of employees)	Labor costs (compensation of employees)	Labor costs (compensation of employees)	Labor costs (compensation of employees)	Number of employees	Number of employees	Number of employees	Number of employees
	US/UK	US/UK	CON	CON	US/UK	US/UK	CON	CON
PE	-0.237		0.639***		1.736**		0.400***	
	(1.258)		(0.156)		(0.768)		(0.127)	
PE Low		-0.295		0.408**		1.965**		0.554***
		(1.239)		(0.183)		(0.800)		(0.140)
PE High		-0.150		0.906***		1.396*		0.213
		(1.332)		(0.186)		(0.774)		(0.160)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$PE_L = PE_H$		0.734		0.010**		0.108		0.0325**
$PE_{US} = PE_{CON}$	0.372		0.372		0.131		0.131	
Observations	660	660	4,804	4,804	660	660	4,245	4,245
R-squared	0.058	0.058	0.266	0.267	0.144	0.148	0.082	0.082