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How to measure the impacts of LBO on employment? The contribution of  
“matching” methods

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## **Introduction**

In 1989, Jensen predicted the “eclipse of the public corporation”. Although public corporations did not disappear, one can observe the rise of LBO backed firms since the 80s. Historically, the development of LBO is deeply linked to junk bonds and to the wave of merger and acquisition due to the refocusing on core businesses in the United States (Lazonick and O'Sullivan, 2000). Nonetheless, we assume that LBO was clearly seen as an organisational innovation to discipline managers. LBO is a private equity investment based on buying up a company by leverage effect, i.e by debt. In fact, it is not the presence of massive debt (70% of the value of the firm involved in LBO) which gives managers strong incentives to succeed but their personal and financial involvement into the repurchase. To some extent, LBO gives a relevant answer to the problem emphasised by Berle and Means in 1932.

In line with the literature (Lowenstein, 1985; Fox and Marcus, 1992; Kaplan and Schoar, 2005), we define three main functions of LBOs. First, LBO is a solution for the capital transfer of family-held firms when the entrepreneur has difficulties to find a buyer. Second, LBO funds aim at buyout firms with difficulties, in fact the ones having inefficient management. Third, LBO can occur because of the higher profitability of the investment for shareholders due to leverage effect. We consider the last function as the main one and we assume that a reduction of employment coupled with a better return for shareholders should be considered as a part of the financialization process (Chambost et al., 2008; Froud and Williams, 2007).

As a consequence, the impact of LBO on targeted companies has received considerable attention recently (Bruton et al., 2002; Wright et al., 2006; Kaplan and Strömberg, 2008; Froud and Williams, 2007; Watt, 2008; Cumming et al., 2007; Nikoskelainen and Wright, 2007). The debate is deeply linked to the impacts on firms that undergo LBO.

Employees worry about LBO because it usually implies restructuring, lay offs and changes in corporate governance and the management of companies. However, the relationship between LBOs and employment is controversial and rises a debate partly because of a lack of robust data, the heterogeneity of authors involved into the debate and the methods followed.

The purpose of the paper is to contribute to the debate on the impact of LBOs on employment in repurchased firms with a discussion of the most recent quantitative methods utilized.

First part of the paper analyzes the logic of the development of LBO and reviews the major current approaches on LBO. We discuss about the agency theory, “free cash flow” theory and “tax shield” theory and we continue with the discussion of the relationship between LBO and employment. In the second part, we discuss the main quantitative methods and other “matching” methods used. In the third part, we present the limits of “matching” methods and the fourth part concludes our discussion.

## 1. Literature review

In this part, we shed some light on the logic of LBO and its perception in literature. Thus, we propose to review the specific literature about the relationship between LBO and employment.

### a. Definition, role and mechanisms of LBO.

Leveraged Buyout (LBO) is a private equity investment based on buying up a company by leverage effect, i.e by debt. According to the literature, debt plays different roles in the case of LBO. In addition, one can argue that debt is the main mechanism in buyouts. First of all, control arising from debt allows to limit managerial discretion and to reduce agency conflicts. Second, using debt increases the ROE (Return On Equity) through leverage effect, especially when interest rates are low. In addition, some studies underline a second leverage effect due to a reduction of tax<sup>1</sup>. Third, LBO could reduce information asymmetries. In the case of listed companies, we observe a substantial increase in stock values of companies just after the announcement of the buyout.

Since (Berle et Means, 1932), an abundance of academic papers in organisational theory dealt with the problems induced by the separation between ownership and control. For Jensen and Meckling 1976, managers and owners do not have the same interests. Managers which are described as opportunistic want to maximise their own utility instead of increase the shareholders value. The misalignment of interest between managers and owners is a source of costs for the owners due to the mechanisms of control which is induced by the conflict. Jensen and Meckling define the relationship between owners and managers as an agency relationship where owners are principals and managers are agents. To resolve the misalignment between the interests of managers and themselves, one can consider different governance mechanisms: boards of directors for controlling directly managers, pecuniary incentives for managers (for example, stock options or golden parachutes), concentrated ownership, etc. However, Jensen and Meckling (1976) and Jensen (1986; 1989) consider LBO as a relevant mechanism to discipline managers. The new governance structure created by LBO allows shareholders to control managers and to reduce agency costs and asymmetries of information more efficiently. The pressure of debt, the possibility for a more active monitoring of management induced by the buyout and the increase of managerial equity ownership are identified as efficient measures permitted by LBO.

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<sup>1</sup>. Indeed, the LBO fund creates a holding which will become the owner of the targeted company. This holding does not have profit but only losses due to debt servicing.

In incorporations controlled by managers with important “free cash flow”, managers have incentives to use cash flows in unprofitable investments to diversify risks and to limit the risks of firing. “Free cash flow is cash flow in excess of that required to fund all projects that have positive net present values when discounted at the relevant cost of capital” (Jensen, 1986). These corporations, because of their unprofitable investments and potential conflicts on appropriation of “free cash flow”, may become targets of hostile takeovers, for example by LBO funds. These funds then institutionalize a direct control of managers by debt and by the control of ownership. LBO solves several agency problems as Jensen (1989) predicted “the eclipse of public corporation” and hegemony of PE firms. More precisely, Jensen concluded that firms which undergo LBO have better performance. So, for Jensen, we should observe a strong development of PE; however, it may be more quickly generalized in anglo-saxon countries, as the property of public corporation is diffused in these countries, it makes hostile takeover easier. But, Jensen’s analyse (1986; 1989) is relevant for public corporations (which may be privatized by LBO), but not necessarily for private companies, which are the most important part of the LBO deals today.

Following Jensen, we find many papers which emphasise the role of LBO in improving performance due to a reduction of agency costs. Kaplan (1989b) finds that LBO improves the performance of companies involved in LBO through the improvement of incentives. DeAngelo et al. (1984), Muscarella and Vetsuypens (1990), Liebeskind et al. (1992) and Long and Ravenscraft (1993a; 1993b) find some results consistent with Jensen’s analysis. Indeed, governance structure of LBO firms seems to be more efficient than governance structure of public companies to control managers and to reduce the “free cash flow” problems (Phan and Hill, 1995). Most of the papers papers focused on the need for large companies to reduce there overall size and to limit diversification. Opler and Titman (1993) underline that firms which undergo LBO are more diversified and have high cash flow.

One could observe a second wave of studies since the 2000s. For Cotter and Peck (2001), the monitoring of LBO funds is an efficient substitute of debt to discipline managers. They consider “buyout specialists are professional active investors”. Bruton et al. (2002) and Nikoskeleinen and Wright (2007) also find some results partly consistent with agency and free cash flow theories. Bruton et al. consider that agency theory is particularly consistent to analyse managerial auctions. In addition, the reduction of agency costs seems to persist after the exit in the case of a reverse buyout. Nikoskeleinen and Wright (2007) find some evidence about the corporate mechanisms induced by LBO. However, the personal involvement of managers and the size of the deals are the main drivers of a successful LBO. In addition, they point out the difference of return between LBO driven by insider managers (MBO) and LBO driven by outsider managers (MBI). More precisely, in the case of buyins, the source of returns is based on divestment and downsizing. Per contra, returns in buyouts are driven by acquisitions. The difference between MBI and MBO has received more attention recently. (Amess and Wright, 2007b) find strong differences between MBI and MBO.

The use of debt leverage to increase the ROE has received large attention. In some cases, especially when interest rates are low, using debt has a direct and mechanical effect on ROE and debt is less expensive than share issues. According to free cash flow theory, the level of free cash flow is related to the level of debt. In fact, debt servicing reduces or eliminates free cash flow. However, some firms which undergo LBO do not have free cash flow. To some extent, LBOs are based on the optimal capital structure theory as debt and its servicing can reduce the tax level. More precisely, the holding created for the buyout is the legal owner of the target and has only losses due to debt serving. As a consequence, taxation

of profit of firms which undergo LBO decreases. One may consider that it is not the free cash flow but fiscal leverage which explains returns. Therefore the role of tax savings is widely discussed in the literature. For Kaplan (1989a), and Lehn and Poulsen (1989) tax savings associated with LBO increase the operating performance and returns for LBO fund. Lowenstein (1985) also considers that the first motivation to utilize debt in a LBO is tax savings. According to Benthabet (2009), one can observe an opposition among various studies analysing the role of debt. More precisely, she assume that studies which find results consistent – at least partly consistent – with “free cash flow” theory (cf supra) does not confirm “tax savings” theory. However, some studies consider mixed effects (Lehn and Poulsen, 1989; Opler and Titman, 1993). They consider that the first role of the debt is to reduce agency costs and the discretionary use of “free cash flow” even if there are tax savings due to the debt. Recent studies (De Jong and Van Dijk, 2007; Kaplan and Stömberg, 2008; Yousfi, 2009; Achleitner et al., 2009) provide some interesting results. For De Jong and Van Dijk (2007), the relationship between debt and agency problems is not evident. In addition, they find strong evidence about the impact of tax system on the level of debt. Kaplan and Strömberg (2008) assess the difficulty to evaluate the quantitative impact of tax system of return even if the impact of tax savings on value created is clear. Yousfi (2009) finds some evidence about the link between high level of debt and tax savings advantage due to the use of debt. Finally, Achleitner et al. (2009) observe a robust relationship between debt and free cash flow. Using leverage can reduce opportunistic managerial behaviour in the use of free cash flow. Nevertheless, they assume that tax savings impact the decisions of LBO funds for firms with a high debt capacity.

For a company, use of debt can be perceived as a signal about its quality. In fact, following Ross (1977), “the values of firms will rise with leverage, since increasing leverage increases the market's perception of value”. Jensen (1989), and Harris and Raviv (1990) emphasise the role of debt in reducing asymmetric information. The announcement of a LBO for listed companies has a direct positive effect on stock values (De Angelo et., 1984; Kaplan, 1989b). We assume that the announcement of a LBO is perceived as a signal by target shareholders that the value of the company is undervalued on the market. Following Grossman and Hart (1980) and Shleifer and Vishny (1986), in large firms with diffused shareholding, the cost of monitoring is too high for small shareholders due to the opportunistic (free rider) behaviour of some minority shareholders. More precisely, shareholders accept to be involved in the control and they keep a watch on management unless the gains of monitoring (valuation of shares) are higher than the cost of the control. According to Grossman and Hart (1980) and Shleifer and Vishny (1986), some shareholders perceive the attempt of other shareholders to improve the management and they try to obtain some gains. In fact, because they know that the costs of monitoring need a minimum equity share, opportunistic shareholders will accept to sell their shares unless they obtain a premium. In their recent study, Achleitner et al. (2009) find some evidence that private equity firms could be interested in buying companies with large shareholders (blockholders). More precisely, diffused shareholding requires LBO firms to repurchase a majority of shares directly from minority shareholders. In case of a public bid, the announcement of delisting through a LBO can increase the cost of the buyout for the LBO firms due to the negotiation of different premia with each shareholder. As we said above, LBO could be understood as a signal for the quality of the target or a signal of better performance with an appropriate management. Opportunistic minority shareholders could attempt to sell their shares at a higher price. As a consequence, the buyout cost for LBO firms increase and this affects the final return at the exit. Wright et al. (2007), highlight that LBO firms attempt to obtain “irrevocable commitments” which could be defined as a presale of shares. In fact, LBO firms try to

repurchase the maximum of shares before the announcement of LBO. Wright et al. (2007) find that the offer of irrevocable commitments is positively linked to the value of the premium, the reputation of firms and the board shareholdings and negatively related to the rumours of a repurchase. We assume that in the case of “irrevocable commitments”, the reduction of information asymmetries is only reduced for the LBO firms. Indeed, one can argue that targeted shareholders can suffer from moral hazard due to the need for LBO firms to keep secret of an eventual buyout in the future in order to pay limited premium.

#### b. Literature review on LBO and employment.

The impact of LBO on employment is controversial. One reason is the perception of employees and unions on LBO deals, one could observe a fear related such deals. LBO most of the time, implies restructuring and change in corporate governance and sometimes refers layoffs. In fact, even though media generally demonizes LBO, we assume that the impact of LBO on employment is confused. The European Venture Capital Association (EVCA) has realized the need to a better understanding of the impact of LBO on employment and shed some light on the subject in a report published in 2008. Another reason of controversy is the difficulties to find some overall results in the literature. Below we discuss the limits of the methods used the most recent studies.

Lutz and Achleitner (2009) provide the most comprehensive survey on the issue. Considering 49 academic papers published, they cannot conclude on the impact of LBO on employment. In fact, there are many papers which provide some consistent results on negative impact of LBO on employment in targeted. To return back to the methodology developed by Lutz and Achleitner (2009), in their review, we observe that they find 120 articles dealing with the issue. Using rigorous criteria of selection, they excluded papers which do not deal directly with LBO, like papers on merger & acquisitions or papers which differentiate LBO from others stages of private equity like venture capital, and other theoretical and descriptive papers, position papers and papers with unclear methodology. Although we agree with the exclusion of papers supported by labour unions, we have some doubt with the fact that they include papers provided by private equity associations. One can argue that these papers are also position papers like papers supported by labour unions even if their methodology seems to be robust. Finally, they distinguish “archival based studies”, “survey based studies” and “case study”. We consider that the first group of papers is the most comprehensive one to analyse the global trend in the impact of LBO on employment. Nevertheless, we are convinced that survey based studies” and “case study” are particularly relevant to obtain information about qualitative aspects like working conditions.

According to the authors, one can argue that the methods used to analyse the effect of LBO on employment affect the sense of the relationship (negative or positive). Indeed, we observe that the results are far affected by the methods. In addition, we observe deep difference between studies according to the size of the sample. In fact, the size of different samples varies from 33 to 11 000 buyouts. The authors distinguish three main methods.

The first one allows taking into account the endogeneity of the LBO decision. Firms which undergo LBO can be in distress and in a trend of lay off. As a consequence, we face a problem of inverse causality. There is no proof of a significant impact of LBO on employment in studies using this method (Amess and Wright 2007a, 2007b). In addition, Amess and Wright (2007a, 2007b) consider that taking into account LBO decisions as an

exogenous process gives some biased results toward a negative impact of LBO on the level of employment. Finally these studies provide some interesting results about the need to distinguish the different types of LBO. According to them, LBO which involves outsider managers (MBI) induces more negative effect on employment than the deals with insider managers (MBO).

The second method is based on a comparison of the level of employment between firms which undergo LBO and a control sample (Boucly et al., 2009; Amess et al., 2008; Davis et al., 2008; Cressy et al., 2008; Liebeskind et al., 1992; Marti Pellon et al., 2007). The formation of the control sample suggests some differences between studies while all the studies still consider industrial sector and the size of firms. Meanwhile some studies emphasize several other factors in the formation of counterfactual. Davis et al. (2008) consider the age of the target and the number of plants the target has. They conclude a negative relationship between LBO and employment. For Liebeskind et al. (1992), the level of diversification need to be kept in mind. Using a difference in means method, they find a negative impact of LBO on employment. Lastly, Amess et al. (2008) present the most comprehensive analysis using counterfactual. They make allowance for the endogeneity of the LBO decision through the consideration of employment level before the LBO. In addition, concerns about productivity and wages are also involved in LBO. They find no evidence of a significant impact of LBO supported by private equity funds on employment and wages. One can argue that a large majority of studies focus only on USA and UK. In fact, empirical analysis of LBO effect on employment have received little attention in other countries. Nevertheless, we still have several studies on European countries. Boucly et al. (2009) for France, Marti Pellon et al. (2007) for Spain paid some attention to the issue in Europe. All of them conclude a positive effect of LBO on employment. In others words, LBO backed firms create more jobs than firms in the control sample.

The third method is based on a comparison between the firms which are involved in LBO and average of the whole sector in terms of employment (Chaplinsky et al., 1998; Kaplan, 1989b, Smith, 1990; Weir et al., 2008). These studies conclude a negative relationship between LBO financings and employment.

So far we assume the difficulty to find some universal results about the impact of LBO on employment. One can ask the necessity to extend these studies to European countries because of the recent development of LBO in Europe. In addition, the development of LBO in Europe seems to be affected by different institutional configurations of these countries (Bédu and Montalban, 2009). Finally, we need to consider the differences between methods (Cf *infra*).

## 2. “Matching” methods.

In the literature on the relationship between LBO and employment, many papers use a “matching” method; i.e. the building of a counterfactual or a control sample for estimating the impact of LBO on the level of employment. According to Lutz and Achleitner (2009), one can argue that the methods used to analyse the effect of LBO on employment affect the sense of the relationship (negative or positive).

### a. “Matching” methods on classic variables.

Most of the papers which aim at explaining the impact of LBO on the level of employment use a counterfactual. Here “matching” methods consist matching companies with similar characteristics with companies observed. In our case, the goal is to compare the level of employment between firms which are involved in a LBO with others which do not have common observable characteristics. The most used criteria are the sectoral affiliation and the size (Boucly et al., 2009; Cressy et al., 2008) albeit Davis et al. (2008) consider the age of the company. The sectoral affiliation allows to capture the global dynamic in the industry and the size permits to compare similar companies given the heterogeneity in terms of the size of firms involved in LBO.

We present in detail three methods used in the recent literature.

Cressy et al. (2008) use a log linear regression of employment. The dependent variable is the logarithm of employment in companies involved in a LBO before the buyout or not (2 years before LBO) an after (5 years) the buyout. Considering the level of employment two years before the buyout allows a comparison of employment level between the two samples of companies. One can argue that LBO could have less or no impact on employment if companies lay off before the buyout. We assume that the authors are partly able to control this problem. They find that levels of employment are not significantly different between the buyout sample and the control sample prior to LBO.

In this method, there are two sets of variables. The first set is a dummy variable which captures the LBO treatment. The second set contains control variables. Authors control different effects: the size effect of the companies through the initial level of employment or the initial total value of assets; the macro effect through the growth of GDP and a dummy which captures potential effect of the rise of stock markets due to the dot.com bubble during the period of 1999-2000, the impact of the level of debt on employment, the industry and the effect of the performance of targeted companies based of the operating profit (EBIT) on total assets. The motivations to use these control variables are:

- The size (in terms of employment) of the companies involved in a buyout: Authors consider that the differences in employment levels among targeted companies could be explained by the choice of LBO funds.
- Controlling with the growth of GDP gives some information about the macroeconomic context and permits to observe if the level of employment is driven by unfavourable context. Given a high correlation between the dummy dot.com bubble and the growth of GDP, the authors drop the last variable;
- Sectoral effects is controlled by dummies for two sectors (ICT and life sciences)

For authors buyout sample is not randomly selected due to a lack of available data for employment (dependant variable). They use a two-step Heckman’s regression to control the bias selection. More precisely, to estimate some change in the level of employment one need to consider companies only with a positive probability of change in employment. The two-step Heckman’s regression is based on Probit model (first step). After an OLS model is estimated (second step):

- The Probit model is utilized in order to capture companies with a positive probability of change in employment.
- Then, the results of the Probit model are utilized for inverse Mills ratio which is included in the OLS model.

The advantage of this model is to compare companies (under LBO or not) with some similarities in terms of change in their level of employment. One can argue that control sample needs to contain only companies without a rise in their level of employment. As we said above, one has to deal with a problem of endogeneity. By controlling the initial level of

employment and using the two-step Heckman's method, Cressy et al. (2008) provide a very comprehensive study and give us some robust results about a negative impact of LBO on employment.

Boucly et al. (2009) provide an analysis of the French case based on the study of 830 LBOs. The authors used classical characteristics in building the control group: Sectoral affiliation (2-digit sector code), size of companies based on their number of employees one year prior to LBO, and a criteria of performance which is the ROA again one year prior to LBO. According to Cressy et al., (2008) we assume that ROA capture concurrently the operating performance and the impact of financial engineering.

The impact of LBO on employment is estimated through a dummy which is one if the company is involved in a LBO in an OLS model and zero otherwise. The authors find a strong positive relationship between LBO and employment. In others words, they find that companies which have undergo LBO present a growth of 13% in employment compared to the companies in control group. As a consequence, some control variables are introduced in order to test the robustness of the result:

- The growth of sales prior to LBO can affect the increase of employees. Indeed, good performances can induce an increase of the company size.
- The simplification of corporate structure in case where target companies have subsidiaries can increase mechanically the level of employment.
- The bias selection due to the difficulties to take failures into account. One can argue that bankruptcy has a deep impact on employment (-100%). The authors provide some results about the rate of failure which is significantly indifferent from control companies.
- In the French case, the rigidity of the market labour can partly explain the growth of employment.
- To control time stability, estimations are carried on two periods in order to observe the impact of dot.com bubble. More precisely, they assume that the favourable context before the crisis could impact positively the growth of employment.
- Finally, they make difference between multi-divisional firms and private companies.

Finally, they find a strong positive relationship between LBO and employment for the French case. However, they note that the French private equity market is less mature than its counterparts in the USA and the UK. In addition, the credit constraints are tighter. According to Jensen (1989) and Harris and Raviv (1990) who emphasise the role of debt in reducing asymmetric information, Boucly et al. (2009) underline the relevant role of LBO funds in increasing the credibility of target companies. By controlling the growth of sales one year prior to LBO, the authors deal with the problem of endogeneity. Nevertheless, the study highlights the difficulties to consider the failure of companies to observe the impact of LBO on employment.

Davis et al. (2008) deal with the impact of LBO on employment through a very large sample of 11.000 buyouts for the American case over a period between 1980 and 2005. The authors use classic criteria to build the control sample:

- Control companies are in the same industry (two-digit code)
- Size of the companies must be similar. Given the heterogeneity of the firm size by industry, the authors provide a specific classification of companies in three groups (small, medium and large) with respect to an equal distribution of employment between the groups.



- Age of the firm could affect the employment growth rate. One can argue some differences in the level of employment and the risk of failure between mature and young firms.
- Finally, the authors take into account the number of firms' plants. More precisely, a multi-plant situation induces some problems for estimating the impact of LBO on employment because divestiture and acquisition are counted as net employment loss or net creation of employment even if there is no change in the level of employment for the plant involved in the deal.

The method used by Davis et al. (2008) is particularly interesting because the authors deal with the problem induced by firm level analysis and give some evidence about the relevance of a plant-level analysis. In accordance with the literature, we assume that mature firms are overrepresented in the sample. The authors consider that plant-level method allows, to some extent, reducing the survivor bias. It seems to be complicated to estimate net job destruction at a firm-level analysis because some plants can survive after the exit of the firm. By contrast, firm level method which is the most well known method allows considering corporate structure. For example, this method seems to be relevant to observe mergers between some plants or to control the effect of acquisition of a new establishment on employment. For the last case, one can argue that acquisition is not a source of job creation if the level of employment does not change after the deal.

Amess and Wright (2007a, 2007b) give some evidence from the UK case about the impact of LBO on employment. With respect to endogeneity issues, the authors conclude on an insignificant impact of LBO on employment. The problem of endogeneity can occur when distressed companies undergo LBO.

We note that control sample is built on classic variables (size and sectoral affiliation). A logit model is used to estimate the probability for a firm to have a LBO governance structure. The model is based on the following variables<sup>2</sup> (Amess and Wright, 2007b):

- The level of employment
- The turnover of employees to capture the change in employment.
- The cost of labour per employee
- The profit per employee
- A ratio (employee/fixed assets) to estimate if the production is labour/capital intensive. The authors argue that firms under LBO are less labour intensive.

Amess and Wright (2007b) give some evidence about some different impact of MBO and MBI on employment. More precisely, while insider managers tend to increase employment, there is no growth in employment when external managers are involved into the corporate governance. Amess and Wright (2007a) provide a comprehensive method about the treatment of endogeneity through instrumental variables<sup>3</sup>. With respect to their findings, LBO treated as exogenous and it has an impact on employment but this effect disappears when endogeneity is controlled. Finally, the authors are not able to conclude on a positive/negative effect of LBO on employment.

#### b. "Propensity score matching" methods

"Propensity score matching" is a relevant method to build a counterfactual. One can argue that the occurrence of an event may not be randomly distributed but along some characteristics of statistical individuals. The occurrence of the event is conditioned by some observables characteristics (conditional independence assumption). In the case of a LBO, one

<sup>2</sup> All variables are expressed in natural logarithm.

<sup>3</sup> Instrumental variables are endogenous variable in t-3 or in t-5

can argue that the probability of the buyout is conditioned by some characteristics. The impact of LBO on dependant variable (employment, productivity, operating performance) could be underestimated or overestimated and it captures only the heterogeneity between the buyout sample and the control sample.

This method is a two step-method:

- Firstly, one needs to identify the characteristics which have a relevant impact of the probability for a firm to be targeted by a LBO through a Probit model. The Probit model allows controlling the effects of observable variables on the probability for firm to undergo a LBO and distinguishes the net effect of LBO on dependant variable.
- Secondly, by using the propensity score obtained through the Probit model, the impact of LBO on dependant variable could be estimated through a difference-in-differences regression. We note that the propensity score<sup>4</sup> is not always used in the second step of the method (Cf infra).

We present in detail two studies on propensity score matching to analyse the impact of LBO on employment.

The method used by Amess et al. (2008) is based on the comparison of employment level between a sample of firms involved in a LBO or an acquisition and a control sample. More precisely, they aim at estimating the impact of an ownership change due to a LBO or an acquisition. They consider three cases: (i) firms which are not affected by restructuring, (ii) firms which undergo LBO and (iii) firms which are involved in an acquisition. They use a difference-in-differences approach to observe some change in employment or wages between, for example, firms which are not affected by restructuring and firms which are involved in LBO.

They authors face with a selection bias due to differences between firms which are involved in a LBO or an acquisition and firms which are not affected by restructuring. Using a propensity score matching algorithm, they distinguish five observable variables that explain the selection bias:

- The initial level of employment prior to the LBO/acquisition.
- The wages prior to the LBO/acquisition.
- The productivity prior to the LBO/acquisition.
- The age of the company prior to the LBO/acquisition.
- The time trend prior to the LBO/acquisition.

One can observe some control variables here are identical in the studies presented above. The authors do not care about industry effect. Initial employment, wages and the age of the companies have a significant effect on the probability for a firm to undergo a LBO. Using a balancing test, the authors valid the propensity score matching, i.e. the quality of the Probit model to explain the probability of buyout. The authors use the propensity score instead of the set of observable characteristics in the difference-in-differences regression and they do not find any significant effect of LBO on employment between one to four years after the LBO.

In their French case, Boucly et al. (2008) provide an empirical study based on propensity score matching and difference-in-differences regression. Controls variables which are estimated one year prior the LBO include:

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<sup>4</sup> According to Rosenbaum and Rubin (1983) the set of observables characteristics could be replaced by the propensity score.

- The log of wage employment
- The log of total assets
- ROA
- ROE
- The growth rate of turnover
- A dummy variable equal to one if the ROE is positive
- The sectoral affiliation
- The geographic origin of the headquarters (French administrative division).

The authors do not consider the size of companies in contrast with most other papers using control sample. The set of observable variables is used in the difference-in-differences regression instead of the propensity score matching which is a summary variable of the criteria used in the matching method. The authors find a positive impact of LBO on employment for the French case. According to the authors, the buyout sample is biased due to large target firms which are overrepresented. To some extent, we assume that the positive impact of LBO on employment is overrepresented due to corporate restructuring which affect more often large companies (more complex corporate structure) than SME (less complex corporate structure). In addition, the authors do not give evidence about the ability of the sample to take into account the corporate structure of companies. By controlling initial employment and growth of sales one year prior to LBO, the authors deal with the problem of endogeneity.

### 3. Discussion about “matching methods”

We assume that building control sample is particularly complicated. We propose a discussion about the limits of the methods presented above and give some proposal to improve the estimation of the impact of LBO on employment.

#### a. A robust counterfactual?

One can propose the limits of matching method because the buildings of the control sample could impact final results. More precisely, we assume the difficulty to capture all relevant variables:

- There is a great heterogeneity of ownership status for firms involved in a LBO: listed companies, SME, subsidiaries, family business, etc. This heterogeneity involves paying attention to the different characteristics used to build the counterfactual. While the size of the company partly allows controlling this effect, some characteristics used in propensity score matching (LBO is the dependant variable) or a two-step Heckman regression (employment is the dependent variable) vary along the ownership status and the corporate structure. As mentioned by Davis et al. (2008), plant-level analysis is suffered from survivor bias less than firm-level analysis. However, firm-level allows capturing some change in corporate structure like divesture or acquisition.
- Databases (Capital IQ, Thomson Reuters, and Zephyr) are affected by a survivor bias and mostly, do not provide enough information about relevant characteristics to build a control sample.
- Given the specific ownership status, we have to make a difference between the holding which has the property rights and the target company.
- Most of the studies focus on the private equity markets in the UK or in the USA. We assume that the studies of other countries, especially European countries need

to pay attention to national specificities in terms of rigidity of employment, depth of financial markets, size of firms and ownership status. Boucly et al. (2008, 2009) find that the rigidity of employment does not affect the positive impact of LBO on employment in the French case. One can argue that the rigidity of labour market is more relevant in the case of layoffs due to a LBO. In addition, the development of the national industry of private equity could impact the relationship between LBO and employment. A more mature market like in the USA or the UK is characterized probably by less profitable investment cases than a young market. Finally, the global tendency of the national private equity market could impact final results. If LBO funds target mature and profitable companies, the effect of LBO on employment could be reduced. *A contrario*, if targeted companies are in distress, the impact of LBO on employment could be overestimated, especially if a control variable of initial level of employment is not used for building the counterfactual.

- The decision of the buyout could be explained through non observable variables. In the case of a public company, the delisting needs funds to obtain a minimum of share and the announcement of public bid can increase the cost of the buyout for the LBO firms due to the negotiation of different premia for each shareholder. Bidder may forsake buyout if the growth of the cost due to free rider behaviour is too high. Achleitner et al. (2009) find that LBO firms could be particularly interested in catching “irrevocable commitments” in the case of companies controlled by blockholders. One can argue that “irrevocable commitments” affect the probability to be delisted through a LBO for listed companies. Literature emphasizes the role of LBO funds for family business owners who face with difficulties to find an acquirer. However, we assume the difficulties to deal with different reasons explaining a cession to a private equity fund.

Given the link between the econometric model (OLS or difference-in-differences model) used to deem the impact of LBO on employment and the counterfactual; we assume the need to build the most comprehensive counterfactual.

#### b. How to analyse bankruptcy?

The impact of LBO on failure is an important debate. According to Strömberg (2008), firms which undergo a LBO are more affected by failure than listed companies. Failures of firms involved in LBO need to be counted as net loss of jobs. Still we have some problems. First of all, the limited availability of data about failures is an issue in the main databases mentioned above. The survivor bias can be explained through the difficulties to find information about failure. In addition, one can argue that private equity funds are reluctant to disclose information about failures.

The formation of control sample needs to take into account the companies with a similar risk of failure as buyouts sample because of the strong impact of bankruptcy on employment. Boucly et al. (2009) give some evidence about a similar rate of failure in the French case between buyout sample and control sample. Nevertheless, one can argue that the French private equity market is less mature than its British and American counterparts. The author give some evidence about the role of private equity firms in reducing credit constraints for targets. Private Equity funds would tend to invest in companies with a growth potential. As a consequence, the sample is biased towards companies with a low probability of failure. To some extent, the negative impact of LBO on employment could be underestimated.

According to Davis et al. (2008), the firm-level analysis introduces a survivor bias and it is complicated to control the corporate restructuring between entity and plants. They limit their study to a short period in order to obtain the most transparent information. In addition, they control the bias implied by firm-level analysis through the plant-level analysis.

Finally, taking into account the net effect of failure is particularly complicated. Nevertheless, we assume that analyses based on quantitative data are more relevant to measure the effect on level of employment so as to observe a global trend in job destruction/creation.

c. How to measure the impact of LBO on employment?

As mentioned above, estimating the net impact of LBO on employment is susceptible. In this paper, we deal only with quantitative analysis based on “matching” methods. While the criteria used to estimate the impact of LBO on employment are quite similar, findings are mixed. According to the mentioned advantages and limits about “matching methods”, we give some proposal of a comprehensive “matching” method:

- Using a propensity score matching is relevant in order to avoid some bias in the estimation of the impact of LBO on employment. We argue that companies which undergo a LBO present some specific characteristics.
- According to Boucly et al. (2009), we have to control the probability of failure which must be similar between target and control.
- A complex corporate structure could induce a bias because of restructuring like mergers between establishments. As mentioned by Davis et al. (2008), the estimation of the impact of LBO on employment needs to distinguish the regressions at firm-level and plant-level.
- Macroeconomic effect has to be controlled. We assume the relevance of cyclical effect in the LBO industry. For example, one can argue that returns, risks of failures, layoff trends were quite different before the financial crisis of 2007, especially for the LBO market which was in a bubble prior to the crisis.
- One can argue that buyout sample are quite different and studies focus on different countries: the USA, the UK and France. Most of the studies on the UK give evidence about an insignificant role of LBO in a fall in employment. Davis et al. (2008) find that LBO has a negative impact on the level of employment for the USA. On the contrary, Boucly et al. (2008; 2009) highlight that LBO plays a significant role in job creation. Different findings imply to consider some national specificities for explaining the role of LBO on employment.
- Given the great heterogeneity of ownership status of companies prior to LBO, control samples must be built without any bias towards a specific category of ownership status. In fact, it would be easier to obtain information for companies which are listed, but, buyouts involve more often, private companies.
- Control sample has to deal with the maturity of national private equity industry. We assume that there are potentially more highly profitable deals in a less mature private equity market.
- According to Amess and Wright (2007b), the impact of buyout could vary if the deal implies internal managers (MBO) or external managers (MBI).
- Given the debates about the role of LBO funds and the heterogeneity of the operating performance between targets, we propose the need to distinguish companies along their economic and financial health. The relationship between

LBO and employment could be rather different if we deal with distressed firms or “cash cows”.

#### 4. Conclusion

Considering the most recent papers which aim at estimating the net impact of LBO on employment, we observe that results are mixed and we are aware of the awkwardness of the work even though actual methods used are quite outstanding. The actual debates on the impact of LBO on employment underline the need of further analysis which deals with larger samples and different countries.

Given the limits of analysis using counterfactual, we suggest the relevance of qualitative methods to capture the effects of LBO which are unobservable in database like changes in working conditions or in worker representation. Nevertheless, such a method still suffers from a large survivor bias and is not really possible to reach representative findings.

We provide some proposal to improve the quality of counterfactual in respect to the specificities of LBO funds, LBO deals type, firms which undergo LBO and national private equity market. We argue that the interest on these proposals for the study of the impact of LBO on employment for European countries present some specific institutional configurations, unequal development of national industries of private equity, and varying distribution of companies along their ownership status, corporate structure and size.

Finally, we highlight the need to treat the endogeneity problem in future empirical analysis in order to estimate the net effect of LBO on employment. Given the effect of the recent crisis on debt market, it seems that the debate is still open.

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